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Venture Capital Performance Determinants and Differences between Europe and Northern America

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Institutional investors have been pessimistic about the potential returns of venture capital funds in Europe during the past few years. This pessimism has made it difficult for European venture capital management firms to raise new funds. The problem has been worst for funds targeted towards early stage investments. According to published statistics, there seems to be a performance gap between Europe and Northern America. However, there is very little previous academic research that tries to explain the observed performance gap between Europe and America. This thesis tries to contribute this area of research by studying the determinants of venture capital returns and the differences between Europe and Northern America. The thesis employs two empirical research methods: a qualitative study with expert interviews and a quantitative study on performance determinants utilizing commercial databases.

The qualitative study indicates that the differences in the characteristics and modes of operation between the European and American venture capital companies are not as significant as the general perception in the industry indicates. However, there are some differences in the venture markets and in the way venture funds operate. American venture funds seem to utilize external advisory boards more and have closer relationships with big corporations. American VCs also get access to a larger deal flow due to the larger markets.

According to the quantitative model, the most important venture capital determinants are the structure of the fund (corporate venture vs. independent), the share B2B (business-to-business) investments, and the amount of syndication. Corporate ventures outperformed independent funds. In addition, syndication and investments in B2B (business-to-business) companies increased the fund performance

The aggregate performance of venture capital has been lower in Europe than in Northern America. However, the poorer performance of European venture funds is not due to their location but due to their other characteristics. Therefore, good returns are equally possible in Europe as in Northern America and the pessimism about the European venture capital performance as a whole is not justified. The variables attributable to most of the performance gap between Europe and Northern America are (effect on IRR difference between Europe and Northern America in brackets) syndication (6%) and corporate ventures (4%). In addition, the poor performance of European venture funds investing in America, lower share of IT and high-tech investments the higher amount of stage specialization, and lower amount of investments in B2B (business-to-business) companies decreased the aggregate performance of European venture capital.

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The views expressed in this study, and all the potentially remaining errors are the sole responsibility of the author.

Tom Lindström

Espoo, March 2006

1. INTRODUCTION

1.1. Background

Public interest towards the private equity industry has increased rapidly during the past few decades. There are several explanations for the rising attention. The amount of capital committed to private equity grew from 2 billion USD in 1980 to 140 billion USD in 2000, totaling over 800B USD over the last 25 years (Gottschalg et al., 2004). In addition, the growing importance of small to medium-sized business enterprises and high-technology startups has made an active venture capital market crucial for the success of every nation. In fact, the modern venture capital industry has grown to become a significant element of the corporate financial sector in virtually every major economy (Murray and Marriot, 1998). Moreover, the general interest in private equity is further boosted by the general argumentation that fund managers play an active and important strategic role in the companies they finance. From this perspective, it is alarming that, according to some academic papers (e.g. Hege et al., 2003; Gottschalg et al., 2004) and performance statistics from industry associations, the recent returns from European venture capital funds have been weak in comparison to the performance of both American venture capital funds and European public equity markets. The main problem is that private equity funds underperform even under conservative assumptions about the risk they carry (Gottschalg et al., 2004).

Consequently, the general perception of the institutional investors concerning the potential returns from European venture capital funds has been very pessimistic during the recent years (e.g. Coller Capital, 2005). This pessimism has made it very difficult for European venture capital management firms to raise new funds. The problem has been worst for funds targeted towards early stage investments. To make matters even worse, there is some indication that the aggregate performance of European private equity is likely to remain low in the near future. This is because funds that have been raised recently (1998-2000) exhibit preliminary indicators of performance that are significantly lower than what their

peers exhibited at the same stage (Gottschalg et al., 2004). This is mainly due to the bubble in the valuations in the stock market during the investment period of those funds.

In order to guarantee the future success of the European venture capital industry, it is important to analyze the reasons behind the observed performance gap between European and Northern American venture funds. There are various speculations about the reasons for low returns, such as a more fragmented market in Europe, the lack of entrepreneurial and venture capital skills and competencies (e.g. Hale, 2005), the learning curve effects in European venture capital industry (CPR Private Equity, 2003), the impact of the technology bubble, the J-curve effects and the other dynamics of the venture capital market etc. However, there is very limited research focusing deeply on explaining the returns from venture capital investments in Europe and in Northern America, a fact that is widely acknowledged in the academic world.

"The difference between developed and emerging VC markets is also mirrored by a widely asymmetric situation on the research side: while the overwhelming majority of research on venture capital investigates North America, there is a dearth of empirical research of the characteristics of European venture capital. The contracting, organization of VC firms, exit decisions etc., and the peculiarities of Europe as well as the features it has in common with the United States as the sole benchmark of a developed market are poorly understood. Rigorous comparative studies directly comparing the US to non-US VC industries are virtually absent."

Hege et al., 2003, p.1

"Given the volume of literature on venture capital, it may seem surprising that there are only a few papers analyzing the returns on private equity. The main obstacle to research has been the limited availability of data."

Ljungqvist and Richardson, 2003, p. 4

This thesis aims to fulfill the aforementioned void in the academic venture capital literature by studying the return determinants of Europe and Northern America (the U.S. and Canada) and comparing them with each other.

1.2. Research Problem and Objectives

This thesis studies the determinants of venture capital investment performance and aims to explain the observed difference in venture capital returns between Europe and Northern America. The ultimate goal of this paper is to find differences between the European and American venture capital environments that are able to explain, at least partially, the observed performance gap. After the main determinants of profitability have been identified, the study aims to give some practical suggestions in order to improve the profitability of the European venture funds.

The research question of the thesis is the following:

- "Why have the observed returns from venture capital investments been lower in Europe than in Northern America and how can they be improved?"

This question is broken down to several sub-questions:

Question	Objective
What are the most important determinants of the performance of a venture fund?	To identify the main determinants of venture fund performance and to evaluate their importance using quantitative analysis. The determinants are then used to build an econometric model explaining the performance of venture funds
What are the factors that explain the observed lower returns in Europe compared to Northern America?	To identify differences between European and American venture capital that contribute to the observed performance difference, and to evaluate their importance based on the constructed econometric model
How could the returns from European venture capital be improved?	To give practical suggestions to improve the venture capital performance in Europe
How does the potential for European venture capital look like?	To roughly evaluate the future of European venture funds based on the information obtained in the thesis

As a whole, this thesis attempts to provide an increased understanding of the returns from the venture capital investments in Europe and in Northern America, as well of the factors

that influence these returns, and gives managerial and policy recommendations to enable higher returns from European venture capital investments. The focus of this study is on early stage funds, but also later stage funds and buyout funds are analyzed.

1.3. Methodology

This thesis aims to answer the stated research question by employing three complementary research methods:

1. Literature review
2. Qualitative study
3. Quantitative study

First, this thesis reviews the most relevant academic literature about private equity. The main focus is on papers studying the determinants of venture capital performance and fund raising. The purpose of the literature study is to give an overall picture of the academic research in the domain of the research question and to obtain a theoretical framework on which the empirical part of the thesis can be built. The literature review is also utilized to identify the best and most recent methods for the quantitative part of this thesis. In addition, related academic research offers some hypotheses and candidates for the variables explaining the performance difference between Europe and Northern America. The reviewed materials include articles in scientific journals, textbooks, publications from venture capital industry associations, and other academic materials.

The empirical part of this thesis starts with an interview study based on several interviews with institutional investors, venture fund managers, and other industry experts. The objective of these interviews is to obtain a better understanding of how the venture capital companies are managed, what kind of criteria they use in their investment decisions, and how do they interact with their portfolio companies. By interviewing experts in the field of venture capital, it is possible to ensure that all relevant theories and hypotheses for the determinants of venture capital returns have been identified in the literature review part of

this thesis. Otherwise, there would be a risk that the academic literature on the subject has not identified all relevant performance determinants. This might be true due to two reasons. Firstly, there are currently surprisingly few academic papers concentrating purely on the determinants of venture capital returns. Secondly, the academic research often concentrates only on hypotheses that can be studied with quantitative methods. This might leave some important determinants, which cannot be studied quantitatively with little or no attention in the academic papers.

The most important part of this thesis is the quantitative study, which aims to building an econometric model about the performance of the venture capital funds. The findings and insights from the previous research methods are used as inputs in the form of hypotheses and candidates for the explaining variables. The objective of the model is to explain, at least partially, the observed performance gap between the two market areas by finding statistically significant explaining variables. The research study employs secondary data collected from Private Equity Intelligence and Venture Economics (e.g. Diller and Kaserer, 2005; Kaplan and Schoar, 2005). The collected data is analyzed statistically using the latest econometric methods. Especially the methodology concerning the measurement of risk and return in private equity has developed rapidly during the recent years (e.g. Cochrane, 2005; Diller and Kaserer, 2005). After the main determinants of profitability have been identified, the study aims to give some practical suggestions in order to improve the profitability of the European venture capital funds.

1.4. Structure of the Thesis

This thesis is structured in six sections:

1. Introduction
2. Literature review
3. Qualitative study
4. Quantitative study

5. Reliability and validity of the results

6. Conclusions

The literature review in the second section analyzes the most relevant academic articles, textbooks, industry association publications, and other materials. The objective of this section is to summarize the main findings from academic research already done in this field. This offers important background information about the subject and creates a suitable ground for the theoretical framework, which is further developed later in the thesis. The literature review is also utilized in the subsequent sections of this thesis as a source of hypotheses and general perceptions.

The third section consists of a qualitative study about the private equity markets. This section summarizes the main findings from interviews with venture capital experts. This information is utilized to complete the overall view obtained from the literature review to ensure that all relevant aspects and issues are identified and understood correctly.

The fourth section of this thesis includes a quantitative study about the determinants of venture capital performance. This section is divided into two separate parts. The first part combines the databases of two commercial data vendors: Venture Economics and Private Equity Intelligence. The objective of the first part is to construct an econometric model explaining the observed performance difference between European and Northern American private equity funds. The second part studies the venture capital fund characteristics in Europe and Northern America utilizing the Venture Economics database. The objective is to compare the operation modes in the two market areas and look for significant differences. Special attention is given to those characteristics that were identified as the main determinants of private equity performance in the first part of this section. The quantitative study offers statistically analyzed empirical evidence for the hypotheses obtained from the literature review and the qualitative study.

The validity and reliability of the results and findings presented in the thesis are evaluated in the fifth section. The purpose is to critically analyze the possible problems,

inconsistencies and shortcomings of the study in order to ensure that the obtained results are not interpreted erroneously.

The sixth section includes a summary of the main findings of the study coupled with practical recommendations to improve the profitability of the European venture capital investments.

1.5. Key Concepts and Definitions

1.5.1. Private Equity and Venture Capital

In this study the terms "private equity" and "venture capital" are used consistent with the American understanding, which makes a clear difference between the two terms. Below are the exact definitions used by Venture Economics (Figure 1).

Private Equity

"Ventures Economics uses the term to describe the universe of all venture investing, buyout investing and mezzanine investing. Fund of fund investing and secondaries are also included in this broadest term. VE is not using the term to include angel investors or business angels, real estate investments or other investing scenarios outside of the public market."

Venture Economics, 2006

Venture Capital

"Venture Economics uses the term to describe the universe of venture investing (see Private Equity). It does not include buyout investing, mezzanine investing, fund of fund investing or secondaries. Angel investors or business angels would also not be included in the definition."

Venture Economics, 2006

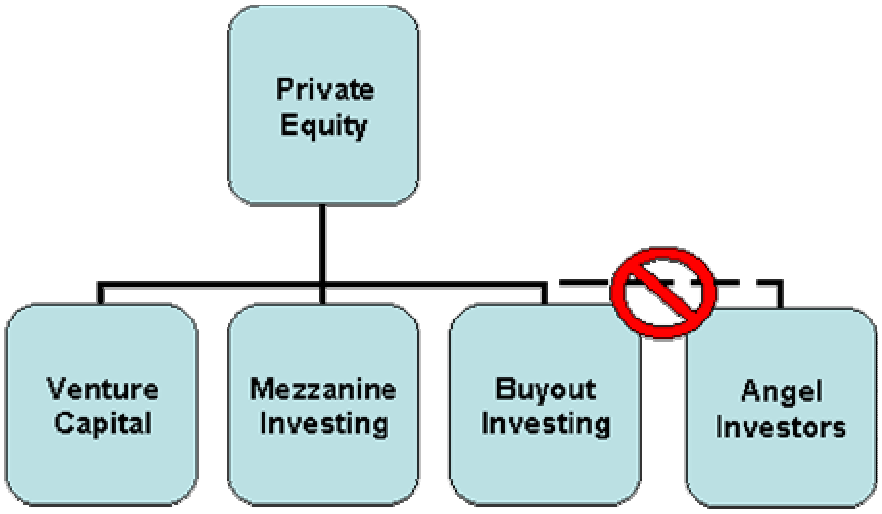

Figure 1 Definitions of private equity and venture capital

1.5.2. Venture Capital Fund Categories

Independent fund

"One in which the main source of fundraising is from third parties."

EVCA (European Venture Capital Association), 2006

Captive fund

"A fund in which the main shareholder of the management company contributes most of the capital, i.e. where parent organisation allocates money to a captive fund from its own internal sources and reinvests realised capital gains into the fund."

EVCA, 2006

Corporate venturing

"There is no single definition of corporate venturing that seems to satisfy all parties, so we distinguish indirect corporate venturing – in which a corporate invests directly in a fund managed by an independent venture capitalist – from a direct corporate venturing program, in which a corporate invests directly by buying a minority stake in a smaller, unquoted company."

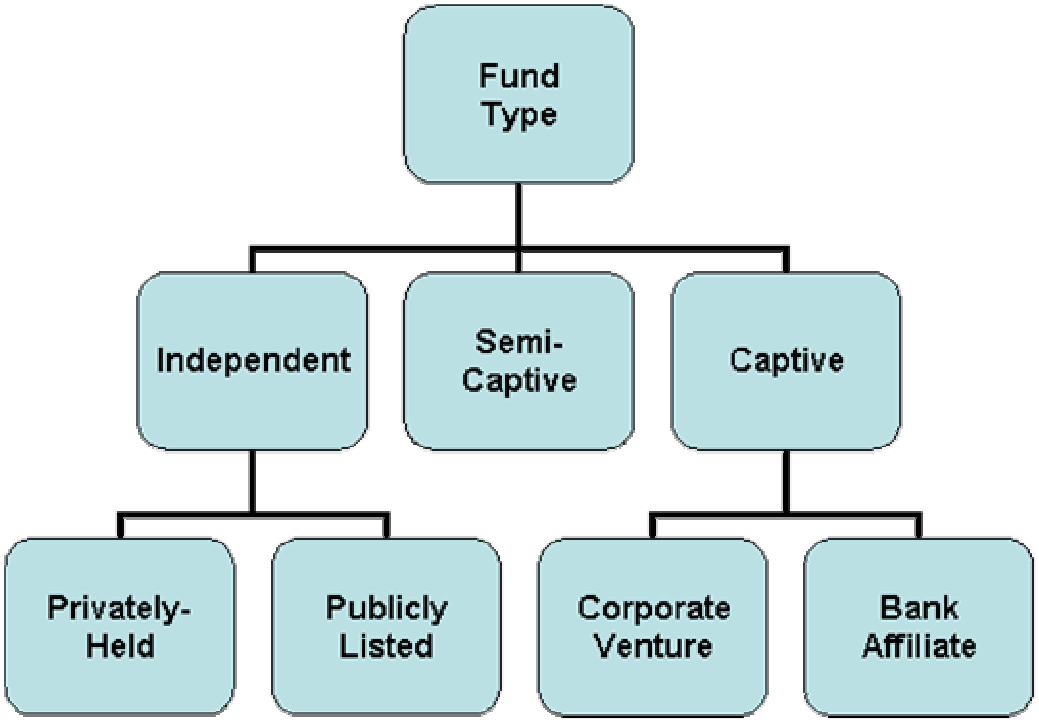

Figure 2 Definitions of fund types

1.5.3. Stages

In the thesis the private equity investment stages are categorized consistently with Venture Economics (Figure 3).

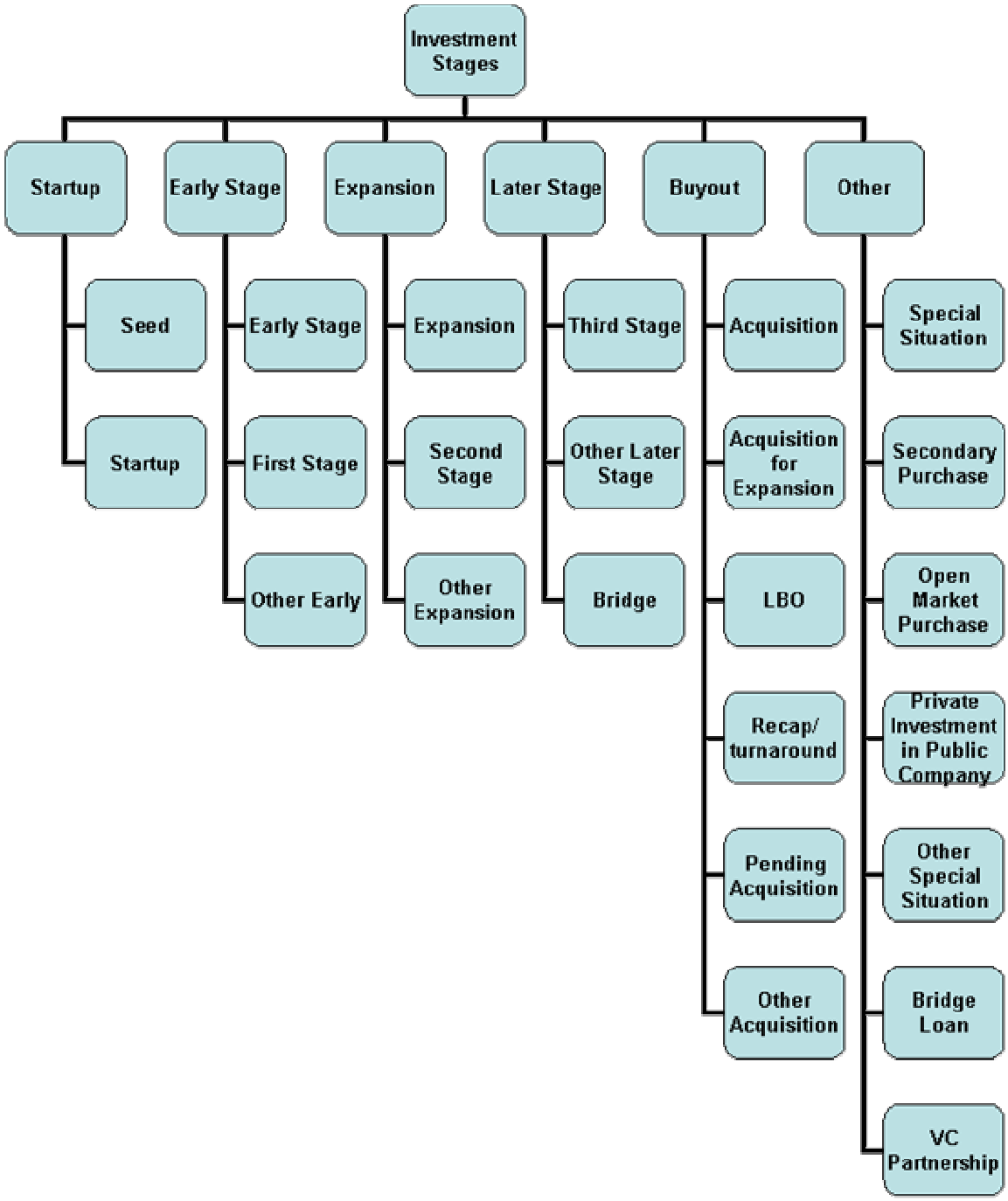

Figure 3 Private equity investment stage categorization by Venture Economics

1.5.4. Capital Commitment, Drawdown and Contributed Capital

Commitment

"A limited partner's obligation to provide a certain amount of capital to a private equity fund when the general partner asks for capital."

EVCA, 2006

Drawdown

"When investors commit themselves to back a private equity fund, all the funding may not be needed at once. Some is used as drawn down later. The amount that is drawn down is defined as contributed capital."

EVCA, 2006

Contributed capital

"Contributed capital represents the portion of capital that was initially raised (committed by investors) which has been drawn down in a private equity fund."

EVCA, 2006

1.5.5. Exit Types

The exit types of private equity investments are categorized into five categories, consistent with Cumming and MacIntosh (2003, p. 514)

1. IPO: Selling part of the company to public markets
2. Trade sale: Selling the entire firm to another firm, which is typically a strategic acquirer
3. Secondary sale: Selling the entire firm to another private equity firm
4. Buyback: Selling the VC's shares back to the entrepreneurs
5. Write-off: Typically involves the failure of the entrepreneurial firm, although the VC may continue to hold shares in a non-viable or barely profitable enterprise. A partial write-off consists of a write-down of the value of the assets on the firm's balance sheet.

1.5.6. Limited Partners and General Partners

The terms "limited partner" (LP) and "general partner" GP are used in this thesis consistently with the definitions by EVCA (European Venture Capital Association). In short, limited partners (LPs) are investors in private equity funds and general partners (GPs) are private equity fund managers.

"The legal structure used by most venture and private equity funds. The partnership is usually a fixed-life investment vehicle, and consists of a general partner (the management firm, which has unlimited liability) and limited partners (the investors, who have limited liability and are not involved with the day-to-day operations). The general partner receives a management fee and a percentage of the profits. The limited partners receive income, capital gains, and tax benefits. The general partner (management firm) manages the partnership using policy laid down in a Partnership Agreement. The agreement also covers, terms, fees, structures and other items agreed between the limited partners and the general partner."

EVCA (European Venture Capital Association)

1.5.7. Vintage Year

The term "vintage year" is used consistently with Venture Economics. Every private equity fund has one, and only one, vintage year which indicates the year of the fund's formation and its first takedown of capital.

1.6. Abbreviations

Below is a list and explanation of the most commonly used abbreviations in this thesis:

AIM = Alternative Investment Market

B2B = Business to Business company

B2C = Business to Consumer company

B2G = Business to Government company

EVCA = European Venture Capital Association

GP = General Partner

IPO = Initial Public Offering

IRR = Internal Rate of Return

LBO = Leveraged buyout

LP = Limited Partner

MBI = Management buyin

MBO = Management buyout

NAV = Net Asset Value

NVCA = National Venture Capital Association

OEM = Original Equipment Manufacturer

SBIC = Small Business Investment Companies

VE = Venture Economics

2. LITERATURE REVIEW

In general, private equity refers to all equities that are not publicly listed in any stock market. Private equity, and especially venture capital, is a growing industry that is an important part of the overall financing sector. A well-functioning and active venture capital industry is crucial for the success of the overall economy as it supports the growth and development of new innovative startup firms by offering financing and advice. In fact, venture capital has become an important intermediary in financial markets, providing capital to firms that might otherwise have difficulty attracting financing. These firms are typically small and young, plagued by high levels of uncertainty and large differences between what entrepreneurs and investors know. Moreover, these firms typically possess few tangible assets and operate in markets that change very rapidly. Venture capital organizations finance these high-risk, potential high-reward projects, purchasing equity or equity-linked stakes while the firms are still privately held (Gompers and Lerner, 2001, p. 1).

To illustrate the importance of the venture capital industry, it can be noted that during the last three decades (1970-2000), American venture capitalists have invested $273.3 billion into new ventures. These venture firms now employ 7.6 million people and generate over $1.3 trillion in annual sales revenue, representing 5.9% and 13.1% of the respective U.S. national totals. In addition, on average every $36,000 in VC investment creates one new job (Megginson, 2004, p. 4). A more detailed description of the history of the venture capital industry is in Appendix 1: History of Venture Capital.

Despite the important role of private equity in financing and fostering innovative firms and in reallocating capital to more productive sectors of the economy, relatively little is known about the key characteristics of private equity as an asset class: liquidity, risk and return. Relative to other asset classes, private equity investments are illiquid, also in the sense that there is no active secondary market for such investments. Investors have little control over how the capital is invested and the investment profile covers a long horizon. (Ljungqvist and Richardson, 2003, p. 1)

Private equity funds are typically structured as limited partnerships in which a specialized private equity firm serves as the general partner (GP) and institutional investors or high-net-worth individuals provide the majority of capital and act as limited partners (LP) (Gottschalg et al., 2004, p.33). The share of capital provided by the general partners is very limited, usually around one percent (Brouwer and Hedrix, 1998, p. 335).

Private equity funds may be either closed-end funds with a usual finite life of 10 or 12 years or open-end, 'evergreen' funds with an indefinite lifetime. The former is the prevailing structure, especially in the U.S. At the time of the fund's inception, LPs commit by a percentage of total fund size. However, despite the commitment, no actual financial transactions are done at this point. During the first years of the fund's life, the GP undertakes private equity investments on behalf of the fund and makes capital calls (or take-downs) to LPs according to their committed share of the fund to finance the investments. Typically, within two weeks LPs have to provide the corresponding cash. The total amount of take-downs can sometimes exceed the amount agreed at the fund's birth, but more often the fund does not invest all the capital committed (Gottschalg et al., 2004, p.33).

The GP usually takes a management fee for its services, which usually amounts to one to three percent of the fund's size. According to Sahlman (1990) over half of venture capital funds call for an annual management fee equal to 2.5% of committed capital. The management fee is fixed in the sense that it does not depend on the performance of the fund. In addition, the GP usually takes its share of the potential profits of the fund. The performance compensation is usually defined so that the GP receives a share (usually 20 percent) of the returns that exceed a certain hurdle rate. This serves as a motivator for the GPs as only successful funds generate good returns to the GPs. The performance compensation is often referred to as carried interest.

Many private equity firms manage several finite limited liability partnerships funds concurrently. In the industry it is typical to raise a new fund three to five years after the

closing of the fund raising process for the previous fund (Gottschalg et al., 2004, p.34; Sahlman, 1990).

There have been some academic studies on the performance determinants of venture capital. The findings and conclusions of these studies will be reviewed later in this text. In general it can be said that explaining, let alone predicting, venture capital performance is extremely difficult. Every investment of a VC fund in a portfolio company is unique and its outcome is unknown to everyone at the time of the initial investment. The variance in investment outcomes is huge, ranging from bankruptcy to world-known success stories. In addition, one VC fund can only invest in a limited number of companies, which makes the return of a single VC fund highly volatile.

As the portfolio companies' success is only partially dependent on the actions of the VC fund, it is often stated that the "luck" is the most important performance determinant in venture capital. This study fully acknowledges the fact that VC returns are often a sum of small things and unexpected outcomes, meaning that a large part of the return variation can never be explained by any quantitative (or even qualitative) model. However, this does not mean that one should give up and account success just on "luck".

There are various matters that may have an impact on the return of a single venture capital fund. In this study the different determinants have been classified into five categories (Figure 4):

1. Portfolio company related performance determinants
2. Investment characteristics related performance determinants
3. Venture fund related performance determinants
4. Funding source related performance determinant
5. Economic environment related performance determinants

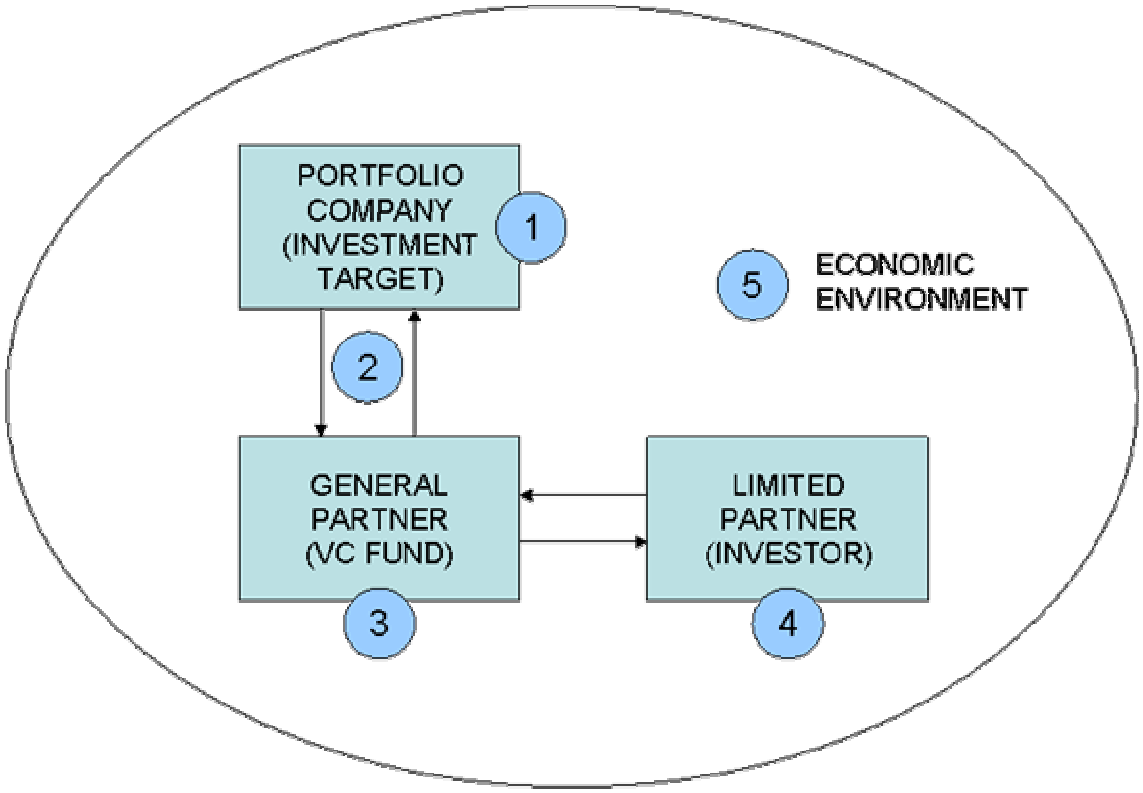

Figure 4 Categorization of the venture capital performance determinants

2.1. Measuring Performance in Private Equity

Private equity, as the name suggests, is largely exempt from public disclosure requirements. Therefore, we have only a limited understanding of private equity returns, capital flows, and their interrelation (Kaplan, 2005, p. 2). This severely hampers the research on private equity as it is often difficult or even impossible to test one's hypotheses with statistical methods. However, there are several organizations, both private and public, that gather information on private equity deals. The problem is that none of these information sources cover even nearly all of the private equity deals. Moreover, the data in these archives is often both erroneous and biased. Thus, the most difficult stream of research in the field of private equity is the one that concentrates on measuring returns.

There are several problems in the measurement of private equity returns. The severity of these problems depends on the research method and source of data. Unfortunately, there is

no way to tackle all of these issues at the same time. The advantages and disadvantages of different research methods are further elaborated in section 4.1.1. The most important problems are:

1. missing data
2. erroneous data
3. selection bias (successful funds report more often than unsuccessful)
4. small sample size
5. return values must be approximated in the absence of exact return data
6. returns of illiquid investments cannot be measured accurately prior to liquidation
7. taking into consideration the time value of money is often problematic as the exact timing of the money transactions are unknown

There are a number of ways to measure the profitability of private equity investments. Venture capital associations and the Association for Investment Management and Research (AIMR) deem the IRR (Internal Rate of Return) to be the most appropriate return measure for venture capital and private equity funds (Meyer and Mathonet, 2005, p.166).

IRR (Internal Rate of Return)

IRR is the rate of return that would make the net present value of all the monetary transactions during the fund's lifetime equal to zero. If the fund is not yet liquidated, the last observed valuation is considered to be the final value of the fund and is treated as if it could be distributed to the LPs immediately. The period over which the net present value is calculated covers the period of funding (takedowns) towards the calculation date (Brouwer and Hendrix, 1998, p. 340). The calculation of IRR is relatively simple and there is no need to determine a fixed discounting factor in order to compare the returns of different funds. Mathematically, it is expressed as (Meyer and Mathonet, 2005):

$$\sum_{i=0}^{n} \frac{CF_i}{(1+IRR_n)^i} + \frac{NAV_n}{(1+IRR_n)^n} = 0 ,$$

where CF_i is the cash flow at the end of time period *i* between the fund and the investors, *n* is the number of periods, NAV_n is the latest NAV of the fund and IRR_n is the interim internal rate of return at time *n*.

However, the use of IRR to measure venture capital performance has also several problems:

1. IRR calculations assume that early distributions can be reinvested at the fund's IRR. This will tend to attenuate the differences (both negative and positive) in relative performance. (Ljungqvist and Richardson, 2003, p. 19; Gottschalg et al., 2004, p.9)

2. IRR calculations assume one discount rate for all cash flows. One can reasonably argue that outflows (i.e., investments should be discounted at a different, and lower, rate than inflows. If so, IRRs will tend to overstate the performance of the fund relative to the true risk profile of the cash flows. (Ljungqvist and Richardson, 2003, p. 19; Gottschalg et al., 2004, p.9)

3. The comparison of one fund's IRR with an average IRR benchmark cannot account for risk. (Woodward and Hall, 2003, p.14)

4. The IRR benchmarks are stale because they are computed from stale valuations. The IRRs are computed from VC estimates of value, which lag market-wide changes by roughly 6 months. (Woodward and Hall, 2003, p.14)

5. The computation of internal rates of return is inconsistent across portfolios holding still-private companies because there is no generally accepted method for estimating the remaining value of these companies or for computing partial internal rates. Practice varies with respect to this key element. (Woodward and Hall, 2003, p.14)

6. Current available IRR benchmarks – vintage year averages – are biased upwards because they miss data from less successful investments. (Woodward and Hall, 2003, p.14)

7. With the exception of pooled-cash-flow IRRs, current benchmarks are not value-weighted. Tiny funds carry just as much weight in the average as do big funds. (Woodward and Hall, 2003, p.14)

8. The average IRRs are not time-weighted. Thus, small profits (losses) generated in a short time result in very high (low) IRRs that may bias the calculated average return figures.

9. The profile of investments in the industry allows GPs to manipulate their IRR by strategically reporting their residual values and timing their cash flows. (Gottschalg et al., 2004, p.9)

Other Measures

Due to the shortcoming of the IRR many other performance measures can also be used to measure private equity profitability:

1. Multiple, the total value to paid-in ratio (TVPI) (Meyer and Mathonet, 2005):

$$Multiple_n = \frac{\sum_{i=0}^{n} CIF_i + NAV_n}{\sum_{i=0}^{n} COF_i},$$

   where CIF_i is the cash inflow at the end of time period *i* from the fund to the investors, COF_i is the cash outflow at the end of time period *i* from the investors to the fund, *n* is the number of periods and NAV_n is the latest NAV of the fund.

2. The distribution to paid-in ratio (DPI) is a measure of the cumulative investment returned relative to invested capital (Meyer and Mathonet, 2005):

$$DPI_n = \frac{\sum_{i=0}^{n} CIF_i}{\sum_{i=0}^{n} COF_i}$$

3. The residual value to paid-in (RVPI) is a measure of how much of the investors' invested capital is still tied up in the equity of the fund (Meyer and Mathonet, 2005):

$$RVPI_n = \frac{NAV_n}{\sum_{i=o}^{n} COF_i}$$

4. The public market equivalent (PME) measures the net present value of all cash flows to an investor in a fund net of fees, where discounting uses the ex post total return on the S&P500 or some other broad stock market index. Using PME as a performance measure is equivalent to assuming that all private equity and venture capital investments have a CAPM beta of one. (Jones and Rhodes-Kropf, 2004, p. 24)

The LPs' returns to private equity investments are usually reported net of all fees paid to the GP. However, there are also other costs related to private equity investments that are not taken into account in these return figures. Some of these fees are present also when investing in public equities or other securities, but the total effect of these costs is, on average, considerably larger in private equity investments. The costs that are usually not included in private equity return figures include:

1. The LPs' costs related to selecting and managing the venture capital investments
2. Fees paid to outside consultants or gate-keepers (Gottschalg et al., 2004, p.28)
3. Penalty charges paid in case of premature liquidation by the LP (Gottschalg et al., 2004, p.28)

4. Direct and indirect costs of selling the distributions done in non-cash forms (sometimes after a certain lock-up period) (Gottschalg et al., 2004, p.28)

Due to wide public interest in the performance of venture capital, many academics and institutions have tried to measure the returns with many different methods. However, these different methods have come up with different return figures resulting from the lack of reliable and comprehensive databases. The large variety in the observed return figures goes to show how difficult it is to measure the performance of venture capital.

A widely acknowledged view is that investors require a higher return on venture investment compared to public equity investments. There are many reasons for the higher required return rate for venture investments:

1. Informational difficulties (Manigart et al. 2002, p. 3)
2. Illiquidity (Manigart et al. 2002, p. 3)
3. Large minimum investments size (Manigart et al. 2002, p. 3)
4. High business risk in VC settings (Manigart et al. 2002, p. 3)
5. Higher administrative costs

2.2. Portfolio Company Related Performance Determinants

Portfolio company related performance determinants refer to characteristics of the investment target companies that may affect the return of the fund. In this thesis only those variables that are known, or at least can be estimated, at the time of the investment are examined.

2.2.1. Investment Stage

It is a widely accepted fact that the investment stage of the fund's portfolio companies has an effect on the returns. However, there is no clear evidence that one particular investment

stage would consistently offer better returns compared to the others. Furthermore, the lucrativeness of a stage may depend on the fund's location and other characteristics.

The industry's general perception is that early stage investments are riskier, and therefore a higher returns rate is required of them (e.g. Megginson, 2004, p. 12; Murray et al. 1998, p. 948). Still, the likelihood of a successful exit is lower for an investment in early stage company as much of the technological risk still needs to be resolved. (Hege et al., 2003, p.14). Thus,

"One principle of venture capital funding never changes: the earlier the development stage of the portfolio company, the higher must be the expected return on the venture capitalist's investment. Professional venture capitalists typically demand compound annual investment returns in excess of 50 percent on start-up investments, but are often willing to accept returns of 20-30 percent per year on later-stage deals, since the risk of the investment is far lower in more established portfolio companies."

Megginson, 2004, p. 12

However, according to several studies, the early stage investments have offered lower returns compared to other stages, in spite of the higher required return rate (e.g. Cumming and Walz, 2004, p. 19, Murray et al., 1998, p. 954). According to the general perception in the industry, early stage investments have performed particularly poorly in Europe.

"European performance statistics indicate that early-stage investments generate the lowest level of returns of any stage of venture capital finance with pooled IRRs of 5.7% compared to 17.6% for MBO funds (Venture Economics and Bannock Consulting, 1997) This raises the question as to whether successful investment in NTBFs[1] is a peculiarly American phenomenon.

…

[1] NTBF = New Technology-based firm

Fund performance figures have indicated unequivocally that the historic returns to early-stage investments have been dramatically poorer than those allocated to later-stage, and less risky, alternatives – particularly MBO/MBI deals."

Murray et al., 1998, p. 948 and 954

Investing (profitably) in early stages can be difficult due to several reasons:

1. Valuation of companies is difficult as it is usually based on very uncertain growth scenarios, rather than on current cash flows or capital.

2. Selecting the right companies to invest in is difficult as the companies usually do not have a ready product or technology (let alone a wide customer base and a established position in the markets)

3. Investment amounts in early stage are smaller compared to later stages. Therefore, a lot higher multiple is required for the investment to cover for the governance and management costs (e.g. Murray et al., 1998, p. 955).

One explanation for the low returns of early stage investments is also the claim that early stage funds are, on average, younger and less experienced than other funds (e.g. Lockett et al., 2002, p. 1016). Despite the fact that there is no direct empirical evidence that early stage funds would be younger, this sounds very logical: new funds are able to collect less money and therefore have to invest in early stage companies that require, on average, less capital. Cumming and MacIntosh (2003, p. 518), Gompers (1996), and Gompers and Lerner (1999b) also state that early stage funds have a higher tendency to grandstand, which may lower the average returns of the investments. This brings us to proposition 1 that early stage investments yield lower returns.

Proposition 1 Early stage investments yield lower returns compared to later stages

2.2.2. Industry

Most venture capital funds have some kind of an industry focus. In fact, private equity funds tend to specialize in one industry much more than the average public equity funds (Ljungqvist and Richardson, 2003, p. 23). However, buyout and venture funds do not differ in the distribution of either the fraction of companies or the fraction of capital that is invested in a single, dominant industry (Ljungqvist and Richardson, 2003, p. 23).

According to the industry's general perception, investments in high-tech and medical companies provide, on average, higher returns compared to other investments. This view is confirmed by a survey for VC firms, where the respondents said that high technology investments have higher variability but provide greater returns (Lockett et al, 2002, p. 1022, Table 7). According to Cochrane (2005), there are more early and highly profitable IPOs in the information and retail industries, but the failure rates are about the same across all industries.

Investments in high-tech, biotech and medical sectors are also easier to exit:

"There is high cross-sectional variation in the probability of an exit across different industries. The high-tech, biotech, and medical sectors had a higher probability of successful exit relative to new ventures operating in other sectors."

Gottschalg et al., 2004

"Biotech and internet firms have the fastest IPO exits. Internet firms are also the fastest to liquidate, while biotech firms are however the slowest."

Giot and Schwienbacher, 2005, p.1

One important thing to bear in mind when comparing the profitability of investments in different sectors is that only a higher market risk can explain a permanent profitability difference across industries (if the assumptions of financial theory and free competition are assumed to hold). Nonetheless, this does not rule out the possibility of temporary prosperous times in certain industries. For example, technology investments exited during the "new economy hype" were, on average, extremely profitable, whereas investments

exited just after the stock market crash were much less profitable. In other words, even if a large share of venture fund performance returns could be explained by their investment distribution across industries, this does not mean that it would be of any use in predicting future returns. Therefore, the view of the profitability of the industry sectors varies across time.

All in all, the general perception is that investments in high-tech, bio, and medical sectors yield above average returns.

Proposition 2 Investments in high-tech, bio, and medical sectors yield higher returns

2.3. Venture Investment Characteristics Related Performance Determinants

Venture investment characteristics related performance determinants refer to the characteristics of the investments and its contractual implementation.

2.3.1. Contract Type

Venture capital investment contracts are distinguished by unquestionably their almost exclusive reliance on convertible securities (particularly convertible stock) as the investment vehicle of choice (Megginson, 2004, p. 18). Another characteristic of venture capital investment contracts is the extensive and very sophisticated use of positive and negative covenants. These are contract clauses that mandate certain things that the portfolio firm's managers must do (positive covenants) and must not do (negative covenants).

There are three important reasons why venture funds usually use either convertible debt or convertible preferred stock instead of common stock or non-convertible preferred stock of debt:

1. Corporate law requires that all shareholders be treated equally; venture capitalists would only be able to exercise effective voting control with common stock if they were to purchase a majority of a firm's common shares, and to purchase these at the same price as other investors. Since convertible debt or preferred stock is a separate class of security from common stock, contract terms and covenants specific to that issue can be negotiated. (Megginson, 2004, p. 18)

2. The use of convertible stocks makes the VC's claim senior to that of the entrepreneur and other existing owners. Since this forces the entrepreneur to bear most of the firm's business risk, the senior status of convertible stock or debt provides the maximum feasible protection for the venture group's investment. (Megginson, 2004, p. 18)

3. In addition to stage financing, many VCs use contractual arrangements that guarantee the venture capitalist explicit intervention rights, also regarding exit issues. These rights allow the venture capitalist to force an exit. Thus, they can avoid being locked into holding the shares for an extended period of time should a disagreement with the entrepreneur occur. (Giot and Schwienbacher, 2005, p.1)

Some of the covenants used in venture capital investments are found in many standard bond and loan financing contracts. These covenants may specify the maximum acceptable leverage and dividend payout ratios, require the firm to carry certain types of business insurance, and/or restrict the firm's ability to acquire other firms or sell assets without prior investor approval (Megginson, 2004, p. 16).

However, there are also a large number of covenants typical to only venture capital investments (Megginson, 2004, p. 16-17):

1. Ownership right agreements, which not only specify how equity ownership will be apportioned after the initial venture investment is made, but also specify that the venture capital investment group will be allocated a certain number of seats on the firm's board of directors, and will enjoy pre-specified voting rights.

2. Ratchet provisions protect the venture group's ownership rights in the event that the firm is forced to sell new equity under duress. Generally, these provisions ensure that the venture capital group's share values will be adjusted so that the penalty of selling low-priced new stock is borne more by the entrepreneur than by the venture capital funds.

3. Registration, participation, and repurchase rights preserve attractive exit opportunities for venture capital investors.

4. Stock option plans are typically provided for current and prospective managers.

Most convertible securities are converted into common stock before venture-backed companies execute initial public offerings, partly to present an uncluttered balance sheet to prospective investors and partly to lock in common equity stakes (and capital gains) before inviting in new stockholders (Megginson, 2004, p. 19).

Even though the investment contract type rarely has an influence on the success of the company, it may affect the VC funds returns in case of failures. According to Hege et al. (2003, p.14) the use of convertibles reduces liquidation costs significantly. Furthermore, Cumming and Walz (2004, p. 4) concluded in their study that investments in which convertible securities are used do yield significantly higher IRRs for the VCs.

There seems to be a clear difference in the way VCs utilize convertible securities in Europe and in Northern America. Venture capitalists in the United States are much more assertive in reserving contingent control rights: they use more systemically financial instruments that convey residual control in case of poor performance, namely convertible securities, and they activate contingent control more frequently, as measured by the replacement of entrepreneurs and the termination of project (Hege et al. 2003, p.4). In addition, there seems to be a significant difference also in the impact of convertible securities between Europe and the U.S.; convertible securities seem to have a negative impact on costs only in the U.S. A possible interpretation for this difference is that the efficient use of contingent securities requires skills which take time to acquire (Hege et al. 2003, p.14). It may even be

that the performance gap between venture returns in Northern America and Europe may be attributable in parts to differences in the contractual relationship between venture capitalists and startup entrepreneurs (Hege et al. 2003, p.1).

This brings us to the proposition 3:

Proposition 3 Investments in which convertible securities are used yield higher returns

2.3.2. Staged Financing

Investing money in small and growing companies is always risky since the future success is never certain. A common method to reduce the risks inherent in investments is to use staged financing. This means that not all of the funding the developing company needs will be given at the time of the first investment. This allows the general partner to cut further funding and withdraw from the company if the development of the investment is not satisfactory. It also strengthens the relative negation power of the general partner in issues concerning the development of the company.

Hege et al. (2003) have studied the influence of staging to venture investment performance. They used the hypothesis that a higher frequency of financing rounds should translate into a more effective use of the abandonment decision, and hence to a higher value (Hege et al., 2003, p.5). However, the result of the empirical study showed that the coefficient of number of stages was significantly negative. This is at odds with standard manager-shareholder agency theory (Hege et al. 2003, p.13).

Even though the manager-shareholder agency theory views that a large number of stages should improve performance, there are also problems with short stages. When the portfolio company gets only small amounts of capital at a time, the focus may shift to short-term performance. This will hamper the long-term development of the company. In addition, the

frequent financing rounds consume a lot of time and may also negatively affect the entrepreneur's motivation.

Proposition 4 Short financing stages hamper the long-term development of the company and lead to lower returns

2.3.3. Syndication

Many VC firms have specialized in one geographical area, certain type of companies, technology, or some particular development operation (e.g. internationalization). This means that in many cases the best possible development of one venture-backed company calls for capabilities and experience of several VC firms. In this kind of situations it seems beneficial to use syndication.

There are also several other reasons to syndicate investments. Leading motives for venture capital syndication mentioned in the literature are: (Hege et al. 2003, p.5)

1. risk diversification
2. improved screening by securing a second opinion in the due diligence process
3. the commitment of a corporate investor to avoid hold-up problems, to secure a distribution channel or a potentially important customer pool
4. certification and reputation gains when syndicating with more experienced venture capitalists
5. sharing of information and pooling of contacts in the exit phase

When several VC firms invest in the same company, one firm is usually the lead investor and the others are syndicate partners (or co-leaders). The lead investor normally gets the largest share of the company and has the most influence on decisions concerning the

company. This means more work and costs but also a higher upside and downside potential.

Syndication also enables the operation of a larger portfolio, since syndication of investments offers a mechanism for venture capitalists to reduce the time required to manage an individual venture by sharing the workload with syndicate partners (Jääskeläinen et al., 2006). In addition, syndication enables a wider industry focus because the syndicate partners may have expertise outside the funds focus industry. This is supported by empirical evidence by De Clercq and Dimov (2004).

In general, it is considered that due to the aforementioned benefits, more syndication leads to higher performance. This view is also supported by empirical evidence showing significantly higher IRRs for syndicated investments (Cumming, Walz, 2004, p. 4). In addition, Hochberg et al. (2005) find evidence that VC firms that enjoy more influential network positions have significantly better fund performance, as measured by the proportion of investments that are successfully exited through an IPO or trade sale. Similarly, the portfolio companies of better-networked VC firms are significantly more likely to survive to subsequent financing and to eventual exit. However, Hege et al. (2003, p.13) found that more syndication has a positive impact on returns in Europe but a negative impact in the U.S. Since there is no logical explanation for the negative impact on performance, it is possible that it is just a statistical coincidence.

All in all, the general perception is that syndication is profitable and increases fund returns.

Proposition 5 Syndicated investments provide above average returns

2.3.4. Investment Size

The size of the investment round is always negotiated between the VC fund(s) and the company. In exchange for the money invested in the firm the VC fund gets a share of the

company. This proportion depends on the agreed valuation of the company and, of course, on the amount of money invested.

Venture capital firms do not usually want to make too small investments. This is due to the fact that their return potential depends on their share of the company, whereas their management costs are relatively fixed and do not depend on the fund's share of the company. Therefore, it is suggested that large investments decrease relative costs and yield higher returns.

The total investment round size depends on the company and its needs for financing. The amount is usually calculated so that it will be enough to finance some particular development phase of the company. Since all companies and their needs are unique, it is impossible to determine an optimal amount of investment. However, there is a perception in the venture capital industry that European VC funds tend to underfund their portfolio companies. This means that the companies receive less money than they would need which severely hampers and slows down the companies' development. Thus, underfunding is assumed to decrease venture capital performance.

On the other hand, there are certainly a number of cases, where a venture-backed company has received more money than it actually would have needed at that time of its development. Most of these cases happened during the "new economy hype". Giving too much money to a company may lead to excessive diversification or inefficient money usage, which decreases the expected return on the investment.

"A casual observation suggests that as fund sizes have grown in recent years, venture capital funds have looked to do larger and larger investments. Entrepreneurs talk of VCs who pushed them to take millions more than they set out to raise."

(Jones and Rhodes-Kropf, 2004, p. 35)

This brings us to the conclusion that either too big or too small investments compared to the needs of the portfolio company in question decrease returns. On the other hand, if the

investment size is optimal, large investments yield higher returns compared to small investments.

Proposition 6 Overfunding and underfunding decreases returns

Proposition 7 Large investments decrease relative costs and yield higher returns

2.3.5. Investment Length

The goal of venture capital investments is usually to finance the growth or other development phase of the company and then exit the company with a higher valuation (Sahlman, 1990). The faster the exit can be done, the higher is the IRR for the investment (assuming same valuation multiple). Thus, VC companies usually aim to exit the investment as soon as the company is ready to be sold, or alternatively when the company is considered to be a failure.

The time needed to develop the company depends on various reasons. The stage of the company during the first investment is one of the most important investment length determinants, since early stage companies are smaller and need more time to develop. Early stage ventures are estimated to take on average 6.16 years to mature, expansion ventures 5.10 years and acquisitions or MBO/MBIs 4.74 years (Manigart et al. 2002, p. 12).

A few academics have studied the effect of investment length on returns. The results from these studies are mixed. Hege et al. (2003, p.20) find that the total length of a project is strongly negatively linked to performance in the U.S., but also as strongly positive in Europe. The authors conclude that if venture capitalists have a higher screening capacity, the most deserving projects get more attention and can be developed more rapidly than other projects. On the other hand, if the screening capacity is low, venture capitalists learn about the quality of the projects over time, and stay longer involved with good projects.

Still, the fact that longer investments provide lower returns does not necessarily mean that they are, in general, worse than shorter investments. In fact, Manigart et al. (2002, p. 15) find some evidence that a longer time period leads to lower required return.

One might criticize that longer investments yield lower IRR returns by definition due to the mathematical calculation form of the IRR measure. However, the return multiple of the investments is not constant. Therefore, longer investments should provide higher return multiples compared to short investments. There is no reason to suspect that this would not hold on average. Nevertheless, the research indicates that the return multiples of long investments are not high enough to keep the IRR returns at the same level as for short investments.

Proposition 8 Longer investments yield lower IRR returns

2.3.6. Exit Type

There are several alternatives to exit an investment. A lot of empirical research has been done on the profitability of these different exit alternatives. However, even though it is easy to measure the average profitability of a certain exit type, this does not necessarily tell us anything about the value of that alternative compared to the other alternatives. For example IPOs may be, on average, most profitable since only good companies are exited through IPOs.

A well accepted rank ordering of successful exits from best to worst is: IPO, trade sale (acquisition by a larger company), buyback (entrepreneur repurchase of VC investment), and write-off (Cumming et al., 2005, p.303). The rank order of an IPO and trade sale is not entirely clear and depends on the situation of the company being sold. One of the main reasons supporting IPO as the best exit alternative is risk diversification analyzed from a

financial theory perspective. However, there are also some empirical research papers that indicate that trade sales provide the best returns (Figure 5).

"The VC can expect to get the fully diversified (beta-based) price from a public sale, but a private buyer is likely to require compensation for some amount of idiosyncratic risk. This theory helps to explain why a VC is much more interested in an IPO than a private sale. The need to get the company to a diversified market drives everyone's desire to IPO."

Jones and Rhodes-Kropf, 2004, p. 36

One issue supporting IPOs is that in many cases it is difficult to find a suitable acquirer for the company. In addition, if there are only a few possible acquirer candidates, it may be difficult to negotiate a sales valuation high enough for the company. Therefore, the IPO possibility can also be used as an option to drive up the valuation for a trade sale.

Some companies have a good product or innovation, but lack the ability to fully utilize its potential due to their small size or lack of resources. In these kinds of cases the company may add more value as a part of some other company, which would support the trade sale option. In addition, some companies can even be developed with the main goal to sell it to some particular company.

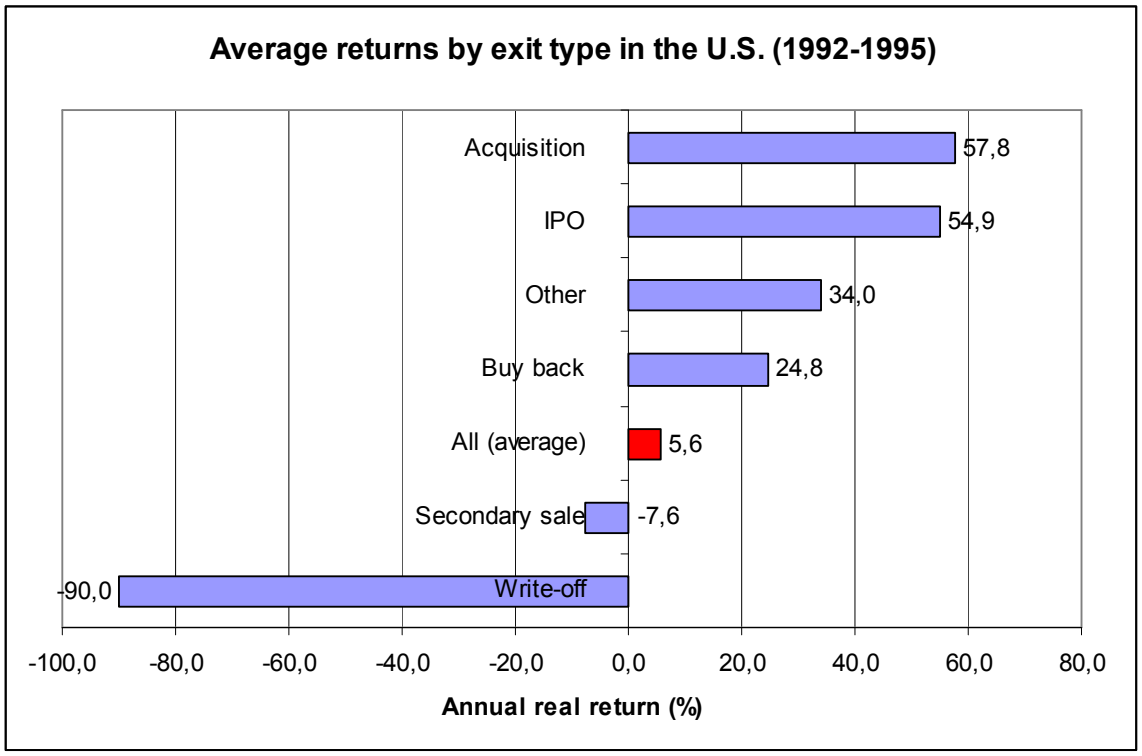

Figure 5 Average annual real returns categorized by exit type (Cumming et al., 2003, p.533)

2.4. Venture Fund Related Performance Determinants

The IRR numbers for VC funds vary a lot, and a large part of the variation comes from the differences between the VC fund (and firm) characteristics. The general perception is that investing in "good" VC funds provides high returns, but investing in "bad" funds leads to low profits. Nonetheless, it is not entirely clear which kinds of firms and funds would be optimal and would provide the best returns.

2.4.1. Size

The size of the private equity fund affects the fund's operation in many ways. A large fund size decreases the relative management costs. The tasks of a venture capitalist share a significant economy of scope, e.g. management assistance, monitoring, and service as a reputational intermediary (Gilson et al., 1999, p.10). However, measuring only the absolute fund size does not reveal the whole picture, since the optimal fund size can be thought to be dependent on the fund's stage focus.

"Let's assume that the size of a VC fund size is X and the maximum number of firms that the fund can manage is Y. Then, the average investment in a portfolio company is X/Y. Based on this, we should expect to find that smaller funds invest in early stage (smaller) deals, while larger funds invest in later stages."

Jones and Rhodes-Kropf, 2004, p. 35

There are also drawbacks in being a small fund. Small funds may not be able to provide enough capital for their portfolio companies. Therefore, it is highly probable that a successful and cash consuming investee company will oblige the small fund to invite a larger fund as a co-investor in any subsequent rounds of finance. The poor financial position of the smaller VC decreases its negotiation power, which means that the larger VC can force a low valuation and good terms for itself. This phenomenon is termed 'cram down' and means that the seed fund bears the highest level of risk but may receive inadequate compensation for that exceptional degree of risk (Gordon, 1999, p.360). Another problem is that the scale and cost of due diligence may be disproportionately high for early stage new technology investments, particularly given the exceptional information demands involved (Lockett et al, 2002, p. 1016).

On the other hand, there are also drawbacks in being a large fund. Jones and Rhodes-Kropf (2004, p. 37) state that a private equity fund must be small enough to ensure that the agent's compensation can be tied directly to the performance of his portfolio companies. Therefore, the venture capital industry should not be a concentrated industry, if there are no economies of scale.

Many empirical research studies have been made on the relationship between fund size and performance (Table 1). Most studies find a positive or a concave relationship.

Table 1 Empirical studies on the relation ship between fund size and performance

Article	Size
Ljungqvist and Richardson, 2003, p. 25	Excess IRRs increase significantly with the log of real fund size and decrease with its level. Excess IRRs are estimated to reach a maximum at fund sizes between 1.1B USD and 1.2B USD, depending on the specification. However, no significant size effect is found regarding buyout funds.
Gottschalg et al., 2004, p.3	Small size is on of the main drivers of underperformance. The relationship between performance and fund size is concave for venture funds.
Kaplan and Schoar, 2005, p.28	Fund size is positively correlated with fund performance.
Kaplan and Schoar, 2003	Larger funds tend to outperform smaller ones.
Jones and Rhodes-Kropf, 2004, p. 26	The largest quartile of venture capital funds outperforms, but the difference is not statistically significant.
Kaserer and Diller, 2004, p.33	Fund size has a positive impact on performance.

In addition to the actual fund size, also the growth rate of the fund can affect the performance. Increasing the size of the fund and recruiting new employees can have an impact on the quality of deal selection and returns. It is also difficult to control the organization, to delegate enough, and to develop internal systems to cope (Meyer and Mathonet, 2005, p.228).

Proposition 9 The relationship between fund size and performance is concave

Proposition 10 Fast VC fund growth results in lower returns

2.4.2. Capabilities

The capabilities of the fund managers have a much higher influence on returns in private equity compared to funds investing in public equity.

"Due to market efficiency for publicly quoted securities, there are few opportunities to assess value through active management. Consequently, the gap between top and bottom managers with – depending on whether bonds or equity – several basis points to low percentages is relatively narrow. The picture is very different for private equity. According

to Raschle & Ender (2004), in recent decades the top quartile of US VC funds have achieved returns that were twice as high as the average VC fund."

Meyer and Mathonet, 2005, p.60

Some senior partners at top venture capital firms have become legendary for their skills in finding, nurturing, and bringing to market many famous high-tech companies (e.g. John Doerr of Kleiner Perkins Caulfied & Byers, William Hambricht of Hambricht and Quist, and Sam Rosen of Rosen Partners) (Megginson, 2004, p. 14). Even though it is widely acknowledged that the capabilities of VC fund managers vary significantly, it is not totally clear how these differences can be seen in practice. Cumming et al. (2005, p.303) suggest that better managers will drawdown and invest money at a faster rate than unsuccessful managers, as they exploit an increased deal flow from a successful franchise. According to Hege et al. (2003, p.4), good VCs have sharper screening skills, which could also partly explain the observed performance difference between European and American venture capital. On the other hand, Wang and Ang (2004, p.360) conclude that strategic skills are the most important capability of any VC manager.

Most empirical research papers report that the capability of the fund managers affects the returns. Diller and Kaserer (2005, p.4) find returns to be positively associated with some measures representing GP's skills. Kaplan and Schoar (2005, p. 2) document substantial persistence in LBO and VC fund performance. General partners whose funds outperform the industry in one fund are likely to outperform the industry in the next and vice versa. Kaplan and Schoar (2005) measure the persistence of performance by building a regression model. The coefficients imply that a one percent increase in past performance is associated with a 0.77% increase in the performance in subsequent funds. The general perception is that the capabilities of the fund managers increase as they get more experience.

Even though some of the skills needed to manage private equity investments can be learned in school and in the business world outside private equity, there are also skills that can be learned by working as a private equity fund manager. This is called the "learning hypothesis" in private equity (Gottschalg et al., 2004, p.23). It is often difficult to measure

and acquire information on the exact experience of a fund's management team. Therefore, the experience of a fund is often measured by the sequence number of the fund, which describes how many funds the firm has raised before the particular fund in question.

Consistent with the learning hypothesis Gottschalg et al. (2004) find that experienced funds offer significantly higher performance. In addition, Sapienza et al. (1996, p.440) find evidence that experience in the venture capital industry contributed significantly to value added.On the other hand, there are also studies that find no significant correlation between fund experience and performance (e.g. Cumming and Walz, 2004, p. 18).

Proposition 11 Experience of the fund managers increases returns

Proposition 12 Good skills of the fund manager increase returns

2.4.3. Involvement in Portfolio Companies

Venture capitalists have a significantly more active role in managing their investments than traditional financial intermediaries. After the initial investment, venture capitalists engage in several 'value-adding' activities with their portfolio companies (MacMillan et al., 1988; Gorman and Sahlman, 1989; Rosenstein, 1993; Sapienza, 1992; Sapienza et al., 1996; Hellmann and Puri, 2000; 2002; Seppä and Maula, 2002):

1. Monitoring financial and operational performance
2. Recruitment of management
3. Arranging financing from complementary sources
4. Serving as a sounding board to the entrepreneur team

5. Arranging incentive plans

6. Providing access to auditors, lawyers, and investment banks

7. Setting company policies

There are some differences between VC firms in the way they interact with their portfolio companies. It would be peculiar if this would not have an effect on the returns, since the fund manager's possibilities to influence the success of the portfolio companies depends on how much time on average he/she is able to spend on helping each company.

Sapienza et al. (1996) conducted a survey on the operation modes of venture capitalists in U.S., UK, the Netherlands, and France. The study examined the determinants of interaction between VCs and CEOs, the roles the VCs assume, and the VCs' perceptions of how much value they add through these roles. Consistent with prior empirical work, they found that VCs rated their most important roles in the following order:

1. Strategic involvement as their most important role, i.e., providing financial and business advice and functioning as a sounding board

2. Interpersonal roles (as a mentor and confidant to CEOs)

3. Networking roles (i.e., as contacts to other firms and professionals)

According to the study by Sapienza et al. (1996, p. 440) VCs in the United States and the United Kingdom are more involved in their ventures and add more value than VCs in other European countries. VCs in France were the least involved and added the least value.

The general perception in the industry is that one fund manager should not manage more than five companies at a time. Nevertheless, Manigart et al. (2002, p.12) report that each investment manager is involved with 5.6 investments on average. This means that the manager is often too busy to help the portfolio companies. Therefore, it is easy to understand, why Cumming and Walz (2004 p. 18) find the effect of portfolio size per VC

manager on returns is negative and highly significant (consistent with Kanniainen and Keuschnigg, 2003a,b; Keuschigg, 2003).

However, a lot of interaction with the portfolio company may not always be good. The role of the venture capitalist is closely related to the success of the portfolio firm. As one of the VCs interviewed by Sapienza et al. (1996) put it: "When the venture is really moving, the best thing you can do is to stay out of the way of the freight train." On the other hand, it seems likely that when VCs believe the ventures are doing very poorly they have a fiduciary responsibility to find out why (Sapienza et al. 1996, p.445). The amount of interaction also affects the VC funds ability to attract new portfolio companies, and also to attract new investors (Cumming et al, 2005).

Jääskeläinen et al. (2006) find a concave relationship between the number of companies per fund manager and the performance of the fund. The result indicates that there is an optimal amount of companies per fund manger.

Measuring the amount and intensity of interaction is difficult. Meyer and Mathonet (2005, p.228) list a number of things that may be regarded as evidence for a hands-on approach:

1. Board position in each portfolio companies
2. Support provided for the definition of the strategy, the recruiting of key employees, fund-raising, etc.
3. Lead role in round of financing
4. For each portfolio companies, several rounds of financing with clear milestones defined
5. Presence of local offices

From the findings above it can be concluded that active participation in portfolio firms increases returns.

Proposition 13 Active participation in portfolio companies increases returns

2.4.4. Reputation and Status

Good capabilities, processes, and strategy are not always enough to succeed in private equity as a fund. Having a good reputation and status in the private equity industry helps in many ways:

1. Easier fund raising, fund's target size always achieved (e.g. Cumming et al., 2005, p.301)
2. More deal flow as every promising entrepreneur wants to get funded by the best and most generous GPs (Gilson et al., 1999, p. 17)
3. Lower valuations and better terms during the first investment round (Seppä and Maula, 2002; Hsu, 2002)
4. Easier syndication with other GPs
5. A respected VC serves as a validating reference for its portfolio companies
6. Better valuation during exit (especially in case of an IPO) (Seppä, Maula, 2002, p. 11; Megginson and Weiss, 1991, p. 880)

Megginson and Weiss (1991, p. 880) document that VC backing reduces the mean and median degree of IPO underpricing and that such backing significantly reduces the underwriting spread charged by the investment banker handling the issue. It is logical to assume that the degree of certification in VC backed IPOs depends on the reputation of the VC. Therefore, prestigious and well-known VCs can get better exits through IPOs compared to young and unknown VCs.

Also, in line with the asymmetric information and signaling theories, Seppä and Maula (2002) find that the reputation of existing venture capital investors adds value in future financing rounds.

However, measuring reputation is not easy. A rough estimate for the reputation is to use the sequence number of the fund. Established players have had time to build up their reputation. Of course one can argue that some old VC firms may also have a bad reputation. Even though this is possible, it is not very likely, since poorly performing VCs usually cannot raise new funds and withdraw from the VC markets. Nonetheless, Cumming and Walz (2004, p. 18) report that they do not find a significant effect of the fund number on returns.

Another way to measure a VC firm's reputation is to examine its networking and syndication with other VCs. There are at least three general alternatives to measure the network of a VC firm (Hochberg et al., 2005, p.6):

1. Degree centrality (indegree and outdegree)
2. Closeness
3. Betweenness

Indegree measures the frequency with which a VC firm is invited to co-invest in other VCs' deals. This expands the investment opportunity set of the specific VC firm and enables access to information and resources it otherwise may not have had access to. Outdegree measures a VC's ability to generate future co-investment opportunities by inviting others to its syndicates.

While degree counts the number of relationships, closeness takes into account their quality. Closeness is usually measured with "eigenvector centrality", Bonacich index (Bonacich, 1972; 1987), which puts weight on an actor's ties to others according to the importance of the actors he is tied to. Eigenvector centrality is a recursive measure of degree, whereby the

actor's centrality is defined as the sum of his ties to other actors weighted by their respective centralities.

Betweenness attributes influence to actors on whom many others must rely to make connections within the network. It proxies for the extent to which a VC may act as an intermediary by bringing together VCs with complementary skills or investment opportunities who lack a direct relationship between them.

A bad or nonexistent reputation can also attract the GP to make decisions that are not optimal for the investors. Young VCs tend to "grandstand", which means taking actions to signal their ability to investors (usually by being more aggressive in bringing firms to market) (Gompers, 1997; Das et al., 2003).

As a conclusion it can be said that highly appreciated VC firms benefit from their good status which increases their performance.

Proposition 14 Good status of the VC firm increases fund returns

2.4.5. Specialization

The whole private equity market is quite large and therefore most VC firms tend to specialize in one or more dimensions. Possible ways to specialize include e.g.:

1. Geographical focus
2. Industry focus
3. Stage focus
4. Customer type focus (B2B, B2C, B2G)

Specialization has both advantages and disadvantages:

"To deliver good performance, the targeted industry sectors and geographical regions have to offer sufficient investment opportunities that are expected to generate a private equity-like target rate of returns. A too-wide orientation, although apparently increasing the potential deal flow, is often not positive, as it will be more difficult for the team to implement a hands-on approach. One has to verify that the team's strategy is adapted to the specificities of the targeted sector."

Meyer and Mathonet, 2005, p.228

One thing that must be taken into account is that analyzing specialization only in one dimension at a time does always provide an accurate picture of the situation. The private equity firm should first build and develop a suitable and efficient strategy for making and managing its investments. The rate of specialization is then dependent on the chosen strategy.

Geographical specialization

Geographical specialization is often necessary, if the VC firm does not have the resources to establish local offices in several countries. The main advantage of a wide geographical focus is a large deal flow. On the other hand, a too wide focus increases costs and makes the management of the investments and the whole firm more difficult.

Industry specialization

Most private equity funds are specialized in one or more industries. On average, the funds invest close to 40 percent of their capital in a single industry (Ljungqvist and Richardson, 2003, p. 3). It is clear that the diversification between industries of the portfolio companies has an effect on the returns of the fund. Specialization in one particular industry enables the fund managers to develop their industry specific capabilities and experience. This is of utmost importance in e.g. high-tech and medical industries. The chaotic uncertainty and opacity of an emerging technology market may be too high a barrier for other than the most specialist investors (Lockett et al, 2002, p. 1016). Sapienza et al. (1996, p.440) find

evidence that VCs with operating experience in the venture's focal industry add significantly more value than those with less industry-specific experience.

One of the most important arguments presented against industry specialization is that a too narrow scope decreases the funds deal flow and forces it to invest also in mediocre companies. However, this view is not supported by the survey presented in Lockett et al (2002, p. 1025). Specialist technology funds had an average acceptance rate of only 2.6% compared to the overall acceptance rate for technology-based projects by all VC firms (3.6%).

Diversification is usually seen as a way to reduce and manage risks. However, several academics encourage private equity firms to specialize in order to reduce risks.

"Given the complexities of the technologies, it is critical that the professional investor is highly informed on both technical and commercially related issues. Thus, a number of venture capitalists manage risk by becoming specialists in one or a small number of technology areas rather than by diversification across several technologies."

Murray et al., 1998, p. 955

"Venture capitalists should continue to specialize by industry, as the specialization can reduce VC's vulnerability to the complex interactions of industry structure, strategy, and environment by limiting their investments to industries with high munificence environment under the conditions of limited hostility."

Wang and Ang, 2004, p.360

Stage specialization

Venture capital funds may also specialize in certain stages (initial stages or stages close to exit. When looking at the private equity industry as a whole, it can be stated that specialization in either venture capital or buyouts is essential due to the totally different nature of the businesses. Specialization clearly may be a source of value creation, as VCs presumably are more expert in the stage-specific skills of their contribution (Hege et al.,

2003, p.7). Stage specialization is supposed to be higher in the U.S. compared to Europe due to the more mature nature of the industry, since VC specialization is presumed to be linked to the development of the VC industry in an economy (Hege et al., 2003, p.7).

Focusing only on one stage may increase risks, but the increased risks are assumed to be mitigated by the other specialization benefits. Thus, one could logically think that stage specialists would require a higher return multiple for their investments. Nevertheless, Manigart et al. (2002, p. 13) do not find any evidence that stage specialists would require a significantly different return for investments in their area of specialization than VC firms that are not specialized in that particular investment stage. Stage specialists only require an above average multiple for investments outside their own specialty stage.

Despite its advantages, stage specialization is difficult due to the illiquid nature of venture capital investments. In other words, exiting portfolio investments is difficult before the company is ready for an IPO or a trade sale. In addition, it may be difficult to participate in the later financing rounds of successful growth companies with sensible valuations. Therefore, a too narrow stage specialization may force the fund to make bad non-optimal investments or exits.

Customer type specialization

There is no academic research available of the relationship between customer type and fund returns.

This brings us to the following propositions:

Proposition 15 Narrow industry focus yields higher returns

Proposition 16 Narrow stage focus yields lower returns

Proposition 17 Narrow geographical focus yields lower returns

2.4.6. Fund Length

Private equity funds are typically (but not always) ten-year limited partnerships, with possible extensions by a few years subject to investor approval (Ljungqvist and Richardson, 2003, p. 10). Since there is only little variation in the length of the funds, it is difficult to assess the effect the fund length has on performance. Brouwer and Hendrix (1998, p. 333) examined the performance of Dutch VC funds with indeterminate length and U.S. VCs with a determinate length of 10 years. They concluded that, paradoxically, the indeterminate length of life of Dutch VC firms shortened their lives, which was considerably less than 10 years on average. According to the study, the indeterminate length lowered the performance of the funds since it for example contributed to a loss of trust in early stage IPOs. However, funds should not stick to their investments for too long either, since Gottschalg et al. (2004) claim that "funds that keep their investments longer tend to underperform".

Proposition 18 Funds with determined length yield higher returns

2.4.7. Compensation

Since there are clear differences in the attractiveness and the perceived capabilities of private equity funds, one could assume a large variation in management fees.

"If heterogeneity in GP skills drives the persistence results, it is puzzling that the returns to superior skill are not appropriated by the GPs through higher fees and larger funds."

Kaplan and Schoar, 2005, p. 3

However, VC compensation is relatively homogenous. Most funds use a compensation scheme of a 1.5% to 2.5% annual management fee and a 20% carried interest or share of the profits (Kaplan and Schoar, 2005, p. 3).

Gompers and Lerner (1999a) find that compensation for older and larger venture capital organizations is more sensitive to performance than the compensation of other venture groups. The oldest and largest venture groups command about a one percent greater share of the capital gains from their investment than their less established counterparts do.

Gompers and Lerner (1999a) do not, however, find any relationship between the incentive compensation and the subsequent performance of the fund. This empirical pattern can be explained with the learning model in which neither the venture capitalist nor the investor initially knows the venture capitalist's capabilities. A fresh venture capitalist will work hard even without explicit pay-for-performance incentives, because if the fund can establish a good reputation, the venture capitalist will gain additional compensation in later funds. These reputation concerns lead to lower pay-for-performance for smaller and younger venture organizations, and explain the apparent lack of a relationship between incentive compensation and performance. (Gompers and Lerner, 2001, p. 153)

Since the compensation rate of the funds does not seem to have any effect on gross performance, it is logical to assume that funds with low management fees provide better net IRR returns. However, since there is very little variation in the management fees, the issue is not very crucial in explaining private equity returns.

Proposition 19 Lower management fees increase net IRR returns for investors

2.4.8. Management of Investments during the Fund's Lifetime

Some academic studies argue that the observed performance gap between European and American venture capital could be explained with the differences in the way that the funds manage their investment portfolio. For example, Hege et al. (2003, p.4) find some evidence for a more effective management of financing relationship and participation of different groups of investors in the United States. It is also often argued that U.S. VC investors

abandon non-performing portfolio companies sooner than their European counterparts (Söderblom, 2005). In addition, Kanniainen and Keuschnigg (2003, p. 523) suspect that the contrasting performance of the VC industry in Europe and the U.S. indicates that the industry might very well follow a more intensive or extensive investment approach. An intensive investment strategy would finance only a few portfolio companies but add high value in terms of managerial support. An extensive strategy, in contrast, would go for large portfolios without much involvement in each single company.

Removing underperforming investments in order to spend more time supporting well-performing investments is also likely to be an optimum use of the venture capitalist's time (Mason and Harrison, 2002, p.225).

Proposition 20 Fast liquidation of unsuccessful companies and focus on the best companies increases returns

2.4.9. Risk

According to financial theory, expected returns correlate with idiosyncratic risk. The theory was made to describe public equity markets, but there is no reason why this would not hold in the case of private equity as well. Jones and Rhodes-Kropf (2004, p. 4, 29) find evidence that idiosyncratic risk is priced, even in net fund returns: "*Consistent with the theory, venture capital and buyout funds with more idiosyncratic risk exhibit higher returns."*

Proposition 21 Funds with more idiosyncratic risk provide above average returns

2.5. Funding Source Related Performance Determinants

The source of the funding may have an effect on the fund's performance. Captive funds get a large share of their capital from one single investor (Meyer and Mathonet, 2005). This investor may also have strategic goals (other than return maximization) which may affect the operation of the fund.

"We argue that one element to consider is that numerous LPs invest in private equity for reasons other than performance."

Gottschalg et al., 2004

Instead of just maximizing profits, a corporate VC may also take into account the impact of the investment on the corporate group that backs him (Hege et al., 2003, p.7). In the same way, a state funded VC may also want to take into account social and patriotic values. Having multiple objectives may not always be in the best interest of the venture (Hege et al., 2003, p.7). Independent VCs may be thought as the only group that has no other objectives than maximizing expected profits.

Public money is usually invested in private equity for other reasons than just profit maximation. This may also affect the operation and investment strategy of the fund. This may decrease the expected profit of the fund. In addition, there is a correlation between the type of the fund's investors and its quality and reputation. Government supported VCs also have other problems: historical reliance on an inappropriate funding sources for venture capital investing and myriad regulations (Megginson, 2004, p. 9).

Bank affiliated venture capitalists often have other goals than profit maximation. According to Hellmann et al. (2004), banks seek complementarities between their venture capital and lending activities. Empirical evidence shows that banks use their venture capital investments to build relationships for their lending activities. Banks also target their venture investments to companies that are more likely to subsequently raise loans, and having made an investment as a venture capitalist increases a bank's likelihood of providing a loan. Using bank affiliated venture capitalists may hamper the development of a startup even

though the company may benefit from the relationship through more favorable loan pricing. The analysis suggests that banks are strategic investors in the venture capital market with investment patterns distinct from independent venture capitalists.

Having a corporate company as the main investors offers many advantages. Achieving synergies with the parent's business is the leading explanation for strategic venture investments (Hellmann, 2000, p. 286). With the help of these synergies a corporate VC may be able to add more value to the portfolio companies than independent VCs. The parent company usually has indepth knowledge of its industry and a wide range of experts which may be useful for the VC. According to Maula (2001) resource acquisition knowledge acquisition, and endorsement benefits are the primary mechanisms through which corporate venture capital investments add value to technology-based new firms beyond financing. Maula and Murray (2002) find evidence that companies with corporate investors have a superior performance to companies solely financed by traditional, independent venture capitalists. Furthermore, investee companies with multiple corporate investors were found to perform better than companies with a single corporate investor.

This brings us to the conclusion that corporate VCs yield higher returns compared to independent VCs.

Proposition 22 Corporate VCs yield higher returns than independent VCs

Proposition 23 Venture funds with commitments from the public sector yield lower returns

2.6. Economic Environment Related Performance Determinants

2.6.1. Country and the Economic Environment

The success and relative importance of venture capital varies a lot between countries. It is logical to conclude that these differences can be, at least partially, explained by country

specific characteristics. In fact, Cumming and Walz (2004, p. 4) concluded that the economic environment attributes significantly to the success of venture capital investments. Examples of countries with characteristics that support successful venture capital investments are the U.S., Canada, Israel, Great Britain, and Switzerland (Gottschalg et al., 2004). The characteristics supporting venture capital include:

1. A tradition of entrepreneurship & risk-taking
2. A well-established legal system, with good investor protection
3. A supportive, but non-interventionist, government
4. A stable regulatory system, that doesn't penalize startups
5. A free (and mobile) labor market, rich in engineering talent
6. A non-punitive taxation regime that allows use of stock options
7. A strong R&D culture - especially in universities or national labs
8. A vibrant IPO market, though this could be a result, rather than a precursor of a strong VC industry
9. A funded pension system, with risk-tolerant institutional investors.

As a conclusion it can be said that a high R&D spending is expected to increase the average profitability of the venture capital industry.

Proposition 24 Investments in countries with high R&D spending compared to GDP yield higher returns

2.6.2. Legal Framework and Policies

There are many things that a country can do to support its private equity industry. Therefore, it is important to analyze the legal environment and government policies and their implications to private equity. Cumming and Walz (2004, p. 4, 7) show that the legal framework in the different countries has a significant effect on the performance of venture capital investments: the more sound the legal conditions, the higher the IRRs. In addition, they find that a better legal and economic framework contributes to higher efficiency and higher expected rates of returns.

Taxation is probably one of the most effective and fastest ways to boost VC activity. The success of U.S. venture capital is partly a consequence of capital gains tax reductions in 1980s. Academic research implies that lower capital gains tax leads to a greater quantity of venture capital being raised (Cumming et al, 2005, p.301). Commitments by tax exempt pension funds are the most affected by changes in the capital gains tax rate (Cumming et al., 2005, p.301).

This brings us to the following propositions:

Proposition 25 A sound legal environment increases returns

Proposition 26 Low taxation on capital gains boosts VC industry and increases returns

2.6.3. Entrepreneurship

Entrepreneurship and new growth companies is the driving force of the venture capital industry. Entrepreneurship and venture capital together form a self reinforcing cycle, which is depicted in Figure 6. A stable flow of new startups ensures good investment opportunities for venture capitalists. This improves the performance of venture capital and attracts new VC firms to the markets. The rise of the venture capital industry will make the fundraising of new growth companies easier, which stimulates more people to start their

own businesses. The U.S. has been able to develop a mature and healthy venture capital industry benefiting from this cycle. Europe, on the other hand, seems to still be struggling with its venture industry. Entrepreneurial spirit is low in Europe and access to finance remains a major barrier for new entrepreneurs (Green Paper: Entrepreneurship in Europe, European Commission, 2003, p.11). Especially business startups have difficulties in getting the seed and early stage finance they need (Green Paper: Entrepreneurship in Europe, European Commission, 2003, p.10).

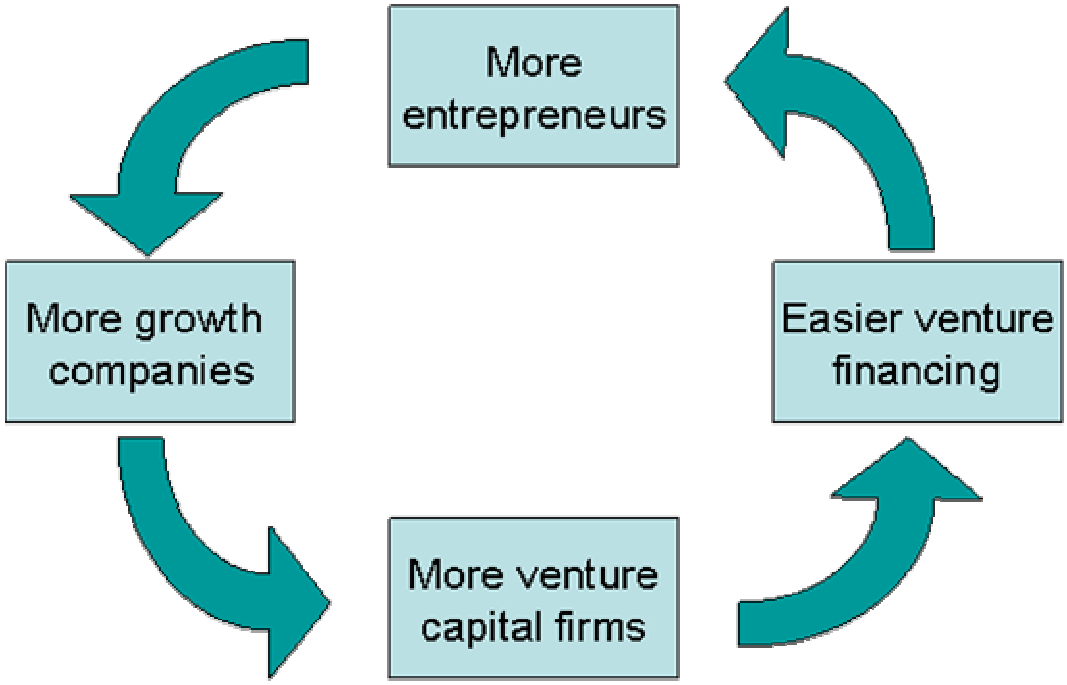

Figure 6 Self-reinforcing cycle of venture capital and entrepreneurship

There is a clear difference in the attitudes of Europeans and Americans towards entrepreneurship. Europeans prefer an employee status over self-employed status: according to the Eurobarometer survey, only 45% of Europeans would prefer to be self-employed compared to 67% in the U.S. In addition, only 4.5% of EU citizens are starting or have started a business over the last three years (13% in the U.S.) (Green Paper: Entrepreneurship in Europe, European Commission, 2003, p.8).

The lack of entrepreneurial spirit in Europe is partially due to the more critical approach to risk taking. This explains why 46% of Europeans agree on that "one should not start a business when there is a risk it might fail" against only 25% of Americans (Green Paper: Entrepreneurship in Europe, European Commission, 2003, p.9).

However, Europe is not homogenous and the level of entrepreneurship varies significantly. People living in Southern Europe, Ireland and the UK seem to especially have a higher preference for self-employment (Green Paper: Entrepreneurship in Europe, European Commission, 2003, p.8).

United States has also benefited from the presence of an active stock market for growth companies (NASDAQ). Many successful IPOs in the U.S. have received a lot of public attention. This kind of publicity encourages talented and motivated people to start their own business. Venture capital exits through trade sales do not generate similar attention in the media even if they are successful. The fact that IPOs in Europe are rare compared to the U.S. figures, can partially explain the difference in the willingness to start new companies between Europe and America.

It is also stated that there is "less entrepreneurial dynamism in Europe" (Green Paper: Entrepreneurship in Europe, European Commission, 2003, p.8). U.S. companies are smaller at birth, but the successful ones expand a lot faster than in Europe.

Therefore, a high volume of entrepreneurs increases the number of investment opportunities and is expected to result in higher returns for venture capital investments.

Proposition 27 Entrepreneurs offer attractive investment opportunities resulting in higher returns

2.6.4. Stock Markets

IPOs (initial public offerings) are often seen as the most profitable way to exit venture backed companies, and they usually generate a large share of the VC industry's returns. Therefore, one can safely say that venture capital is not viable without IPOs (Brouwer and Hendrix, 1998, p. 340). To be able to make successful IPOs, an active stock market for small companies is needed. NASDAQ in the U.S. is a good example of such a market place. In fact, Black and Gilson (1998) argue that the key source of the U.S. competitive advantage in venture capital is the existence of an active market for IPOs. In addition, EVCA believes that one of the biggest barriers to success for European venture capital, in comparison to the U.S. is the lack of European capital markets to provide capital for small cap growth companies. However, there are signs that the European listing markets have recovered a lot faster from the stock market crash in early 2000s (DowJones VentureSource, 2005) . The fast recovery of the European listing markets is partially attributable to the success of the AIM market in London. On the other hand, the lucrativeness of NASDAQ is hampered by the tightened listing requirements and regulations.

The presence of an active stock market does not just make the IPOs easier; it may also affects the trade sale valuations.

"Even in cases where a trade sale is favored over an IPO, there is no doubt that value is enhanced if the company can present a credible alternative in which it remains independent and obtains shareholder liquidity via an IPO."

(EVCA, October 2005, p. 2)

From a venture capital and investor perspective, active trading of small cap growth stocks (i.e., trading liquidity) is critical in order to (EVCA, October 2005, p. 3):

1. Enable investors to come into and out of investments positions without significantly impacting the stock price;

2. Generate sufficient trading commissions to support high quality sellside research coverage (this generates positive and negative investment views which drives trading volume in the stock).

On the other hand, from a company perspective, the active trading of its shares is critical for: (EVCA, October 2005, p. 3)

1. The success of share offerings required to fund corporate growth;
2. The orderly sale of venture capital share positions to efficiently replace them with capital from institutional and retail investors;
3. Visibility and press coverage that comes from being an actively traded stock;
4. The perceived value of a stock option program (stock can be an important motivator for employees, but it needs to be perceived as having value to be an effective motivation tool);
5. A liquid acquisition currency with which to buy other public or private businesses.

The main problem in Europe is that the stock markets are too dispersed. There are over 20 stock exchanges in Europe and each stock exchange has its own set of listing criteria and regulations, disclosure requirements, IPO market practices, underwriting fees, and trading system (EVCA, October 2005, p. 4). Although the major European stock exchanges have adequate liquidity for large market capitalization stock, they lack the critical mass and market focus to be effective stock exchanges for small cap growth stocks. Despite early hopes for success on the Neuer Markt, EASDAQ, Nouveau Marche and AIM, the European stock exchanges failed to consolidate interest in small cap growth stocks. This meant that companies that were listed on these exchanges lacked trading liquidity (EVCA, October 2005, p. 2).

Proposition 28 Investments in countries with active stock markets enable successful IPOs and yield higher returns

2.6.5. Economic Situation

The overall economic situation clearly affects the performance of venture capital funds. Venture capital performance is higher when investments are exited in periods of high valuation levels on public stock-markets, as proxied by the overall earning to price ratio (Gottschalg et al., 2004, p.3). This is logical since the returns to venture funds are positively correlated with the exit valuations of their portfolio companies. However, there is some evidence that the effect is not symmetric in good and bad times. According to Gottschalg et al. (2004, p.3) private equity funds deliver significantly higher losses during large market downturns but are not as sensitive to economic conditions in good times. Gottschalg et al. also find that low credit spreads, low interest rates, and high GDP growth are all positively related to PE performance. The effect of the economic situation during the vintage year of the fund is the opposite. Diller and Kaserer (2005, p. 8) find that funds raised in vintage years with above average stock market returns have lower returns.

Some academics have also found empirical evidence on contrary to the aforementioned theories. Diller and Kaserer (2005, p.4) claim that funds closed in years with above average stock market conditions generate lower returns. However, it is difficult to offer logical explanation for this phenomenon.

Proposition 29 Good economic situation during exit increases valuations resulting in higher returns

2.6.6. Venture Capital Market Situation

The state of the venture capital markets has an effect on the valuations of growth companies. Gompers and Lerner (2000) find that large inflows into private equity funds increase the prices funds pay for their investments. The "money chasing deals" tend to decrease the profitability of venture capital. Ljungqvist and Richardson (2003, p. 26) find that the more money was raised in the fund's vintage year, the worse is the fund's subsequent performance. Supporting this, Kaplan and Schoar (2005, p. 28) find that funds and partnerships raised in boom times are less likely to raise follow-on funds, suggesting that these funds perform worse.

Also Diller and Kaserer (2005, p.4) find evidence for the "money chasing" phenomenon. They find that for a given absolute fund inflow an increase in the allocation of money towards a particular fund type has a significant negative impact on the performance of this fund type. Moreover, this effect is much stronger for venture funds than for buyout funds.

The below average performance of venture capital during times of large money inflows is also partly a consequence of the varying capabilities of the fund management teams. Kaplan and Schoar (2005, p. 3) suggest that new venture capital companies are more likely to be started in periods after the industry has performed especially well. Therefore, during these times a larger fraction of fund flows appears to go to new funds that have lower capabilities than the most experienced ones. Finally, the dilution of overall industry performance in periods when many new funds enter is mainly driven by the poor performance of new entrants. However, the performance of established funds is less affected.

Proposition 30 A high amount of private equity commitments during fund's vintage year increase the prices of portfolio companies resulting in lower returns

2.7. Measurement Errors and Biases Affecting Observed Performance

Measuring venture capital returns objectively and without any biases is extremely difficult due to several reasons:

1. Inaccurate and missing data
2. Differences in accounting and valuation customs
3. Large random variation in returns
4. The motive of venture capital funds to exaggerate their returns

It might be that the observed performance difference between European and U.S. venture capital is due to erroneous and biased measurement methods at least to some extent. Although the performance determinants described in this sub-section are not actual determinants of venture capital performance, they must be analyzed thoroughly in order to be able to take them into consideration when analyzing the available historical data and when building the econometric model.

Three kinds of possible biases can be identified when measuring the returns of private equity at the fund level:

1. Performance bias
2. Selection bias
3. Liquidation bias

In this study the term "performance bias" is used to describe measurement problems that distort the observed performance of a single fund. On the other hand, the term "selection bias" is used to describe problems that do not distort the performance figures of individual funds but affect the way that the funds are selected in the sample. The term "liquidation bias" refers to problems arising from the fact that the performance of non-liquidated funds cannot be measures exactly.

2.7.1. Performance Bias

The level and severity of the performance bias is largely dependent on the quality of data and research method employed. The bias is most significant when using public return figures at the disbursement or portfolio company levels. In this case, the main source of performance bias comes from the fact that the return of an investment is usually observed only when the firm gets new financing or is acquired. This causes an upside bias for the returns because projects are more likely to get new financing, and especially to go public, when their value has risen (Cochcrane, 2005, p. 8). This theory is consistent with the finding of Gottschalg et al (2004, p.10) that deals reported in Venture Economics appear to have above average performances.

Performance bias is usually very low, or inexistent, in fund level studies. This is due to the fact that cash flows are more likely to reflect both successful and unsuccessful investments (Gottschalg et al., 2004, p.12).

In the worst case, the performance bias is so significant that it makes the results of the research practically worthless. Therefore, it is of utmost importance to identify and understand the nature and determinants of performance bias. Luckily, there are a number of methods to correct, or at least mitigate, the effects of performance bias. Some of the most advanced methods are described in more detail in recent academic literature (e.g. Cochcrane, 2003; Cochcrane, 2005).

2.7.2. Selection Bias

Selection bias comes from the fact that the funds included in the sample do not correctly represent the set of venture funds that the study is supposed to examine. Several possible reasons for selection bias can be identified:

- Fund size
- Fund vintage year (old funds are often underrepresented in samples)
- Fund type (captive or independent)

- Fund performance (good performance is reported more often)
- Limited partners (the type of the fund's investors)

It is important to take the selection bias into account because otherwise it can bias the results significantly. Fortunately, there are methods for measuring and correcting selection bias, which are discussed later in this thesis.

2.7.3. Liquidation Bias

The return of private equity investments is known exactly only after they are exited. Therefore, the performance of non-liquidated funds is usually uncertain.

"The value of a non-liquidated fund can be estimated on the basis of net asset values (NAV). The basic problem is that net asset values are subject to valuation biases and, hence, returns estimated on this basis will be biased as well."

Kaserer and Diller, 2004, p.20

Liquidation bias can be avoided by selecting only fully liquidated funds in the sample. Nonetheless, this is not usually done due to two reasons:

1. Possible selection bias
2. Reduction of sample size

Using a sample of largely liquidated funds may introduce a selection bias as the decision to liquidate is endogenous and is likely to be influenced by the success of the investments. Funds that are not fully liquidated (and hence excluded from the sample) may be finding it difficult to sell their current investments or may simply be waiting before realizing and officially acknowledging a poor performance. (Gottschalg et al., 2004, p.2, 6)

Woodward and Hall (2003, p.11) studied the accuracy of reported returns of non-liquidated funds. They concluded that the reported returns are about right when compared to the returns for their portfolio companies, but they are smoothed and about six months old.

Therefore, they are too low in a rising market, but too high in a falling market. According to Jones and Rhodes-Kropf (2004, p.22), there may also be some differences in the valuation methods of different funds. For example, some funds may be conservative and delay writing up an investment's value until, say, another entity at a higher valuation.

Meyer and Mathonet (2005, p.154) list four reasons why the performance figures of non-liquidated funds are never exactly right:

1. Undrawn commitments: The expected future cash flows of a private equity fund are generated not only out of the NAV but also out of investments still to be made. The success of these investments is unknown and depends on the capabilities of the fund managers.

2. Private equity fund added value: The value added provided by the management team should be reflected in the current valuation.

3. Future fund expenses: The portfolio companies will be realized in the future, which means that management fees, expenses and eventually carried interest will be charged against the fund and reduce the cash flows to the investor.

4. Capital constraints: Even if an investee company theoretically has a value during the early investment stages, success will depend on the fund's intentions in the of going forward.

2.8. Differences between Europe and Northern America

Europe and the U.S. are quite different in many aspects relating to venture capital. A few academics have tried to find the differences that could be accountable for the observed performance gap between the two market areas. Hege et al. (2003, p.4) lists three reasons for the aforementioned gap:

1. Venture capitalists in the United States are much more assertive in reserving contingent control rights: they use more systemically financial instruments that

convey residual control in case of poor performance, namely convertible securities, and they activate contingent control more frequently, as measured by the replacement of entrepreneurs and the termination of project.

2. It seems that US VCs have sharper screening skills than their European counterparts. This translates into a larger fraction of the total investments and funding frequency into success.

3. There is some evidence for a more effective management of financing relationship and participation of different groups of investors in the United States.

In addition, Hege et al. (2003, p.4) claim that venture capital firms in Europe are more deal makers and less active monitors; they seem to be still lagging in their capacity to select projects and add value to innovative firms.

There is also a clear difference in the investment focus of the private equity industries. The European VC industry differs from its U.S. counterpart with respect to the share of early stage investments. European venture capital is much less interested in investing in new firms, but instead favors LBOs and MBOs (Brouwer and Hendrix, 1998, p. 338; Megginson, 2004, p. 24.

The sourcing of European venture capital funds differs from their American counterparts primarily in the Europe's greater reliance on financial institutions (which tend to be very powerful in Europe) and lesser reliance on pension funds, which generally play a much smaller role in the old world than in the new (Megginson, 2004, p. 24). Another significant difference is in the structure of the venture funds. U.S. funds are normally organized as stand-alone limited partnerships sponsored by specialist venture capital firms staffed by technically trained professionals. However, European funds are generally organized as investment companies under various national laws, and their approach to dealing with portfolio companies is much more akin to the reactive style of U.S. mutual fund managers than to the proactive style of America's venture capitalists. (Megginson, 2004, p. 24)

There is also some evidence that European funds settle for lower after-tax returns for their investments. According to Manigart et al. (2002, p. 15) Belgian and Dutch VCs require a significantly lower after-tax return for all investment stages, and French and British VCs require a significantly lower return for expansion investments compared to their American colleagues,.

According to Gilson et al (1999, p. 23), there are significant differences in labor market regulations. Germany and many other Western European countries impose substantial restrictions on layoffs. These rules impose costs on startup businesses and thus discourage their formation. Therefore, labor market regulation can well affect the vitality of venture capital.

Gilson et al. (1999, p. 23) also offer cultural differences between Europe and America as a reason behind the gap in venture capital activity. Germans and Japanese are less entrepreneurial and less willing to risk failure than Americans. This leads to smaller demand for venture capital services. However, Gilson et al. (1999) also point out that there that also the nature and characteristics of the new startups have an impact on the venture capital industry. A more important subject than why Germans and Japanese do not start risky businesses would be that why they do not start many high-technology businesses.

This section identified one new possible determinant of venture capital performance not mentioned earlier in this study.

Proposition 31 Investments in countries with flexible labor markets yield higher returns

3. QUALITATIVE STUDY

Several industry experts were interviewed for this master's thesis. The main findings from these interviews are described in this chapter. The objectives and motivations for this qualitative study are the following:

1. Assess the quality of the findings from the academic literature and specify the context where they are applicable
2. Fill any possible voids in the coverage of academic literature
3. Deepen the understanding of venture capital by offering real life examples
4. Get a picture of the current situation and the future prospects in the venture capital industry
5. Gather opinions from different interest groups in order to be able to make suggestions to improve the efficiency of the venture capital (especially in Europe)

The interviewees were chosen from both Europe and North America in order to get different opinions and to be able to assess any differences between the two continents (Table 2). The general interview agenda is presented in

Appendix 2: Interview Agenda for Qualitative Study. However, the interview questions were revised for each interview depending on the interviewee.

Table 2 List of experts interviewed for this study

Last name	First name	Company	Grouping	Country
Cullow	Dana	Boston Millennia Partners	VC	U.S.
De la Porte du Theil	Amaury	Ventech	VC	France
Gutzen	Till	Sixth Swedish National Pension Fund	Investor	Sweden
Helgesson	Staffan	Creandum	VC	Sweden
Ingeborn	Staffan	Innovation Kapital	VC	Sweden
Keder	Guus	Axiom Ventures	VC	Belgium
Kesanto	Jarmo	Cavendish Management Resources Ltd	VC / Consulting	UK/Finland
Lane	David	Diamondhead Ventures	VC	U.S.
Levänen	Turo	Proventure	VC / Consulting	Finland
Mäkinen	Timo	Proventure	VC / Consulting	Finland
Makkula	Janne	Suomen Yrittäjät	Other / law	Finland
Niemi	Petri	CapMan	VC	Finland
Paulin	William	Paulin Neal Associates	VC / Consulting	U.S.
Tarjanne	Artturi	Nexit Ventures	VC	Finland
Turunen	Matti	Eqvitec	VC	Finland

The qualitative study utilizes two different approaches for examining the differences between Europe and America:

1. Comparing the answers from European and American VCs concerning their own fund

2. Asking the interviewees directly about their views on the differences between Europe and America

In addition, the study also presents some of the general ideas about private equity markets presented by the experts.

3.1. Venture Capital Company Characteristics

3.1.1. Overall Strategy

The main interest area of this thesis is early stage venture capital. Therefore the experts included in the interview sample were chosen to represent venture capital firms or other institutions dealing mainly with early stage investments. Most of the venture funds make most of their first investments in the early or expansion stages. Nevertheless, most funds want to stick to their companies as they develop, even if this would require investments in later stages. However, the sizes of the early stage funds are not usually large enough to

allow for sole investments in later rounds. This means that the funds are forced to syndicate their later stage investments with other venture capital companies.

All of the funds have a relatively narrow geographical focus (e.g. East Coast in the U.S., Nordic countries, France, etc.). The funds also have a certain industry that they are focused on, most often high-technology companies or some sub-segment in this area. Only one of the funds makes investments in both bio and technology companies.

Most of the funds had chosen their original strategy due to the expertise areas of the founders or due to the investors' preferences. None of the interviewed fund managers had done nor were planning to do any significant changes in their funds' strategies. In fact, some of the managers said that sticking to the original investment strategy was of particular importance since the investors usually do not like "style drifts".

Most fund managers named their distinctively large deal flow as the main competitive advantage over their competitors. Other core competences referred to were:

- A large company as a strategic partner
- Active participation in portfolio companies
- Efficient processes and good team work
- Industry specific capabilities and experience
- Good contacts with all possible useful stakeholders in venture capital
- Good track record and brand name

3.1.2. Investments

Two generic approaches for selecting the companies to invest in can be distinguished from the answers:

1. top-down selection model

2. bottom-up selection model

The top-down approach starts with analyzing all industries fitting into the specified focus of the fund. The objective is to find a few narrow industry sectors that appear particularly promising for possible investments. After selecting the niches, the niches are carefully scrutinized carefully in order to understand the competitive landscape in that business. This helps in finding out the best companies in these segments that are in the best position for growth. The top-down selection model ensures that all industries are checked and the fund only invests in promising industry sectors that it has a good knowledge of.

In the bottom-up approach the main idea is to search for particularly promising investment targets by analyzing each company and investment case independently. The overall portfolio decomposition is decided only after finding the best investment alternatives.

Most of the funds had a deal flow of about 500 deals/year, but the variation was also significant as the range was from 300 to 10,000 deals/year. Funds with large deal flow seemed to prefer the top-down approach. This seems logical, since analyzing e.g. 10,000 companies is not sensible. On the other hand, the top-down selection model does not work very effectively with a limited deal flow as the fund may not see any companies in some particular segments.

There was little debate about what is the most important thing to consider when making the investment decision: all interviewees named the quality and experience of the company's management as one of the most important issues. The capabilities of the management were mainly evaluated by looking at their past merits. Most interviews mentioned that achieving something big is the most important thing. Even a failure after a good effort is better than doing nothing. As one of the interviewees put it: "If you are over 40 years old and haven't achieved anything, it's very unlikely that you will achieve anything during the next 10 years either." Other named selection criteria (in addition to management competence) were the following:

- Market potential

- Intellectual property rights
- Good exit potential
- Good return expectation
- Good current or forecasted future profitability
- Ability to add value as a venture capitalist

The above mentioned criteria were also the main drivers of negative investment decisions. The overall view was that things that prevent the fund from investing in a company are those that cannot be solved by the VC fund. For example, the VC fund can even invest in a company with a poor management, if it believes that it can fix the problem by changing the management.

All of the interviewed venture fund managers preferred being a lead investor as opposed to being just a syndicate partner. The biggest motivation for being a lead investor was the possibility to have an effect on the success of the investment. This was regarded as highly important since the capabilities and objectives of other VCs were often not clear. Another clear benefit was that the lead investor usually gets the biggest share of the company. Nevertheless, being just a syndicate partner was thought to be the best alternative in cross-border investments and other investments outside the core competences of the fund.

The investment sizes in the first round ranged from about 1 to 5 million euros. The total investment amount for a successful company was between 4 and 15 million euros. The investment sizes were somewhat bigger for American funds, but this notion is only indicative due to the small sample.

Since the capabilities and experience of the entrepreneur and the management were regarded as the most important investment criteria they can be expected to have a significant impact on the profitability of the investment.

Proposition 32 Investments in portfolio companies with experienced entrepreneurs yield higher returns

3.1.3. Monitoring

Venture funds want to monitor their portfolio companies' development to ensure that the money they invest is utilized according to their and the companies' best interest. In order to minimize the losses in case of an unsuccessful investment, the investments are divided into smaller parts, stages. The general perception in the industry and academic research seems to be that European VCs tend to have shorter stages and smaller investment. However, the answers of the interviewees do not support this as there were no significant differences between the answers of European and American respondents. The first investment round lasts between 12 and 18 months depending on the stage and overall situation of the company.

The funds usually use different kinds of milestones to monitor the development of the companies. The size of the first investment is usually calculated so that it enables the company to achieve some specified target (e.g. new product, new market area…). The fulfillment of the milestones usually determines whether or not the company will receive further funding. In addition to this, it may also affect the valuation of the company during the next round. The most often mentioned types of milestones were the following:

- Sales
- Number of customers
- Product (development)
- Recruitment of key personnel
- New market areas

- Sales channels

Despite the use of milestones that are agreed beforehand between the VC and the entrepreneur, also other factors determine the amount of further funding. Some VCs said that they "practically always" decide on the further financing according to the milestones, but some VCs used them only as a guideline. Especially unexpected changes in the market situation may affect the decision on further funding.

"We take the general situation also into account. Sometimes they (the portfolio companies) fail to achieve the milestones, but still get funded. Sometimes they achieve the milestones, but still don't get further funding."

European VC fund manager

In addition to the investment rounds, the portfolio companies are also continuously monitored and helped. When the VCs were asked how they react to unsatisfactory development of the portfolio companies, the most common answer was to change the management. According to the interviews, the management is changed, at least at some point of the development of the company, in about 50-70% of the investments. Other commonly used reactions to poor performance were changes in overall strategy and sales channels.

The fund managers said they cut the funding in about 20 to 30 percent of the investments. Contrary to the general perceptions in the industry, there did not seem to be any clear difference in this figure between American and European VCs.

3.1.4. Interaction with Portfolio Companies

The idea of venture capital is not just to give financing to growing companies. VCs should also add value by guiding and helping their portfolio companies. There is no exact way of measuring how much value the VCs bring to the companies, but the fund manager's time spent helping its portfolio companies is a good proxy for it.

According to the interviews the amount of time one fund manager spends helping his/hers portfolio companies depends on the company and the type of the investment. In investments where the company serves as the lead investor, the fund manager spends on average 4-8 hours per week helping the company. The same figure for syndicate partner investments is only 0.5 to 1 hours per week. Most interviewees said that the best and most promising companies should get more attention than the unsuccessful ones. However, many said that this is difficult to do in practice, and therefore many fund managers end up spending most of their time with the unsuccessful companies. Figure 7 is an indicative figure illustrating the time and resources used to help portfolio companies during their lifetime.

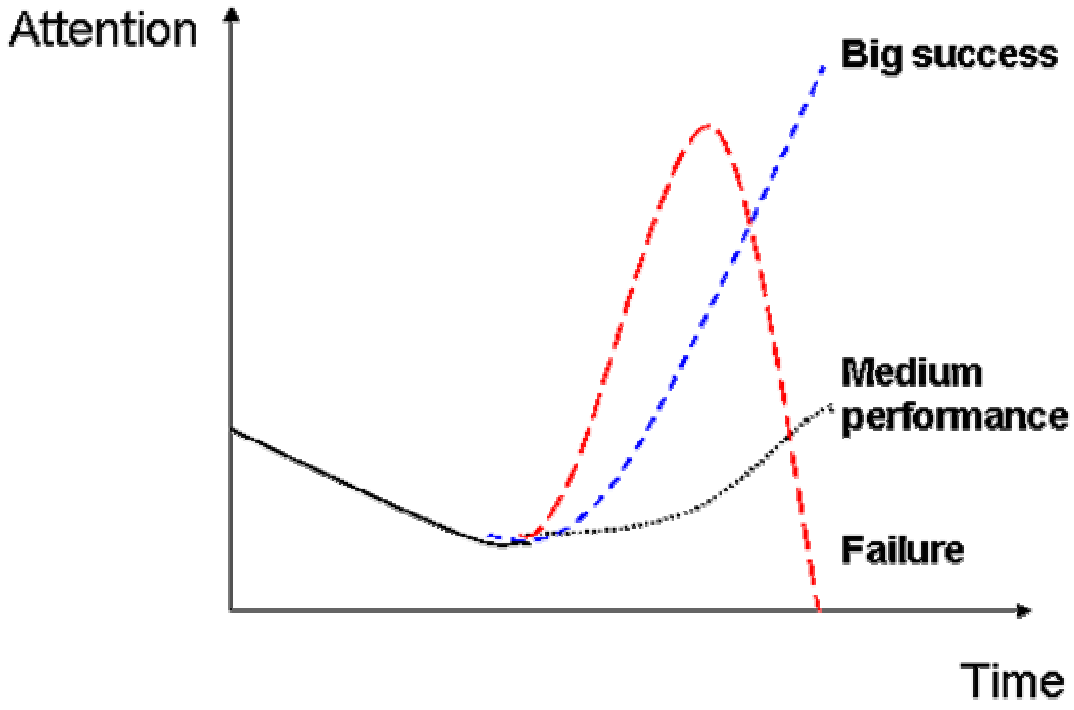

Figure 7 Time spent on helping portfolio companies during the lifetime of the investment

According to the interviews, a fund manager's time can roughly be divided into two parts:

1. Time spent on investments (searching, making, and closing)
2. Time spent with the portfolio companies (guiding, supporting, and helping)

The amount of time a fund manager can spend on one portfolio company depends mainly on three things:

1. Working hours per week (h/week)
2. Share of the fund manager's time allocated to helping portfolio companies (%)
3. Number of portfolio companies per VC manager (companies/manager)

The relationship between these variables and the time spent on each company is presented in Equation 1.

Equation 1 Amount of time a fund manager can spend helping his/hers portfolio companies

$$\text{Time spent on company (h/week)} = \frac{\text{Working hours (h/week)} \times \text{Time allocated to portfolio companies (\%)}}{\text{Number of portfolio companies per VC manager (pcs)}}$$

Since most fund managers are working very long hours, it is difficult to increase the working hours. The share of time allocated to portfolio companies can be increased by hiring analysts and other supportive employees to decrease the time spent on managing investments. Nonetheless, the number of portfolio companies per fund manager is by far the easiest and most important way to influence the time available to each portfolio company. According to the interviews, five companies is the absolute maximum that one partner can handle. However, a company specialized in very early stages, mainly seed, allowed a maximum of 8 companies. Seed investments are usually very small, and hence also the returns in absolute terms, which means that the fund managers need more investments to cover their expenses. Most fund managers said that they have 3 – 4 portfolio companies per manager, which was also said to be the optimal amount.

All interviewees said that they are almost always in the board of their portfolio companies. In general, an investment without a board seat was possible in only cross-border investments as a syndicate partner. The way of board working was usually described as active.

An important thing to consider is what kind of assistance VCs usually offer to their portfolio companies, and whether or not there exists any differences between Europe and America in this respect. The most often mentioned issues included:

- Recruitment new people (especially top management)
- Strategic advice (new directions or just acting as a sounding board)
- Contact and network building
- Sales channel and OEM relationships
- Practical things
- Monitoring (financial situation and market/sales development)
- Further financing

The type of help that the portfolio companies need evolves during their lifetime. In the beginning of a seed investment the VC usually helps with the recruitment of key personnel and also with various practical problems. As the company starts to grow, it needs more strategic help. However, some fund managers said that doing small incremental strategic changes is possible, and often also necessary, but repositioning a company is often very difficult.

According to the respondents, VCs can sometimes add value significantly by just helping to build contact networks and by acting as a reference for small startups. This is particularly important for B2B (business-to-business) companies due to the following reasons:

1. Corporate buyers like continuity and long term deals. A wealthy and respected VC fund can significantly increase the credibility of a young startup.

2. VCs usually have good connections to the industrial world, especially in the domain of their investment focus. Many VCs even have strategic collaboration with potential buyers or customers of their portfolio companies.

3. Respected and well-known VCs are highly valued in the business world. They are, however, not very familiar to the regular consumers.

Due to the aforementioned fact, one can assume that VCs are able to add more value to B2B (business-to-business) companies compared to B2C (business-to-consumer) companies.

According to the interviews, there seems to be no differences between European and U.S. VCs in the way they help their portfolio companies. The only difference in this sample seems to be that American VCs use more advisory councils and use their strategic partnerships with big corporations to offer expertise for their portfolio companies.

This section provides us with one new proposition not identified in the literature study:

Proposition 33 Investments in B2B companies provide better returns compared to B2C and B2G companies

3.1.5. Experience

The general perception is that the American VCs are a lot more experienced than European counterparts due to the maturity of the U.S. markets. There is large variety in the experience of the interviewed funds: the total cumulative VC experience of the fund managers ranges from 15 to over 100 years. The U.S. VCs in the sample taken for the thesis are somewhat more experienced, but the difference is not very significant.

Even though the fund management teams usually have a lot of cumulative experience, there is usually only one fund manager that has experienced the full life cycle of a fund, if even

any fund manager at all. Only one of the interviewed VC companies had several fund managers with full life cycle experience.

"It's amazing how few people in the VC business have experienced the full life cycle of a fund. My estimate is only about 25% of all fund managers."

American VC manager

According to the interviewees, personnel turnover is an interesting topic in venture capital funds. Almost all of the respondents admitted that they had had changes in their management team during the fund's lifetime. An American VC manager said that the normal turnover is about 20% of the personnel during the life cycle of a fund. Based on the small sample, no significant differences between America and Europe seem to exist.

"(Personnel) turnover is one of the number one topics on VC business concerning risks."

American VC manager

Well-performing fund managers that leave the company voluntarily were regarded as unfortunate but rare incidents. Most of the personnel changes were said to be "mutual decisions". However, getting rid of poorly performing fund managers was said to be very important:

"If you are not making enough money, you should not be afraid of firing a partner."

European VC manager

An important way to decrease personnel turnover and improve motivation is to financially commit the fund managers to their work. According to the interviews, this is mainly done through capital investments or bonus systems. Almost all of the funds required their fund managers to invest money in the fund. Some funds also offered subjectively assessed bonuses to their personnel. No clear differences could be seen between European and American VCs concerning the reward systems.

Venture capital funds have to manage and guide a large variety of portfolio companies. Therefore, it is clear that they have to use external expert services to be able to offer the

best possible help. VC firms mainly use external expertise in their portfolio companies, but they may also utilize them in their own operations. The external expertise services mentioned in the interviews include:

- Legal advise
- Accounting
- Human resources, head-hunting
- Technical consultancy
- Due diligence consultancy
- Investment banks (exit process)
- Advisory boards (strategic, scientific, technologic)

3.1.6. Return Expectations

The outcome of a venture investment is always unknown during the time of the investment decision. Investing profitably in risky companies requires that successful investment must provide very good returns. Venture capital funds usually demand a certain minimum return multiple that must seem possible at the time of the investment. According to the interviews, the required return multiple is usually between 3 and 10.

The required return multiple depends mainly on the estimated risk level of the investment. Early level investments are, in general, considered to be riskier than later stage investments. Also other issues can be taken into consideration when assessing the risks of the investment, but they may be difficult to evaluate precisely.

3.2. Differences between Europe and Northern America.

All of the interviewed fund managers agreed that there exists large variation in the capabilities of the fund managers. These differences can be seen in a number of ways. The

- Connections
- Screening and selecting companies
- Development and internationalization of portfolio companies
- Ability to negotiate on valuations
- Self esteem and courage to force changes in portfolio companies, if necessary
- Interaction with portfolio companies
- Industry experience
- Financial orientation
- Way of board working
- Short term vs. long term strategic focus

Many interviewees believed that American VCs are probably more capable on average than the European VCs due to the higher maturity of the U.S. venture market. However, this view was based on logical thinking or hearsay rather than on own experiences. In addition, many respondents emphasized that the variation inside the two markets is more significant than between the markets. The capability differences between Europe and America were said to exist in the following areas:

- American VCs are better and more active in building and developing portfolio companies
- American VCs are better in handling exit opportunities
- American VCs have more industrial experience in their management team
- American VCs have better networks and take better advantage of them

The evaluation of the venture capital firms' capabilities is extremely important from the viewpoint of the limited partners, since all interviewees agreed that the VC capabilities have a huge effect on investor returns. Historical returns were said to correlate with future performance, which makes it a good indicator of the VC's capabilities.

However, due to the risky and volatile nature of venture capital, determining the capabilities of a venture capital firm based on the absolute performance of may not give an objective view of the situation. Therefore, it is important to take into consideration also the overall situation in the VC markets during the investments. To make things even more complicated, one VC manager pointed out that certain operation modes may yield above average returns in boom times but below average returns in bust times. In addition, the performance of the fund's previous fund is not usually known during the time of the investment.

"Successful venture funds can be divided into three categories:

1. *Lucky investments*
2. *Selecting a hot niche area at the right time (partially lucky)*
3. *Successful investments due to fundamental know-how of how to make good investments and build successful companies."*

American VC manager

3.2.1. Venture Capital Markets

Most of the interviewees were familiar only with either the European or American VC market. This makes the comparison of the markets more difficult. However, the interviewees all had some comments on the differences between the two market areas. The differences mentioned most often were:

- Maturity of the markets

- Culture for entrepreneurialism and risk taking
- Market size
- Exit markets
- Collaboration between VCs and large companies

The maturity of the markets was clearly seen as the most important difference between the two markets. The maturity was said to have implications on several things including the experience among venture capital firms, large corporations and entrepreneurs. The maturity of the market was also regarded as a huge advantage for the American venture capitalists, since it makes fundraising, the development of the companies, and the exiting of the companies a lot easier.

"There are a lot more people in America, who have 'been there and done that'."

American VC manager

The American culture was described as more risk-tolerant and more suitable for venture capital investments. Europeans were said to avoid risky investment and rather settle for lower returns. However, Europe was not considered to be a homogeneous market in this respect: Brits were said to be more willing to take risks than the continental Europeans. In addition, the UK was also described as a more mature market than the rest of the Europe, but not quite as mature as Northern America.

The U.S. is a large unified market area with almost inexistent cultural or legal barriers. This makes the growth of portfolio companies a lot easier than in the fragmented European markets. The U.S. has also been able to develop a critical mass needed for the efficient operation of venture capital markets. Especially the West Coast was considered to be very lucrative area for both VCs and entrepreneurs due to good connections and networks between different players.

The exit markets for venture capital companies were considered to be better in the U.S. than in Europe. Regarding trade sales, this is at least partially attributable to the better collaboration with the VCs and large companies.

This brings us to the following new propositions not identified in the literature view.

Proposition 34 Investments in mature VC markets yield higher returns

Proposition 35 Investments in countries with large home market make the growth phase of the portfolio companies easier and yield higher returns

3.2.2. Venture Capital Firms

Most respondents stated that there are no large differences in the way the VCs operate in Europe and America. The general perception was that the operation models have differed markedly in the past but they are now more or less the same. The differences that came forth in the interviews included the following statements:

- American VCs are tougher towards their portfolio companies and let go of them a lot easier.
- American VCs are more aggressive in seeking growth opportunities
- American VCs have more analysts
- European VCs are less sensitive for valuation and often end up paying too much
- American VCs have a narrower focus due to the higher amount of investment opportunities

- American VCs invest earlier in the companies (entrepreneurs are quicker to seek venture money)

- American VCs are more interested in "homeruns" compared to Europeans who prefer many investments with moderate returns

Despite the differences in the venture markets in Europe and the U.S., the respondents did not believe that the optimal way of operating as a VC would differ significantly in these two market areas. Nonetheless, most interviewees saw that encouraging and supporting portfolio companies in their internationalization is more important in Europe. To be able to do this, European VCs have to have good connections not only inside Europe but also to the U.S. to be able to carry out cross-border syndicates. On the other hand, internationalization is not equally essential in the U.S. due to the large home market.

3.2.3. Exit Markets

According to the interviewees, IPO and trade sale are the most profitable ways to exit a portfolio company. All other exit alternatives were thought to offer significantly lower returns. However, the ranking of trade sale and IPO depends on the company and the overall market situation. In general, IPOs were thought to offer the best returns only for highly successful companies during times of high valuation in the public markets. IPOs usually have a lock-up of 6-12 months, which was regarded as a significant drawback by some respondents.

"Historically there has been only a few years when the public market has been the best exit alternative on a broad basis."

American VC manager

Some interviewees thought that most companies can be exited only through a trade sale or only through an IPO, not through both. A trade sale was considered to require technology or other assets that are beneficial for some industrial partner generating synergies.

In general the exit markets in the U.S. were thought to be a lot better than in Europe. The difference was said to be even more apparent in IPOs than in trade sales. However, the current situation was described unique due to the fact that the listing markets have recovered better in Europe after the crash in the early 2000s.

The biggest problem in Europe is the fragmented stock markets which do not offer sufficiently large volumes for listings and active after markets. The AIM in London was considered to be very promising and was hoped to solve the problem at least partially.

According to the interviewees, the lack of active trade sales markets in Europe is due to the cultural difference of large corporations. American companies have a culture of buying small startups. Some companies have even partially replaced their product development with buying companies with promising new technologies. European companies are more skeptical towards small companies and tend to avoid acquisitions.

The unanimous opinion of the respondents is that the optimal way of exit depends on the company and the market situation. However, according to most interviewees, this statement is also valid the other way round: the optimal way of exit (which is partly dependent on the market situation) affects the optimal way of developing the company. This is due to the fact that the chosen exit path affects many things (e.g. the optimal organization structure).

Proposition 36 Funds that develop their companies to maximize their exit value yield higher returns

3.2.4. Valuation Curve

Many respondents thought that the venture capital model is works a lot better in the U.S. compared to Europe. The problem in Europe was said to be the poor performance of early stage investments. An idea presented by one European fund manager was that the valuation curves in Europe and North America are different (Figure 8). According to this view, the poor performance of seed and early stage investments is due to the low valuations in the

following stages. The low valuations in the middle stages are a consequence of low demand and unequal negotiation composition between (small) early stage and (large) later stage funds. This idea was largely supported by many respondents, even though some VCs, especially European seed fund managers, did not entirely agree with the valuation structure.

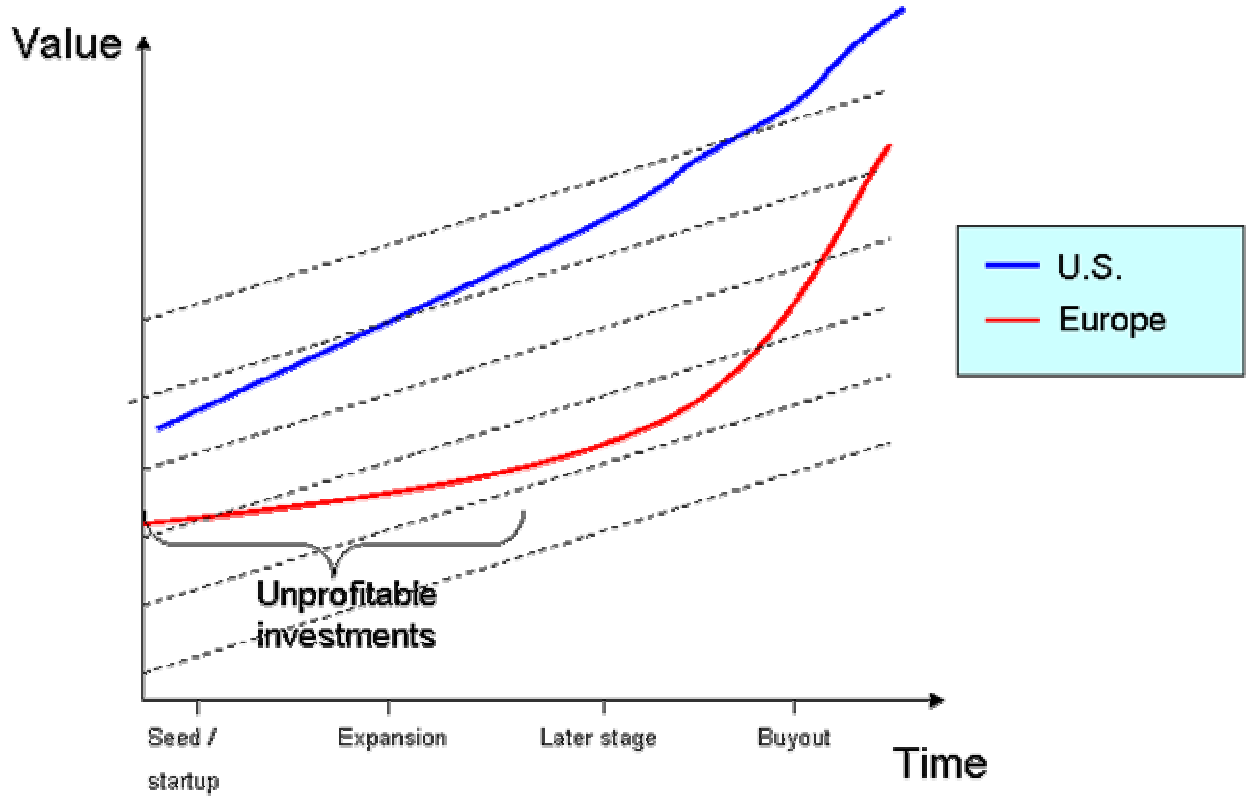

Figure 8 Estimated valuation curve in Europe and in the U.S.

This brings us to the following proposition:

Proposition 37 Early stage investments yield relatively lower returns in Europe than in America

3.3. General Findings and Ideas

3.3.1. Risks

The general perception in the private equity industry seems to be that early stage investments are riskier than later stage investments. This statement is often used as the main argument why a higher expected return should be required from early stage investments by the investors. However, one European VC expert thought that seed and early stage investments do have a higher company specific risk, but the market risk is actually lower (Figure 9). Since investors are able to diversify their investments, the required returns for early stage investments should actually be lower compared to later stage investments.

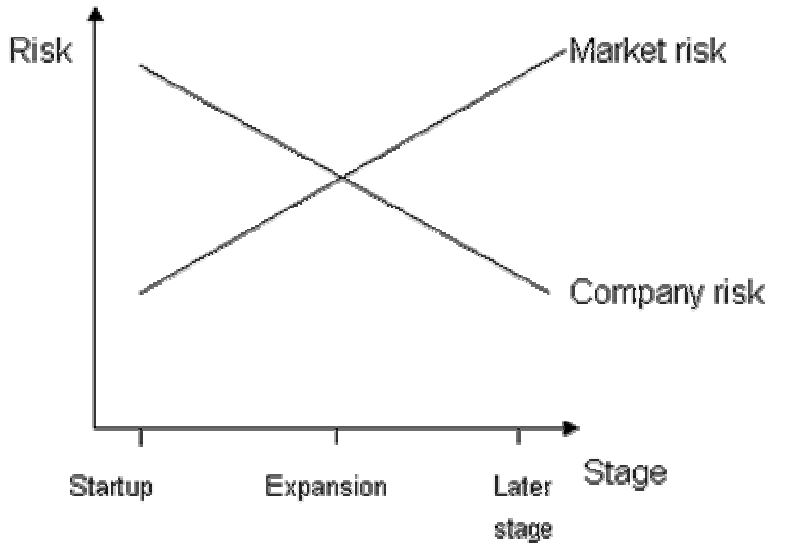

Figure 9 Market and company specific risk by stage

3.3.2. Skills

According to the interviews, there is no one type of education or experience that would be clearly the best for acting as a fund manager. Many respondents emphasized that having a variety of complementing skills is more important. However, in general a technical or business related education was thought to be the most suitable. More specifically, the type of skills needed to act as a fund manager was thought to depend on the stage of the fund's

investments. Technological experience is particularly important in seed and early stage investments whereas financial capabilities are more useful in later stage and buyout investments (Figure 10).

However, many responded that one cannot learn the necessary skills for acting as a fund manager at school; the experience from working life was considered to be more important. Management consulting, top management or starting an own company was often said to be the best possible working experience for working as a fund manager.

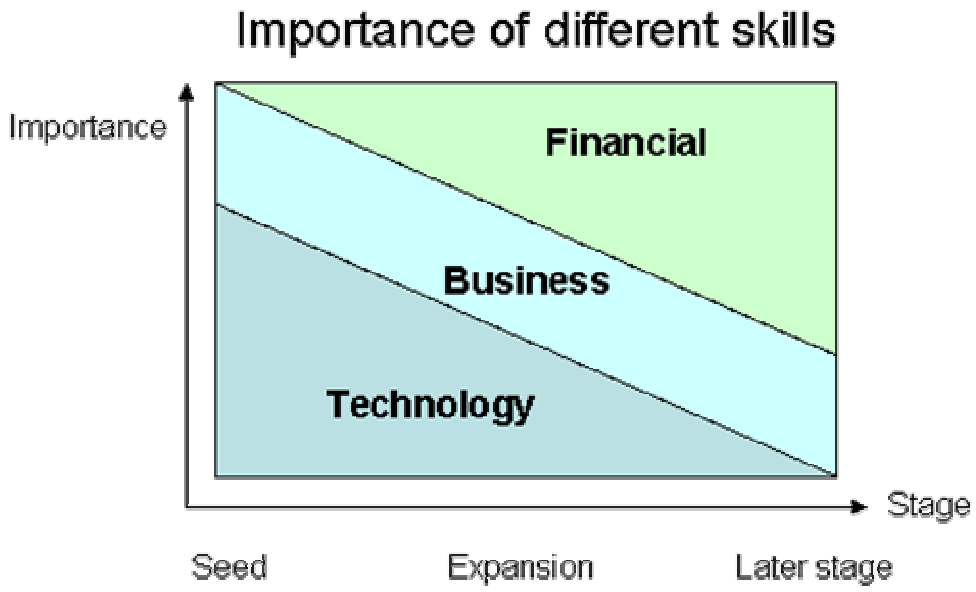

Figure 10 Importance of business and industry specific skills by stage

3.3.3. The Future of Venture Capital

The interviewees were, in general, relatively optimistic about the future of venture capital. The industry is now recovering from the most severe collapse during its lifetime. Most respondents described the current situation in the industry as "poor" or "moderate", but saw many signs of improvements in the near future.

The private equity market situation varies a lot by stage. The funds investing in seed and startup stages were said to have the biggest problems whereas the later stages are performing somewhat better. However, the buyout market was considered to be a totally different type of market. Some interviewees even thought that the European buyout market is overheated at the moment.

The main problem in the industry was said to be the situation in the stock exchanges and the listings market. The same problem was present both in America and in Europe. Some respondents said that the situation is already getting better. Especially the emergence of AIM (in London) and local stock markets for startups were considered to improve the situation in Europe. Also the trade sales market was seen to be getting better as some big companies have started to buy small growth companies.

The amount of money raised was expected to increase slowly in the future. Many respondents were worried that because many investors lost so much money when the stock markets collapsed in 2000-2001, they will never invest in venture capital again. Especially in Europe where the industry is relatively young, the capital commitments will not rise significantly before some really good returns can be seen.

The future of early stage funds were seen as particularly challenging. The main problem was said to be in the small investment sums:

"The operation of early stage venture funds is too expensive due to low investment sums compared to management costs. There is a crisis developing in the early stage money right now."

American VC manager

Another problem is fund raising, which is difficult for early stage funds due to bad historical performance. Seed investments have always been difficult and, consequently, they have been supported by national governments in many countries. The U.S. is often envied due to their "working venture capital model" where even seed funds are able to raise

their money without public support. According to the interviews, the situation in the U.S. is not so different compared to Europe.

"Early stage, and especially seed money, is drying up. There is not enough money to put in the funds. The seed stage funds need support, mainly money, from the state."

American VC manager

Despite all problems, most respondents also saw some positive signs in the early stage venture markets. The worst situation was said to be in 2002-2004 when nobody believed there would be any potential in early stage investments. The number of venture funds investing in early stages decreased dramatically after the stock market crash in 2000-2001. However, but the investors' faith has recently recovered and the competition is expected to increase in the near future as new players will enter the field.

3.3.4. Suggestions for Policy Makers

This section reviews the opinions and views of the interviewed experts regarding essential policy changes.

There are several ways to boost the private equity industry. An important thing to bear in mind is that in order to get the private equity markets working correctly and effectively, the market must be profitable for all stakeholders (limited partners, general partners, and entrepreneurs). Venture capital has a lot longer history in Northern America than in Europe, which can be seen as a more active and mature venture capital markets. There are a number of reasons ranging from legislative issues to cultural differences why the environment in the Northern America is generally seen as more suitable for venture capital industry.

Offering direct support to the venture industry is one alternative to increase venture activity. Public support is needed in the early stages, but later stages should not be intervened. Some interviewees stated that later stages are currently receiving too much support. However, the funding should not influence or distort the markets. It is also important that the public support is offered equally to all players in the market. Direct support can be offered e.g. directly to VC firms or through government investments in seed

funds with asymmetric profit allocation. A cheap way to increase commitments to private equity is to decrease the regulation of pension fund asset allocation.

Private equity can also be supported through indirect measures. Taxation was seen as one of the most severe problems in Europe hampering the development of an active venture capital industry. Reducing capital gains taxation would increase people's motivation to start new companies. It would also increase the net returns of private equity investments. Also the level of income taxes was regarded to be too high by some respondents. Decreasing income taxation would also make management stock options more efficient, which are very often used in growth companies. Removing the regulations concerning employment reductions would also help the restructuring of companies in buyout investments.

Venture capital needs a critical mass in order to be able to work efficiently. Therefore, the small and fragmented markets in Europe should be unified. The large variety of different tax laws and other regulations make the operation of a pan-European fund very difficult and expensive. All national barriers that hinder free competition should be removed. Double taxation also causes serious problems and complicates the structuring of a fund. A common European fund structure should be developed to make the home country of the fund irrelevant.

The lack of a common stock market for growth companies in Europe makes IPOs difficult to achieve. The national markets are not big enough to generate enough trading volume to guarantee liquidity for the shares. Establishing a common stock market would be beneficial for all European countries, but the respondents did not think it would be possible in the near future due to differing national interests.

According to the interviews, the public opinion towards entrepreneurship is not as supportive in Europe as it is in America. The European Union and national governments should try to raise the status of entrepreneurship. In addition, real growth entrepreneurs should be separated from people just aiming to employ themselves. Serial entrepreneurship

is rare in Europe due to the attitudes towards failure. Therefore, the government should help the situation of failed entrepreneurs.

3.4. Summary of the Qualitative Study

The qualitative study indicated that the differences in the characteristics and modes of operation between European and American venture capital companies are not as significant as is the industry's general perception. However, there are some differences in the venture capital markets and in the ways venture funds operate. American venture capital funds seem to utilize more external advisory boards and have closer relationships with big corporations. American VCs also get access to a larger deal flow due to the larger markets. This also enables a narrower focus without having too few investment opportunities.

3.5. Summary of Return Determinants from Literature Review and from Qualitative Study

The return determinants identified earlier in this thesis are presented in Table 3. The importance of the determinants were assessed by the experts interviewed for this thesis.

Table 3 Venture capital return determinants

Determinant	Estimated importance	Estimated effect on returns
Portfolio company related		
Management	High	Investments in portfolio companies with experienced entrepreneurs yield higher retuns
Investment stage	Medium	Early stage investments yield lower returns compared to later stages
Industry	Medium	Investments in high-tech, bio, and medical sectors yield higher returns
Customer type	Low	Investments in B2B companies yield higher returns compared to B2C and B2G companies
Venture investment characteristics related		
Syndication	Medium	Syndicated investments provide above average returns
Contract type	Low	Investments in which convertible securities are used provide above average returns
Stage financing	Low	Short financing stages hamper the long-term development of the company and lead to lower returns
Investment size	Low	Large investments decrease relative costs and yield higher returns
Investment size suitability	Low	Overfunding and underfunding decreases returns
Investment length	Low	Longer investments yield lower IRR returns
Venture fund related		
VC's capabilities	High	Good skills of the fund manager increase returns
Industry specialization	High	Narrow industry focus yields higher returns
VC's participation in portfolio companies	High	Active participation in portfolio companies increases returns
VC's reputation	Medium	Good reputation increases fund returns
Fund size	Medium	The relation between fund size and returns is concave
Growth rate	Medium	Fast VC fund growth results in lower returns
Portfolio management	Medium	Fast liquidation of unsuccessful companies and focus on the best companies increases returns
Exit focused development	Low	Funds that develop their companies to maximize their exit value yield higher returns
Fund length	Low	Funds with determined length yield higher returns
Geographical focus	Low	Narrow geographical focus yields lower returns
Management fees	Low	Lower management fees increase net IRR returns for investors
Risk	Low	Funds with more idiosyncratic risk provide above average returns
Stage focus	Low	Narrow stage focus yields lower returns

Table 3 Venture capital return determinants

(Continued)

Determinant	Estimated importance	Estimated effect on returns
Funding source related		
Financing from public sectors	High	Venture funds with commitments from the public sector yield lower returns
Fund structure	High	Corporate VCs yield higher returns than independent VCs
Economic environment related		
Stock markets	High	Investment in countries with active stock markets enable successful IPOs and yield higher returns
Level of entrepreneurship	High	Entrepreneurs offer attractive investment opportunities resulting in higher returns
Private equity raised during vintage year	High	A high amount of private equity commitments during fund's vintage year increase the prices of portfolio companies resulting in lower returns
Macro economic situation on exit year	High	Good economic situation increases valuation resulting in higher returns
Maturity of the VC market	High	Investments in mature VC markets yield higher returns
Potential market size	Medium	Investments in countries with a large home market make the growth phase of the portfolio companies easier and yield higher returns
Education level	Medium	High education level increases returns
Public opinion on entrepreneurs	Medium	A culture where success brings glory and failure is not a shame provides better returns
Legal environment	Low	A sound legal environment increases returns
Flexibility of labor markets	Low	Investments in countries with flexible labor markets yield higher returns
R&D spending	Low	Investments in countries with high R&D spending compared to GDP yield higher returns
Capital gain tax	Low	Low taxation on capital gains boosts VC industry and increases returns

4. QUANTITATIVE STUDY

In order to be able to explain the performance gap between Europe and North America, it is necessary to find those fund characteristics that have an effect on the fund's returns and that are significantly different between the two continents. In order to find these characteristics, it is crucial to look at fund performance quantitatively. The quantitative study is divided into two different parts. The objective of the first part is to statistically examine the effects of the venture capital performance determinants identified earlier in this study. The second part compares the fund characteristics between Europe and North America.

4.1. Performance Determinants

4.1.1. Selection of the Research Approach

There are a number of decisions a researcher has to make before starting to study the performance of private equity. Perhaps one of the most important decisions is to decide on the level in which the performance is measured. There are four different levels (Figure 11):

1. Aggregate level: average performance by e.g. geography, fund type, etc.
2. Fund level: performance of funds
3. Company level: returns of combined investment in one company
4. Disbursement level: returns of individual investments

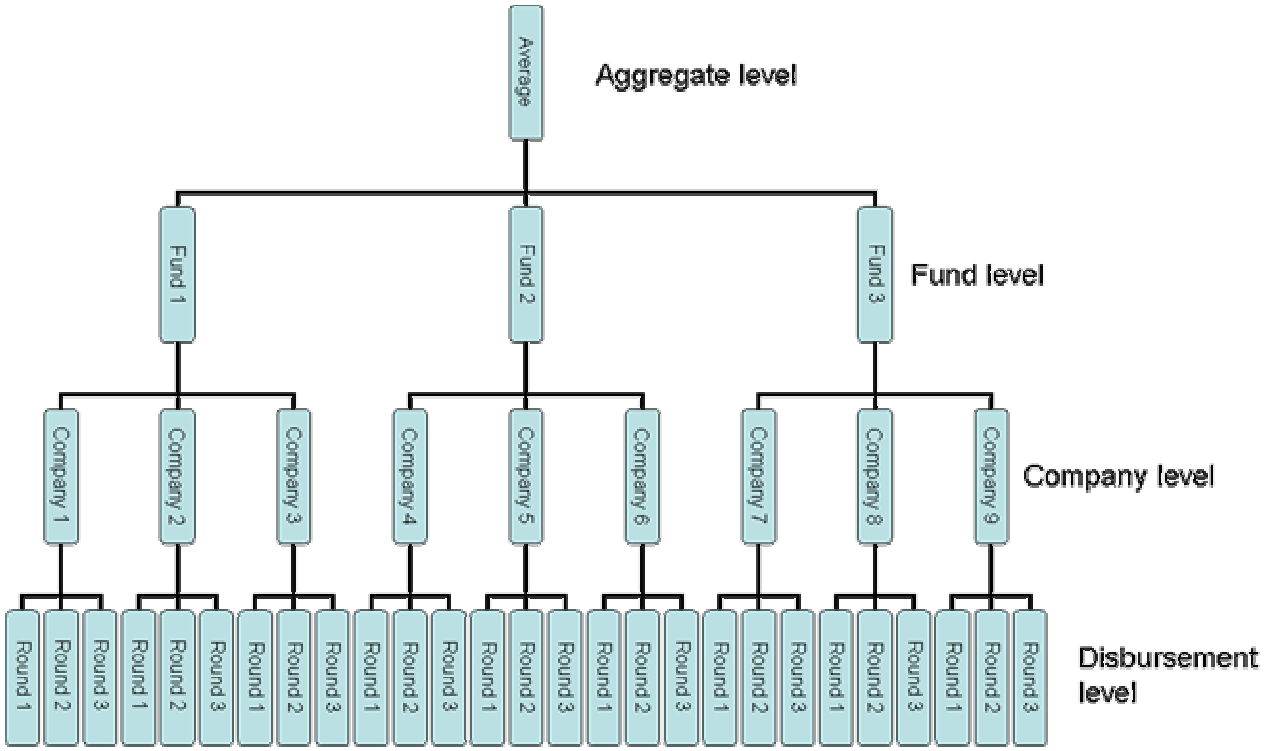

Figure 11 Alternative levels of measuring private equity performance

The optimal level of analysis depends on the research goals and the data available. In this master's thesis we are mainly interested in the way VC funds operate (in Europe and in North America). Therefore, it is logical to analyze the returns on the fund level. Lowering the level of analysis to company or disbursement level might bring more insight into the returns determinants of single investments, but would not enable the direct comparison of fund level return determinants. In addition, acquiring performance data from individual investments is more challenging, and the calculation of the profitability of a single investment is not always meaningful.

There are three general alternative research approaches for conducting quantitative research on venture capital performance:

1. Portfolio company level data from commercial source (in practice either Venture Economics or Venture One)

2. Anonymous fund level data from Venture Economics

3. Fund level or portfolio company level from a limited partner(s) + commercial source

4. Fund level data from Private Equity intelligence + Venture Economics or Venture One

The first alternative means utilizing only one commercial data vendor. Not having to combine data from different data sources enables full utilization of the data points and a large sample size. The main sources of data on the private equity industry are two commercial data vendors, Venture Economics and VentureOne. These are in general excellent sources of information about the investment behavior of private equity funds. They provide information such as which fund invests how much in which company. These data sources are, however, not ideal for investigating the performance of private equity funds (Ljungqvist and Richardson, 2003, p. 4). The main problem in this approach is that neither VE nor VO releases any direct information on the profitability of the funds or investments. Therefore, the returns on the investments must be estimated based on incomplete and partly erroneous information on exits. This methodology also suffers from a severe performance bias, as many funds are reluctant to reveal information on their failed investments, whereas the successful investments (IPOs and trade sales) are practically always reported. The performance bias can be mitigated by using different kinds of selection models. However, building credible regression models on private equity performance is difficult, if not impossible, when the dependent variable (returns) is not exactly known. Examples of studies utilizing this research approach are Das et al. (2003), Giot et al. (2005), and Hege et al. (2003). A good example of a sophisticated method for correcting the performance bias is presented in Cochrane's paper (2005).

Private equity performance can also be studied from the fund level. Venture Economics has gathered reliable information on fund returns. However, this data is not publicly available and it has been revealed to some academics only in anonymous form. The data includes

some basic information on the funds, but as the fund cannot be identified, the data cannot be completed with information from other sources. The return information includes only fund-level data making the analysis of single investments impossible.

"All the empirical work in this section is limited by the confidential nature of the data. We have controlled for fund size, but we have essentially no other additional information about the funds beyond their cash flows. It would be useful, for example, to know how many entities a fund has invested in. It would also be useful to know industry focus and concentration for each fund. Both of these pieces of information could also proxy for idiosyncratic risk. This is an advantage of the dataset used by Ljungqvist and Richardson (2003), who have extensive fund and individual investment data for funds managed by a single general partner. The advantage of the Venture Economics data is that it covers a much larger portion of the asset class."

(Jones and Rhodes-Kropf, 2004, p. 31)

Examples of studies using this approach include Gottschalg et al. (2004), Kaplan and Schoar (2005), and Jones and Rhodes-Kropf (2003).

A second alternative to study private equity is to get access to fund return information from some large investor. The main advantage in this approach is that it enables access to exact and reliable return information with no performance bias. However, the drawback is that the sample size is often relatively small. In addition, the investment strategy of the limited partner affects the funds it invests in, which may lead to a severe selection bias. In other words, the sample is not representative of the whole private equity universe. Getting access to confidential return information requires good connections to the limited partner who would reveal the information. However, due to the Freedom of Information Act in the U.S. some large public investors (e.g. California Public Employees' Retirement System (CalPERS), The University of Texas Investment Management Company (UTIMCO), University of Michigan) have been forced to publish return information on their investments. Knowing only the return information of the funds does not enable constructing any regression models, so the gathered data must be completed with some commercial data

vendor (e.g. Venture Economics). A good example of a study utilizing the method described above is Ljungqvist and Richardson (2003).

A third alternative is to combine the information of two different commercial data vendors. Private Equity Intelligence is a commercial data vendor that has collected exact return information for almost 3000 funds. The information is gathered from publicly revealed returns, limited partners and voluntarily reporting general partners. The data includes full names of the funds, which enables to complete the data with information gathered from e.g. Venture Economics. This approach combines the advantages of all the other research approaches described above: large sample, exact return information, no performance bias, relatively low selection bias, and the possibility to complete the data with other databases. Private Equity Intelligence is a relatively new data source. As a consequence, currently published articles have not utilized it to analyze the determinants of private equity performance. Thus, it is interesting to see how the results utilizing this new research approach relate to older studies on the subject.

The advantages, disadvantages and other characteristics of the different research methods are summarized in Table 4. This thesis utilizes the third research method (Venture Economics and Private Equity Intelligence) due to its apparent superiority over the other methods.

Table 4 Advantages, disadvantages, and other characteristics of different research approaches

Data source	VE/VO		Limited partners+ VE/VO		Private Equity Intelligence + VE	
Measurement level	Fund level	Portfolio company	Fund level	Portfolio company	Fund level	Portfolio company
Sample size	700-1200 funds	5000-15000 funds, 20000-50000 rounds	0-300	0-2000 companies	500-900 funds	N/A
Performance bias	Low	High	none	none	none	N/A
Other selection bias	Low	Low	High	High	Medium	N/A
Accuracy	Good	Poor	Good	?	Good	N/A
Number of possible explaining variables	Low	High	High	High	High	N/A
Availability	Not public	Commercial service	Not public (with some exceptions)	Not public	Commercial service	N/A
Information	IRR, TVPI (cumulative total value to paid-in capital), DPI (distributed total value to paid-in capital), size, sequence number, year, venture/buyout, industry, area, stage	All fund characteristics but no return information	Return information and all fund characteristics	Fund and company return information and all fund characteristics	Net IRR returns and all fund characteristics	N/A

4.1.2. Methodology

Regression analysis

Regression analysis is a statistical methodology which can be used to (Johnson et al., 2002):

1. predict values of one or more dependent variables from a collection of independent variable values

2. assess the effects of the independent variables on the dependent variable

In this study, the regression analysis is utilized to assess the effects of the independent variable(s) on only one dependent variable.

Let $z_1, z_2,\ldots,z_r$ be r independent variables thought to be related to a dependent variable Y. The statistical linear regression model states that Y is composed of a mean, which depends in a continuous manner on the z_i's and a random error ε, which accounts for measurement error and the effects of other variables not explicitly considered in the model. The values of the independent variables recorded from the experiment or set by the investigator are

treated as fixed. The error (and hence the dependent variable) is viewed as a random variable whose behavior is characterized by a set of distributional assumptions (Johnson et al., 2002).

The linear regression model with a single dependent variable takes the form

Equation 2 $$Y = \beta_0 + \beta_1 z_1 + ... + \beta_r z_r + \varepsilon$$

With *n* independent observations on Y and the associated values of z_i, the complete model becomes

Equation 3
$$\begin{aligned} Y_1 &= \beta_0 + \beta_1 z_{11} + \beta_2 z_{12} + ... + \beta_r z_{1r} + \varepsilon_1 \\ Y_2 &= \beta_0 + \beta_1 z_{21} + \beta_2 z_{22} + ... + \beta_r z_{2r} + \varepsilon_2 \\ &... \\ Y_n &= \beta_0 + \beta_1 z_{n1} + \beta_2 z_{n2} + ... + \beta_r z_{nr} + \varepsilon_n \end{aligned}$$

The error terms are assumed to have the following properties:

1. Zero mean, $E(\varepsilon_j) = 0$
2. Constant variance, $Var(\varepsilon_j) = \sigma^2$ (constant)
3. Mutually independent, $Cov(\varepsilon_j, \varepsilon_k)=0$, $j \neq k$
4. Normally distributed

The objective of regression analysis is to determine the values for the regression coefficients β and the error variance σ^2 consistent with the available data. Therefore, it is necessary to "fit" the model in to the observed y_j corresponding to the known values 1, $z_{j1},\ldots,z_{jr}$. This is done with the method of least squares. The parameter values are selected so that the sum of the squares of difference between observed and predicted dependent variables is minimized.

Equation 4 $\min \sum_{j=1}^{n} (y_j - b_0 - b1\ z_{j1} - ... - b_r z_{jr})^2$

Heckman selection method

The Heckman selection model mitigates the bias that results from using nonrandomly selected samples to estimate behavioral relationships (Heckman, 1979). In this study the methodology is utilized to avoid the effects of the possible selection bias in the data used in the econometric model. The general idea is to first estimate the probability that the performance of the venture capital fund is known. Thereafter, the actual regression model is estimated taking into consideration the results of the Heckman selection model.

The utilization of the Heckman selection model is possible in this study since we have the information of all funds in the Venture Economics database (except for the IRR figures). The Venture Economics database is considerably larger than our sample for the funds with performance data, and it is generally considered to be quite exhaustive of all private equity funds. In short, the selection model compares the differences between the two samples and takes these differences into account when generalizing the results obtained from the regression analysis performed for the smaller sample.

Heckman's approach to the selection problem is closely linked to economic theory. His key insight is that observations are often missing because of conscious choices made by economic agents. The relationship between the reasons for missing observations and the nature of non-missing observations thus takes on an intriguing theoretical structure (The Royal Swedish Academy of Sciences, 2000).

In this study it is estimated that the probability of knowing the performance figures of a certain fund is dependent on the following things:

1. Fund type (independent, corporate venture, etc.)
2. Vintage year

3. Location (Europe or North America)

4. Fund size

With the help of the Heckman selection model the results of the econometric model should represent the characteristics of the whole universe of private equity funds, instead of just the sample with performance data.

4.1.3. Hypotheses

Due to the restrictions (e.g. information available and sample size) in the data available and the characteristics of the chosen research approach, all the propositions stated in the literature review and qualitative study cannot be examined quantitatively. In this section we examine only the following hypotheses:

Portfolio company related
Hypothesis 1 Early stage investments yield lower returns compared to later stages
Hypothesis 2 Investments in high-tech, bio, and medical sectors yield higher returns
Hypothesis 3 Investments in B2B companies yield higher returns compared to B2C and B2G companies
Investment characteristics related
Hypothesis 4 Syndicated investments provide above average returns
Hypothesis 5 Short financing stages hamper the long-term development of the company and lead to lower returns
Hypothesis 6 Large investments decrease relative costs and yield higher returns
Hypothesis 7 Longer investments yield lower IRR returns
Fund related
Hypothesis 8 Narrow industry focus yields higher returns
Hypothesis 9 Good reputation increases fund returns
Hypothesis 10 The relation between fund size and returns is concave
Hypothesis 11 Fast liquidation of unsuccessful companies and focus on the best companies increases returns
Hypothesis 12 Narrow stage focus yields lower returns
Funding source related
Hypothesis 13 Corporate VCs yield higher returns than independent VCs
Differences between Europe and North America

Hypothesis 14 Venture capital investments yield higher returns in North America than in Europe
Hypothesis 15 Early stage investments yield relatively lower returns in Europe than in America
Hypothesis 16 Buyout investments yield higher returns in Europe than in America

4.1.4. Categorizations and Data Characteristics

Venture and buyout categorization

The categorization of funds into venture funds and buyout funds is not as clear as one might think. This is due to the fact that many fund make both venture and buyout investments (Figure 12). To avoid the possible differences between Europe and America in emphasizing their investment focus, it was decided not to use the investment focus stated by the funds themselves in the thesis. In addition, the preferred investment focus might not always correlate with the actual investment focus. Therefore, using the type of the actual investments is considered to be less biased than the initially stated investment focus.

The problem is the categorization of funds with both buyout and venture investments. One alternative would be to categorize only funds with 100% venture investments as venture funds, and the same for buyout funds respectively. However, this would leave over half of funds unclassified, which would decrease the sample sizes unnecessarily. On the other hand, using 50% as the required limit would categorize some funds as either venture or buyout, even though they would be essentially investing in both. As a compromise, a limit of 90% is used throughout the study (if not mentioned otherwise).

Fund type categorization

The fund type categorization used in this study is presented in Appendix 3: Categorization of Private Equity Fund Types. The categorization is based on the information provided by Venture Economics.

Correlation of the variables

In general, the correlation of the variables does not seem to be a problem. Correlation of the variables for venture funds are presented in Appendix 4: Correlations of the Variables.

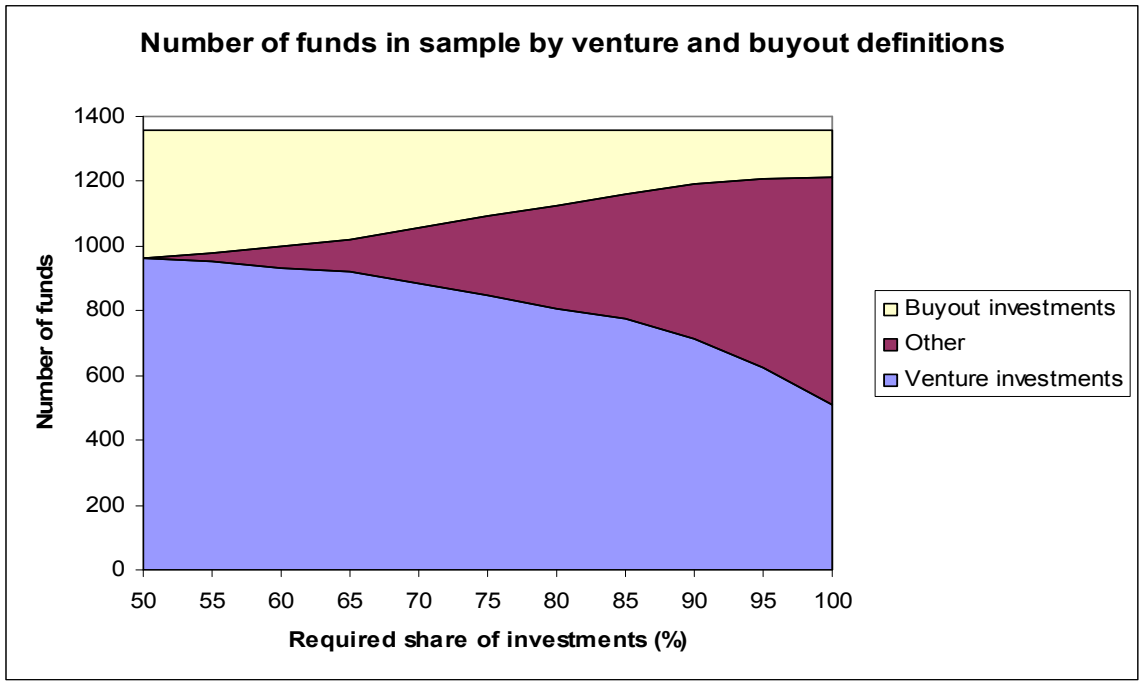

Figure 12 Number of funds in sample using different definitions for venture and buyout funds

Liquidation

The data employed in this study includes information on the performance of non-liquidated funds. However, these figures are not very reliable, since the measurement of future cash flows requires assumptions and subjective assessment. Therefore, one cannot be sure that the reported figures are entirely comparable with one another.

To avoid using erroneous data the examined data sample is restricted to only liquidated funds. The best way to measure the liquidation rate of a fund is to calculate the ratio of distributions the estimated net present value:

Equation 5 $$\text{Liquidation rate} = \frac{\text{Distributions}}{\text{Net present value (NAV) of investments}}$$

However, using the liquidation rate as a selection criterion may bias the sample severely, as described earlier (section 2.7.3). Therefore, we use the fund's vintage year as a selection criterion instead of liquidation rate. The decision of the last vintage year still included in the

sample is a compromise between sample size and accuracy. Since the typical length of a fund is about 10 years, we decided to exclude funds with a vintage year of 1999 or higher from the sample.

Winsorizing

To make sure that our results are not driven by outliers, we report the estimation results for the winsorized sample where the values of the 1% of the upper and lower tails of observations are limited to the border values. This is consistent with e.g. Hege et al., 2003.

Robust variance estimates

The models presented in this thesis are executed with the Stata's robust option which means that the model-based variance estimates are replaced with more model-agnostic "robust" variances. Robust variances give accurate assessments of the sample-to-sample variability of the parameter estimates even when the model is misspecified. The robust variance is known as the Huber/White/sandwich estimate of variance (Huber, 1967; White, 1980)

Comparison with Venture Economics

Despite the careful structuring of the research method, selection bias cannot be avoided if it is present in the used data itself. Therefore, it is important to compare the used data sample to other data or statistics available. Venture capital performance, as the dependent variable in the study, is our main concern related to possible biases. Nonetheless, there seems to be no biases in the performance figures, when compared to the anonymous data collected by Venture Economics (Figure 13, Figure 14, Figure 15, and Figure 16). The performance of venture funds with vintage year after 1998 is marked with a dotted line, since their performance is still uncertain due to non-liquidated investments.

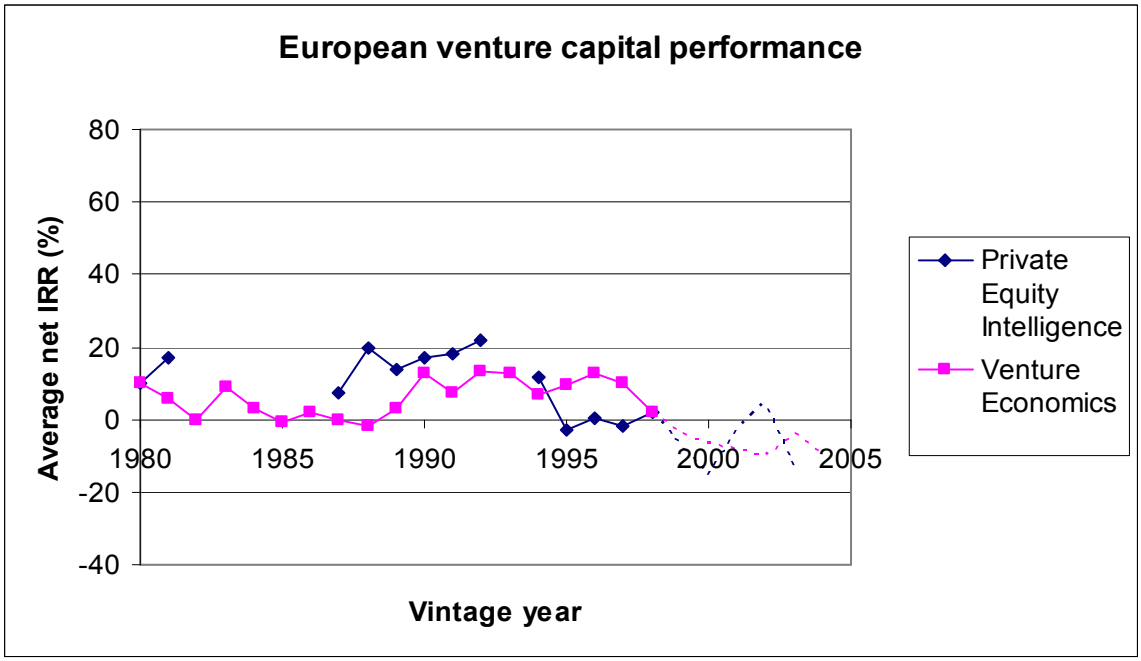

Figure 13 Data source comparison between Venture Economics and Private Equity Intelligence using non-weighted average IRRs by funds' vintage year: European venture

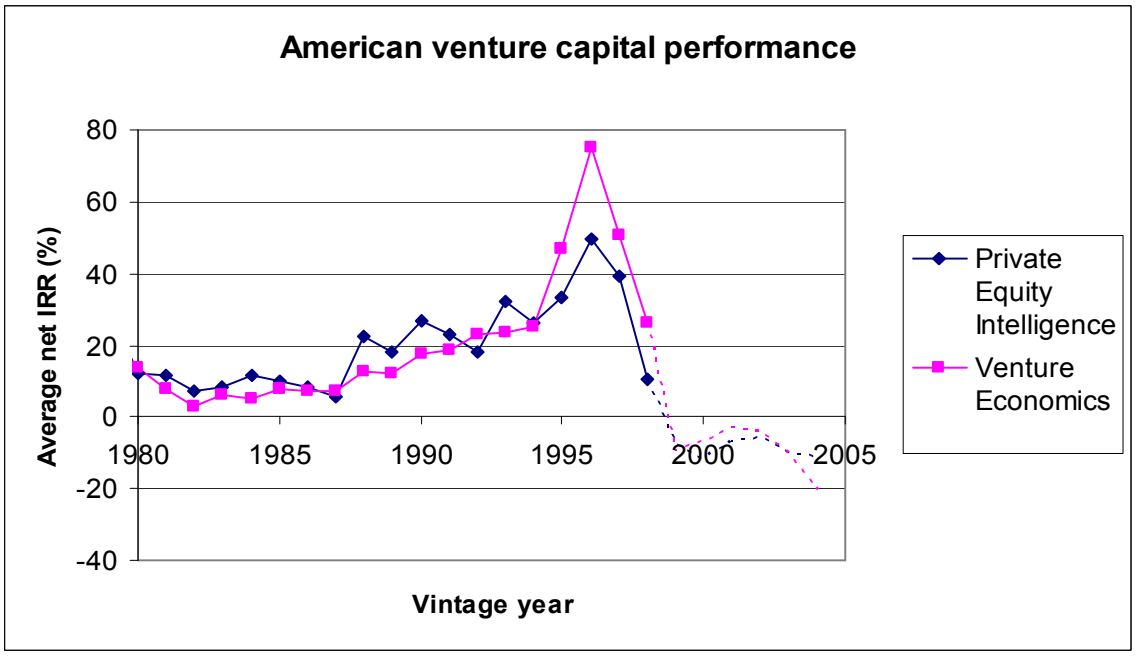

Figure 14 Data source comparison between Venture Economics and Private Equity Intelligence using non-weighted average IRRs by funds' vintage year: American venture

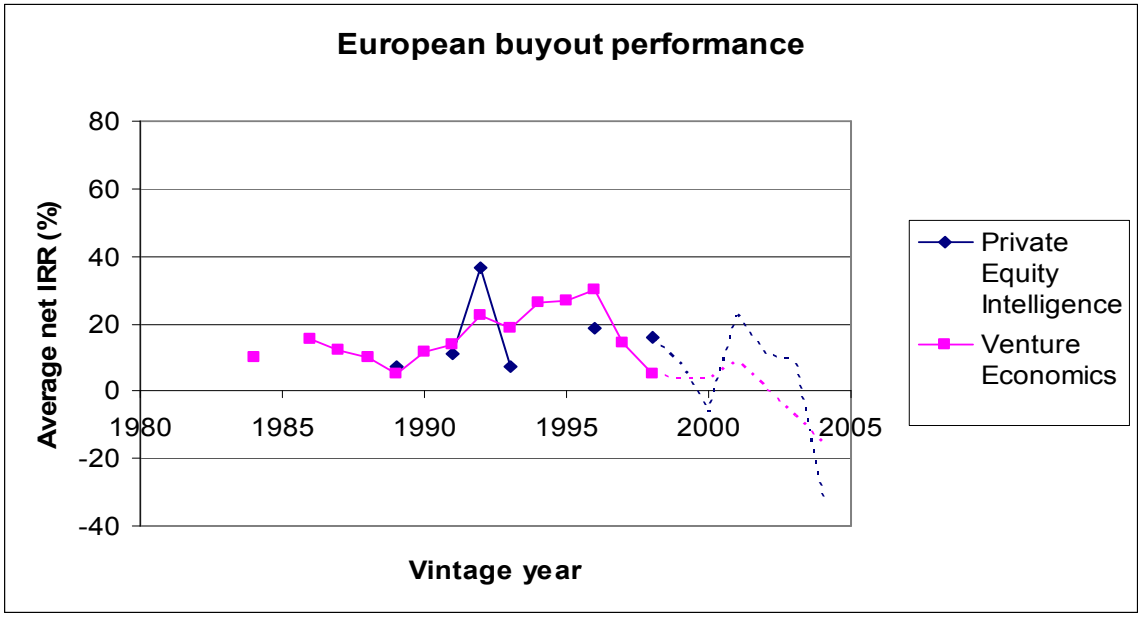

Figure 15 Data source comparison between Venture Economics and Private Equity Intelligence using non-weighted average IRRs by funds' vintage year: European buyout

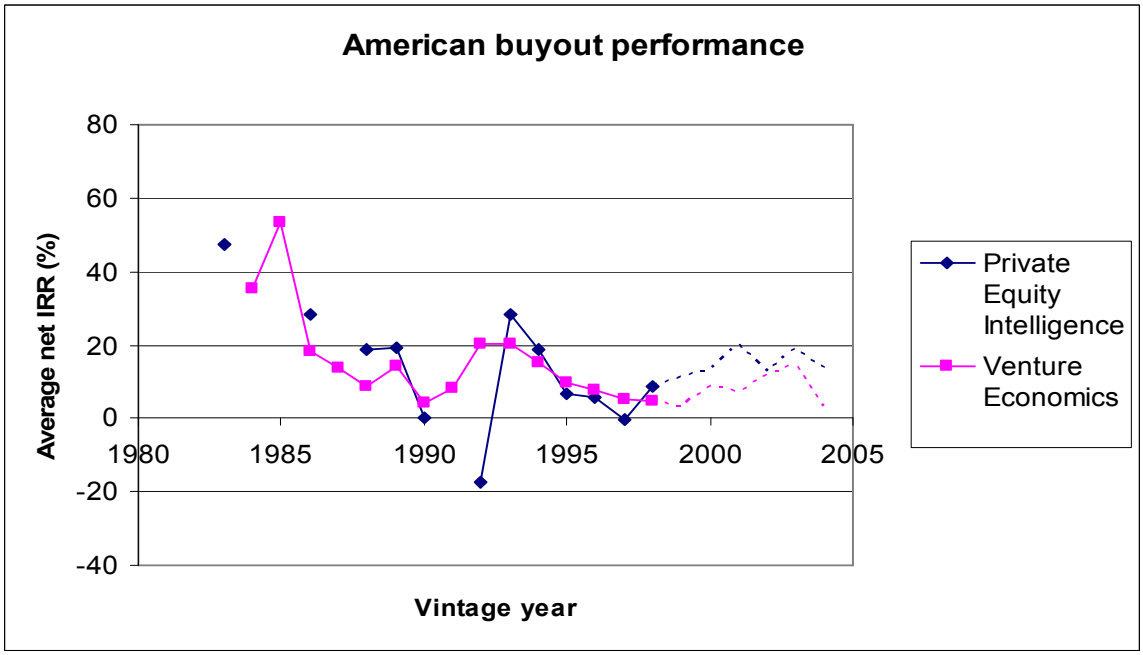

Figure 16 Data source comparison between Venture Economics and Private Equity Intelligence using non-weighted average IRRs by funds' vintage year: American buyout

The vintage year distribution of the sample seems to correspond to the distribution of all funds reported in Venture Economics (Figure 17 and Figure 18). The only exception is that European funds with vintage year of 2000 are clearly underrepresented. However, this does not influence the results of the econometric model since only funds with vintage year of 1998 or older are included in the model. Furthermore, the Heckman selection model correction mitigates all possible selection biases in the sample.

One problem in the Venture Economics database is that it is more complete concerning North American private equity funds compared to European funds. A larger share of the actual investment rounds are reported in the database in Northern America. In addition, the data reported in Northern America is more detailed and accurate.

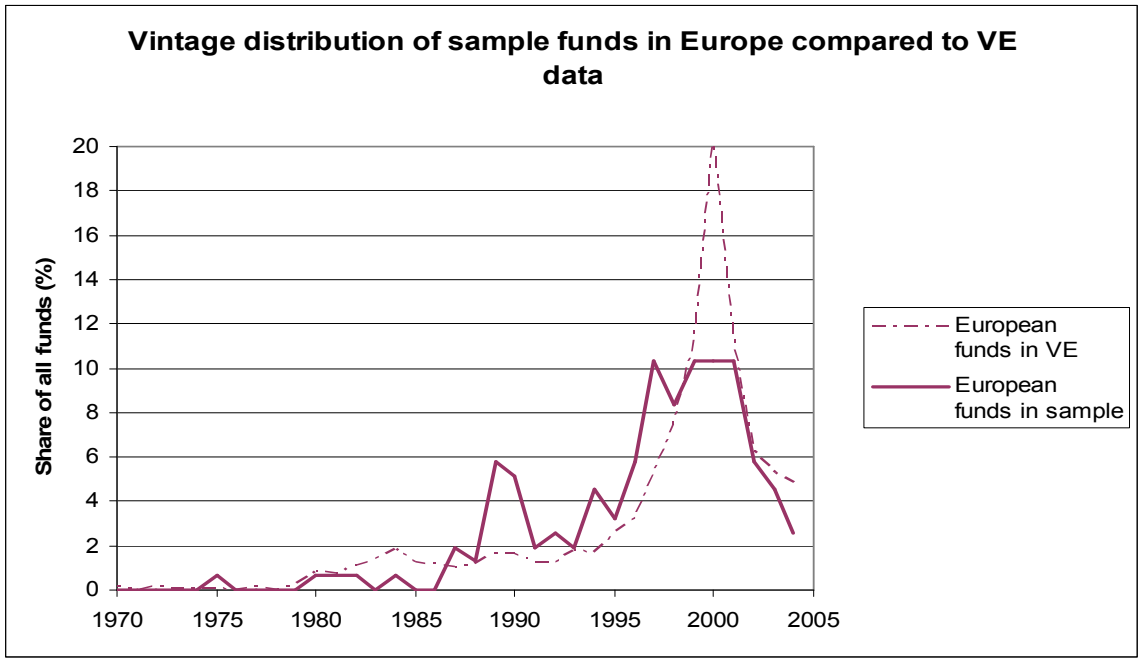

Figure 17 Vintage distribution of sample funds in Europe compared to all data in Venture Economics

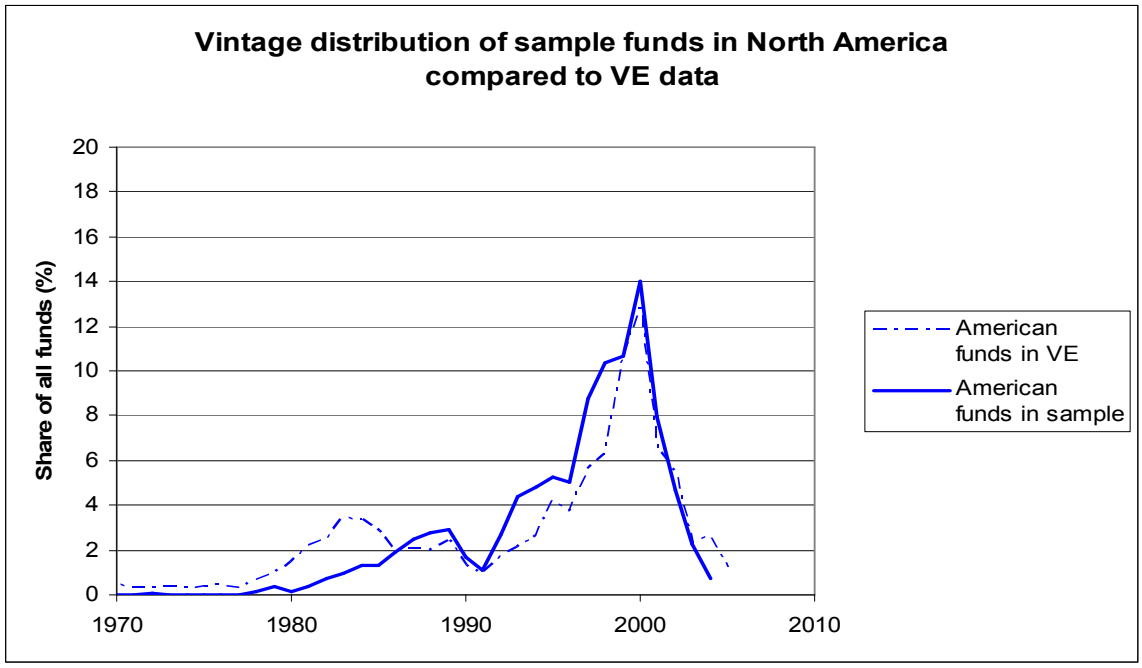

Figure 18 Vintage distribution of sample funds in North America compared to all data in Venture Economics

The data used in the statistical model was analyzed critically to ensure the quality of the results and conclusions. The following corrections were implemented:

- Removal of clearly erroneous vintage year (1 fund)
- Removal of fund with inconsistent location information (1 fund)
- Excluding funds and investor entities not categorized as private equity funds (e.g. angel investors, family groups, fund-of-funds, etc.) (441 funds / investor entities)
- Excluding funds located outside Europe and North America (1616 funds)

4.1.5. Models

Table 5 General structure of the econometric model on private equity performance

Category	Description	VE variables	Final Variables
Performance (dependent variable)			
Performance	Net IRR returns for investors	IRR figures taken from Private Equity Intelligence database	Fund's net IRR (%)
Portfolio company related determinants			
Stage	Percentage of portfolio companies in different stages	Company Stage Level 1 at each Round Date	Startup/Seed (%)
			Early Stage (%)
			Expansion (%)
			Later Stage (%)
			Buyout/Acquisition (%)
			Other (%)
Industry	Percentage of portfolio companies in different industries	Company Industry Class	Information Technology (%)
			Medical/Health/Life Science (%)
			Non-High Technology (%)
Customer focus	Percentage of portfolio companies with different customer focus	Company Primary Customer Type	Consumer (%)
			Business (%)
			Government (%)
			All / no focus (%)
Venture investment characteristics related determinants			
Investment size	Average round investment by all funds in rounds that the fund participated	Estimated Round Total ($ Mil)	Total investment size / round
	Average company investment by all funds in rounds that the fund participated	Total Known Amt Invested in Company ($ Mil)	Total investment size / company
Investment length	Average round length (months)	Date Company Received First Investment	(Last - first investment) / number of rounds
		Date Company Received Last Investment	
	Average investment length (months)	Date Company Received First Investment	Last - first investment
		Date Company Received Last Investment	

Table 5 General structure of the econometric model on private equity performance (continued)

Category	Description	VE variables	Final Variables
Venture fund related determinants			
Location	Fund Nation	Fund Nation	Europe (D)
			US (D)
Specialization	Percentage of investments in different stages	Company Stage Level 1 at each Round Date	Stage specialization (Herfindahl index)
	Percentage of investments in different industries	Company Industry Class	Industry specialization (Herfindahl index)
	Percentage of investments in different customer types	Company Primary Customer Type	Customer specialization (Herfindahl index)
Syndication	Average number of investors in rounds in which the company participated	No. of Funds Invested in Company	Investors / round
Networking	The amount and quality of firm's connections to other VCs	Firm Name	Bonacich index
		Company name	
Stickiness to investments	Percentage of companies receiving more than one financing round	No. of Rounds Company Rcvd	(Average rounds/company if successful exit) / (Average rounds/company if unsuccessful exit)
		Company situation	
	Percentage of company's all rounds company participated in	No. of Rounds in which Fund Participated in Company	Round participation (%)
		No. of Rounds Company Rcvd	
VC's experience	Fund Sequence No.	Fund Sequence No.	Fund Sequence No.
			Log of Fund Sequence No.
Fund size	Fund size	Fund Size ($ Mil)	Fund Size
	(Fund size)^2	Fund Size ($ Mil)	(Fund size)^2
Timing	Vintage year	Vintage year	1960
			1961
			…
			2005
Cross-border investments	Percentage of investments outside home area	Company Specific World Region	American fund in European company (%)
		Fund Specific World Region	European fund in American company (%)
Funding source related determinants			
Fund Structure	Captive or independent	Fund type	Independent
			Corporate venture
			State supported
			Other
			Not private equity

There are almost an unlimited number of different models that can be constructed from the data collected in this thesis. Several different models were constructed with the data in order to be able to ensure the reliability of the results and to be able to interpret them correctly. However, only some of the constructed models could be included in this thesis. The models shown in this study are categorized into the following groups:

1. Pure venture funds (main model)
2. Pure venture funds models comparing the performance between Europe and Northern America
3. Pure buyout funds
4. Private equity model (venture funds + buyout funds + mixed funds)
5. Consistency checking by last vintage year included in the sample for private equity funds model

Pure venture funds (main model)

In order to be able to take into account the unique characteristics of venture capital versus buyouts, a model that includes only pure venture funds was constructed. This model is assumed to give the best possible picture of the performance determinants of venture capital. Having separate models for European and North American venture funds enables the analysis the impact of the variables separately for both market areas. Additional models with separate investment stages and vintage years are also constructed to ensure that the potential differences in performance by stages or vintage years are identified.

The venture capital category includes five different models (Table 6):

Model 1A: Main model for venture funds

Model 1B: Model for Northern American venture funds

Model 1C: Model for European venture funds

Model 1D: Model for venture funds with separate variables for European and American stages

Model 1E: Model for venture funds with separate variables for European and American vintage year

Table 6 Heckman selection model results for venture funds

	Model 1A (all venture)		Model 1B (America)		Model 1C (Europe)		Model 1D (sep. stages)		Model 1E (sep. vintages)	
Variable	IRR	Selection	IRR	Selection	IRR	Selection	IRR	Selection	IRR	Selection
European fund (D)	1.139	-0.482 ***						-0.482 ***		-0.483 ***
Investments in American startups (%)							0.080			
Investments in American early stages (%)							-0.017			
Investments in American expansion stages (%)							-0.277			
Investments in American later stages (%)							0.099			
Investments in European startups (%)							-0.328			
Investments in European early stages (%)							-0.231			
Investments in European expansion stages (%)							-0.010			
Investments in European later stages (%)							-0.074			
North European fund (D)					29.222					
East European fund (D)					58.961					
American fund investing in Europe (% of investments)	21.500		9.448				24.726		30.331	
European fund investing in America (% of investments)	-6.366				28.665		-12.020		-55.434 ***	
Startup (% of investments)	2.583		-13.047		-11.394				6.860	
Early stage (% of investments)	-7.232		-3.280		-34.205				-4.932	
Expansion stage (% of investments)	-26.945		-36.592		-10.805				-23.575	
Later stage (% of investments)	-3.125		-3.368		-18.763				-9.265	
Buyout (% of investments)	-129.264 *		-72.096		436.791				-128.023 *	
Stage specialization (Herfindahl)	-4.924		14.637		-5.046		-0.857		-14.383	
IT and high-tech (% of investments)	17.556 *		10.623		-23.359		16.793 *		19.893 *	
Medical and bio (% of investments)	-1.483		-6.329		-10.800		2.037		-0.035	
Industry specialization (Herfindahl)	8.421		7.888		36.635		13.977		9.049	
B2B companies (% of investments)	36.437 ***		32.286 ***		-2.498		33.943 **		34.225 **	
B2G companies (% of investments)	-71.147						-75.975		-58.623	
B2C companies (% of investments)	16.244 +						13.544		14.914	
Customer specialization (Herfindahl)	-2.763						0.438		2.509	
Average investment round size	-0.189 +						-0.196 +		-0.223 +	
Average investment round length	0.178						0.134		0.203	
Logarithm of fund's sequence number	5.308 *		-6.417 +		-5.835		4.364 +		4.529 *	
Syndication	3.525 **		3.061 *		0.366		3.565 **		4.163 ***	
Bonacich index during vintage year			71.723 ***							
Size of the fund	7.483	2.275 ***	-30.296	2.323 ***	-201.646	2.147 **	6.508	2.274 ***	-4.140	2.267 ***
Size of the fund (squared)	-8.979		8.368		-44.296		-9.486		-3.113	
Corporate venture (D)	45.322 *	-1.064 ***	89.537 ***	-1.415 ***	14.632	0.077	45.942 *	-1.063 ***	51.676 **	-1.062 ***
State funded (D)	1.878		3.117		-50.432		2.716		2.433	
Other fund type (D)	-0.573	-0.837 ***	-1.460	-1.121 ***	42.515	-0.260	-0.871	-0.838 ***	0.460	-0.836 ***
Vintage in 1960-69 (D)		-0.573		-0.509				-0.572		-0.573
Vintage in 1970-79 (D)		-0.533 *		-0.452 *		-5.250		-0.532 *		-0.533 *
Vintage in 1980-89 (D)		-0.115 +		-0.185 *	-10.822	0.259		-0.115 +		-0.116 +
Fund's sequence number		0.061 ***		0.076 ***		0.042		0.061 ***		0.061 ***
Vintage year dummies	included		included		included		separate		included	
Constant	-6.755	-1.197 ***	8.029	-1.269 ***	205.738	-1.788 ***	-19.620	-1.198 ***	-9.810	-1.198 ***
Observations	331	2282	281	1852	26	406	331	2282	331	2282
Type	Heckman likelihood		Heckman likelihood		Heckman twostep		Heckman likelihood		Heckman likelihood	

Significance: *** = 0.1%, ** = 1% * = 5%, + = 10% (1-tailed significance used because all variables are based on hypotheses)

Pure venture funds models comparing the performance between Europe and Northern America

The performance difference between Europe and Northern America is of particular interest in this thesis. A commonly known fact is that the aggregate performance of European venture capital has been lower in Europe compared to Northern America. This can be confirmed by calculating the aggregate performance of European and American venture funds included in the data of this study (Table 7). However, an interesting question is that whether or not this observed performance gap in the aggregate returns can be explained by the differences in the characteristics of the funds. To be able to assess the impact of the fund characteristics on the performance gap four different models were constructed (Table 8):

Model 2A: A model with the dummy of the fund's location as the only variable

Model 2B: A model with the location dummy and the vintage dummies

Model 2C: A model with location dummies, vintage dummies, and sample bias corrections

Model 2D: A model with location dummies, vintage dummies, sample bias corrections, and fund characteristics corrections

Table 7 The observed performance gap in venture capital returns between Europe and Northern America

	Mean net IRR	Standard error	95% low	95% high
Europe	8.58	2.55	3.37	13.79
Northern America	21.25	2.00	17.32	25.19

Table 8 Value and significance of the variable European fund (D) in different model specifications

	Model 2A	Model 2B	Model 2C	Model 2D (=1A)
Variable	IRR	IRR	IRR	IRR
European fund (D)	-11.321 ***	-13.372 ***	-10.161 *	1.139
P value	0	0.0005	0.0355	0.446
Vintage correction	No	Yes	Yes	Yes
Sample bias correction	No	No	Yes	Yes
Fund characteristics correction	No	No	No	Yes
R-squared	0.007	0.093	0.096	0.279
Type	Regression	Regression	Heckman likelihood	Heckman likelihood

Pure buyout funds

Buyout funds are not in the focus of this study, and therefore the results concerning buyout funds are reported in the Appendix 5: Econometric Model Results for Buyout Funds. Nevertheless, three models for buyout funds were constructed:

Model 3A: Main model for buyout funds

Model 3B: Model for Northern American buyout funds

Model 3C: Model for European buyout funds

Private equity model (venture funds + buyout funds + mixed funds)

The models in the fourth category utilize the whole data set (venture funds and buyout funds). Therefore, the sample size is large and allows the examination of the effect of many variables. However, the different characteristics of venture and buyout investments cannot be taken into account in this model. This feature reduces the ability of the model to explain the variation in the dependent variable and may distort the values of the regression coefficients. The results of the models are reported in Appendix 6: Econometric Model Results for All Private Equity Funds.

The category includes three different models:

Model 4A: Simple regression model

Model 4B: Heckman selection model

Model 4C Heckman selection model without Bonacich variable measuring the status of the fund

The Bonacich variable is calculated using the information on investment rounds in the Venture Economics database. Due to the fact that a significantly higher share of all actual investment rounds is reported in America than in Europe, the Bonacich variables of the two areas are not exactly comparable with each other. Therefore, Model 1C should be used instead of Model 1B when comparing the performance of European and Northern American private equity.

Consistency checking by last vintage year included in the sample for private equity funds model

In all the models presented above, only funds with a vintage year of 1998 or before are included in the sample. To increase the robustness of the analysis, the models were run also including newer funds. The results for model 4C with different vintage specifications are presented in Appendix 7: Econometric Model Results with Different Vintage Samples. There does not seem to be any significant differences in the regression coefficients between the models which increases the confidence in the results of the models.

4.1.6. Results

The econometric model of this study was constructed based on the hypotheses stated earlier in this text. Below we examine whether or not the results of the models support the hypotheses.

Hypothesis 1 Early stage investments yield lower returns compared to later stages

Not supported.

The effect of the portfolio companies' stages does not seem to be statistically significant in any of the model specifications. This is consistent through American and European venture capital. Therefore, the data does not give any support for the hypothesis.

Hypothesis 2 Investments in high-tech, bio, and medical sectors yield higher returns

Some support.

The regression coefficient is statistically significantly positive for investments in the IT sector in all models including both venture and buyout. According to the model 2A, increasing the share of IT investments by 10% is expected to increase the fund's net IRR return by 1.7%. The models 2B and 2C give some indication that the IT investments could be more profitable in Northern America than in Europe. The bio and medical investments seem to yield only average returns. The coefficient for bio and medical investments is not statistically different from zero.

Hypothesis 3 Investments in B2B companies yield higher returns compared to B2C and B2G companies

Supported.

Investments in B2B companies seem to increase the fund returns, since the coefficients are positive and significant in almost all model specifications. The only exception is European venture funds, but the result is not statistically significant

Hypothesis 4 Syndicated investments provide above average returns

Supported.

Syndicated investments seem to provide above average returns. The more funds participate in the investment rounds, the better the returns. The coefficient for syndication is positive in all model specifications (except for European buyout), and also statistically significant in most cases. The coefficient ranges from 3 to 4 meaning that one extra investor in the investment round increases the expected IRR return about 3 - 4 %.

Hypothesis 5 Short financing stages hamper the long-term development of the company and lead to lower returns

Some support.

The coefficient for the variable describing the average length of the fund's investment rounds is positive in almost all model specifications. This difference is statistically significant for venture funds. However, the estimated effect is relatively low since increasing the average length of the investment rounds by one month is expected to increase the net IRR by only 0.1-0.2%.

Hypothesis 6 Large investments decrease relative costs and yield higher returns

Not supported.

The size of the average investment does not seem to affect the fund returns. The coefficient for the variable measuring average size of the fund's investment round is negative in all venture capital model specifications. However, none of the coefficients is statistically significantly unequal to zero.

Hypothesis 7 Longer investments yield lower IRR returns

Not supported.

According to the econometric model, the average length of the funds investments does not seem to affect the returns of venture capital funds. The coefficient of the variable was not statistically significantly different from zero. However, the variable is not included in the models presented in this thesis due to correlation with other variables.

Hypothesis 8 Narrow industry focus yields higher returns

Some support.

A narrow industry focus seems to provide above average returns for venture funds. This is consistent through all model specifications, even though the effect is not statistically significant. The impact on returns on the buyout side, however, seems to the opposite. A narrow focus seems to decrease returns for buyouts but the effect is not statistically significant. This sounds logical, since the industry specific knowledge is not as important in the buyout side compared to venture investments.

Hypothesis 9 Good reputation increases fund returns

Supported.

The reputation of a VC fund cannot be measured directly from the data and therefore the stated hypothesis cannot be examined exactly. However, the Bonacich index has a clear and statistically highly significant impact on fund returns. One could assume that reputation correlates with the amount of networking with other VCs, since a good reputation helps to establish new relationships. Nonetheless, this does not necessary tell us anything about the causal relationship between returns and good reputation.

Hypothesis 10 The relation between fund size and returns is concave

Some support.

The relation between fund size and returns seem to be concave in most model specifications. However, the results are not statistically significant for the squared fund size. This would indicate that there is an optimal size for a private equity fund. Nevertheless, this optimal size cannot be calculated due to the variation and insignificance of these results.

Hypothesis 11 Fast liquidation of unsuccessful companies and focus on the best companies increases returns

Not supported.

This statement was examined by including a variable that calculates the ratio between the average number of rounds per successful and unsuccessful round. The coefficient was insignificant and even negative for most model specifications. Due to the lack of data this variable could be calculated for only about half of the sample funds. Therefore, this variable was excluded from the models presented in this study.

Hypothesis 12 Narrow stage focus yields lower returns

Some support.

Even though the coefficients are not statistically significant, it seems that a too narrow stage focus lowers fund returns. This is consistent through all combined model specifications and through European venture funds. However, buyout funds seem to benefit from a narrow stage focus. This is logical because a low stage focus for a buyout fund would mean investments in venture funds, which are not their core competence.

Hypothesis 13 Corporate VCs yield higher returns than independent VCs

Supported.

According to the model, corporate affiliated venture funds provide higher returns compared to independent VCs. The result is highly significant and consistent through all venture fund model specifications. However, the effect seems to be the opposite for buyout funds, even though the result is not statistically significant.

Hypothesis 14 Venture capital investments yield higher returns in North America than in Europe

Not supported.

The general perception is that the performance of European venture capital has been poorer compared to Northern America. This is true if we only look at the aggregate returns without controlling the characteristics of the funds (Table 7). Similarly, according to the model 2A in Table 8 which does not include any other variables than the location of the fund, the

aggregate returns for venture capital investments have been on average 11 % higher in Northern America than in Europe. This difference is statistically significant.

However, the performance difference between Europe and Northern America becomes nonexistent when we control for the differences in the fund characteristics (model 2D). This can be interpreted so that the location of the fund does not have any effect on performance. However, the characteristics of the European funds have been poorer which has caused them to perform on average poorer than their Northern American counterparts. In other words, the location of the fund is irrelevant and only the characteristics of the fund matters.

Hypothesis 15 Early stage investments yield relatively lower returns in Europe than in America

Not supported.

The stage of the investment does not seem to have a statistically significant impact on fund returns. This is consistent in both America and Europe. Therefore, the data does not give any support for the stated hypothesis.

Hypothesis 16 Buyout investments yield higher returns in Europe than in America

Not supported.

According to the model, there is no difference in the returns for pure buyout funds between Europe and North America. The coefficients are insignificant in all model specifications.

4.2. Differences between European and American Venture Funds

This section examines the differences in private equity characteristics between Europe and North America. Since the performance figures of the funds are not necessary in this analysis, the whole universe of funds present in the Venture Economics database can be utilized. This gives a very good picture of the situation because the coverage of Venture Economics is generally regarded as good.

4.2.1. Portfolio Company Characteristics

The European private equity industry is traditionally more concentrated on buyouts whereas the North America has a long history of successful venture capital investments. This can clearly be seen in the higher share of buyout investments in Europe (Figure 19). The differences in the stage allocation of venture capital investments are not as significant. Somewhat surprisingly, startup investments are slightly more common in Europe. European venture capitalists also seem to make more investments in expansion stages. On the other hand, American VCs prefer early stage and later stage investments more than European VCs. The differences are statistically highly significant, although not remarkably important.

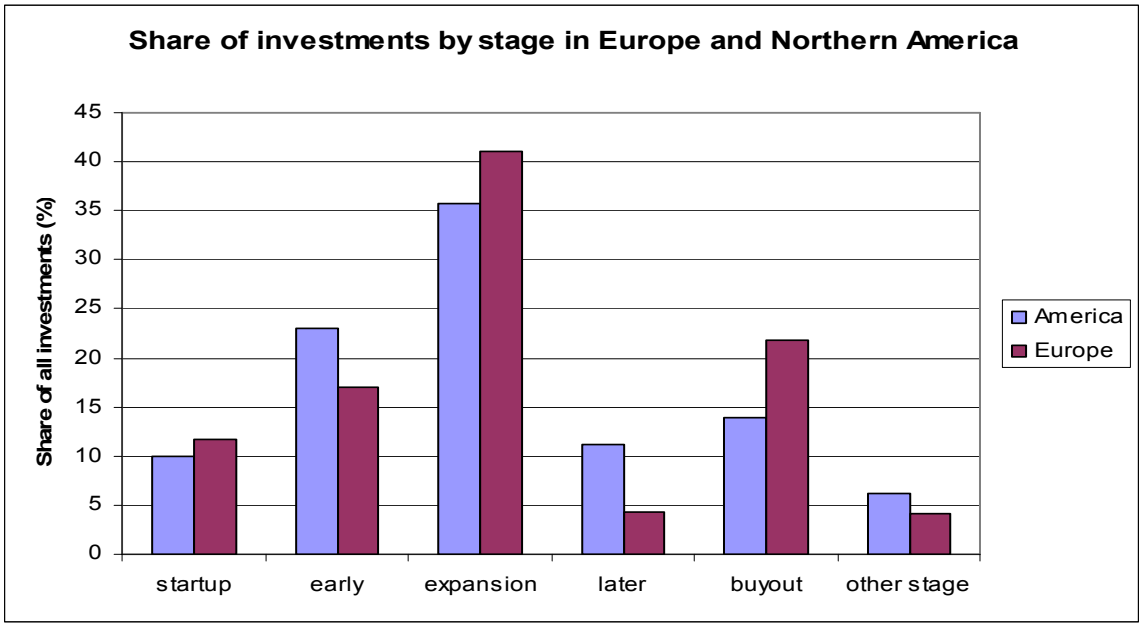

Figure 19 Investment stage distribution in Europe and in North America

According to the general perception in the industry, investments in information technology are far more common in North America than in Europe. The difference is confirmed by our data set, but the difference is not as significant as expected. As the American VCs invest more in high-tech firms, European VCs tend to focus more investments in medical and traditional industry sectors. Therefore, it can be concluded that the observed performance

gap between Europe and America could partially be explained by the higher share of high-tech investments in America.

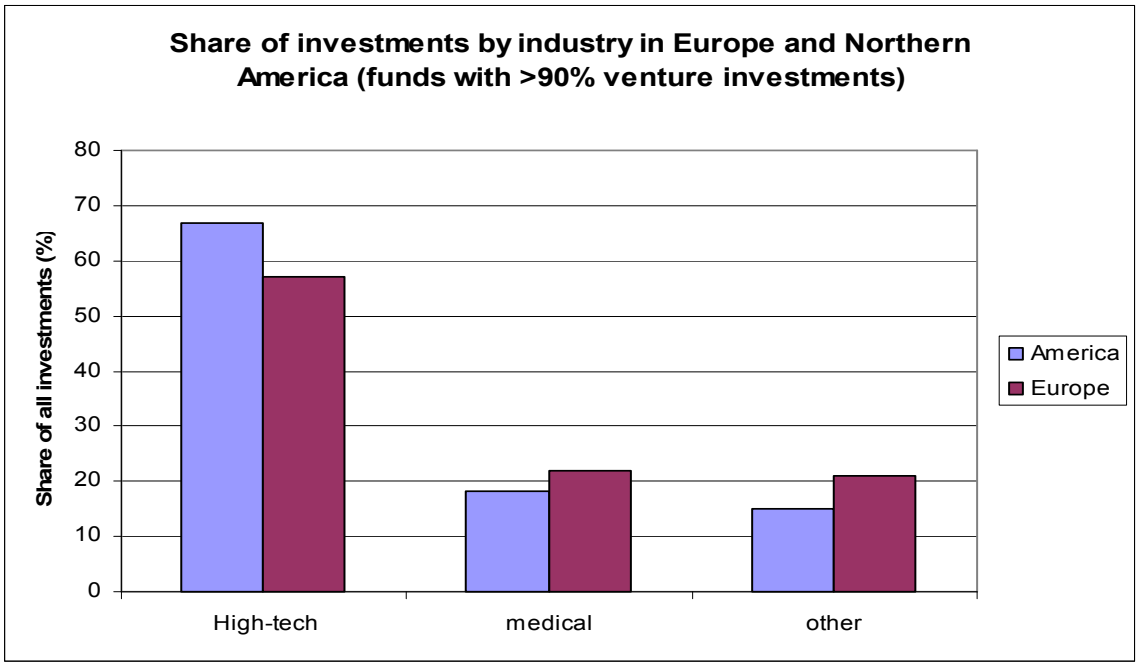

Figure 20 Industry distribution of venture capital investments in Europe and in North America

According to our data, there seems to be no significant difference in the customer focus of the target companies of the European and American VC companies. However, North American ventures are more often concentrated on either business or consumer customers. In addition, American invest more in B2B (business-to-business) companies, which were found to be more profitable earlier in this study. Nevertheless, the difference is so small that the effect on the average profitability of the venture industry is insignificant.

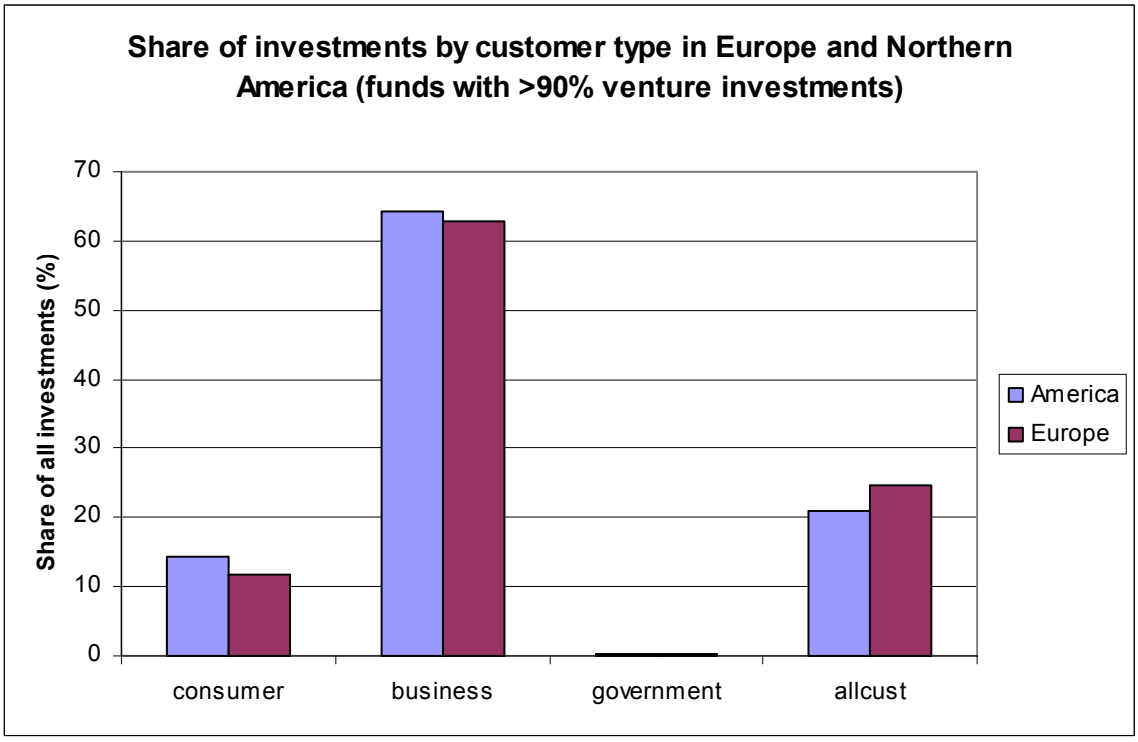

Figure 21 Customer type distribution in Europe and in North America

4.2.2. Size and Length of Investments

The common perception in the private equity industry is that the round sizes in America are significantly bigger compared to Europe. The latest research has shown that the investments are on average about triple in size in the U.S. compared to Europe (Minniti et al., 2005).

According to the Venture Economics data, the difference is almost inexistent (Figure 22). The round sizes are examined through median values due to the higher robustness of median values compared to mean values. The round sizes seem to be slightly bigger in America from the startup phase to the expansion stage of the company. After that, from later stage to buyouts, the median round sizes are bigger in Europe.

However, the median round sizes in Europe and North America are not entirely comparable due to the fact that the American round sizes are reported in the data base significantly

more often (Figure 23). Since it is highly probable that large round sizes are reported more often than small sizes, the actual median round sizes are somewhat smaller than the ones reported here. The true impact of the bias is immeasurable but most likely significant. Therefore, it can be concluded that the median round sizes are smaller in Europe than in North America, but the difference is not as significant as the general perception in the industry.

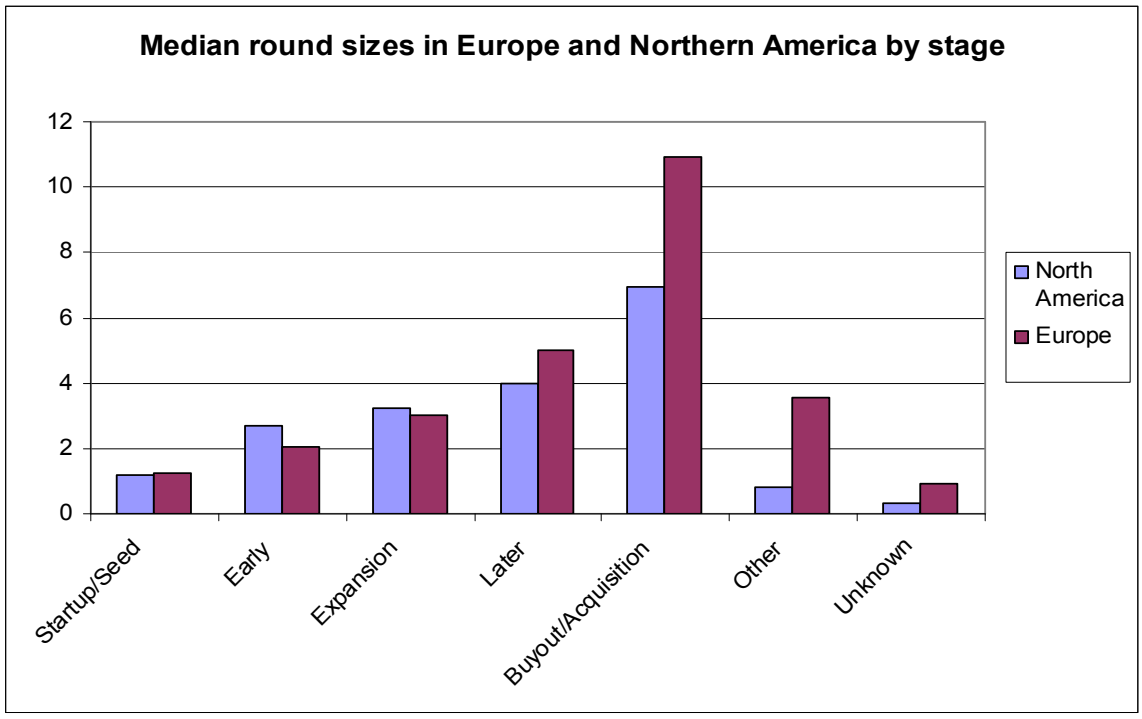

Figure 22 Investment sizes in Europe and in North America[2]

[2] The figures of Europe and Northern America are not entirely comparable due to the incomplete data available in Venture Economics, which is likely bias upwards the figure for Europe

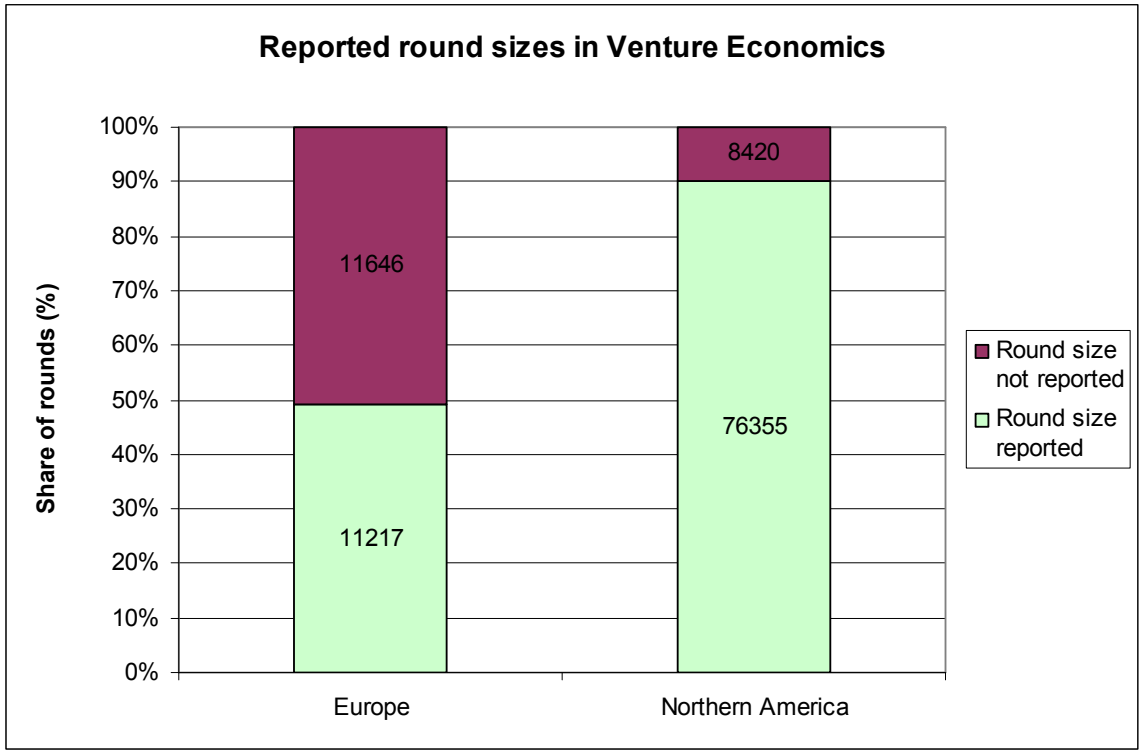

Figure 23 Reportation of round sizes in Venture Economics

Our data indicates that there are significant differences in the median round sizes within different parts of Europe (Figure 24). Western and Northern Europe seem to have the highest median round sizes (apart from investments in startups that are significantly smaller in Norther Europe). The sizes of investments in the earliest stages in Southern Europe are almost equal to the ones in Western and Northern Europe, but the later stage and buyout investments are significantly smaller. Median round sizes in Eastern Europe are smaller compared to the rest of Europe across all investment stages. Respective mean and quartile statistics were also analyzed and the results were essentially the same.

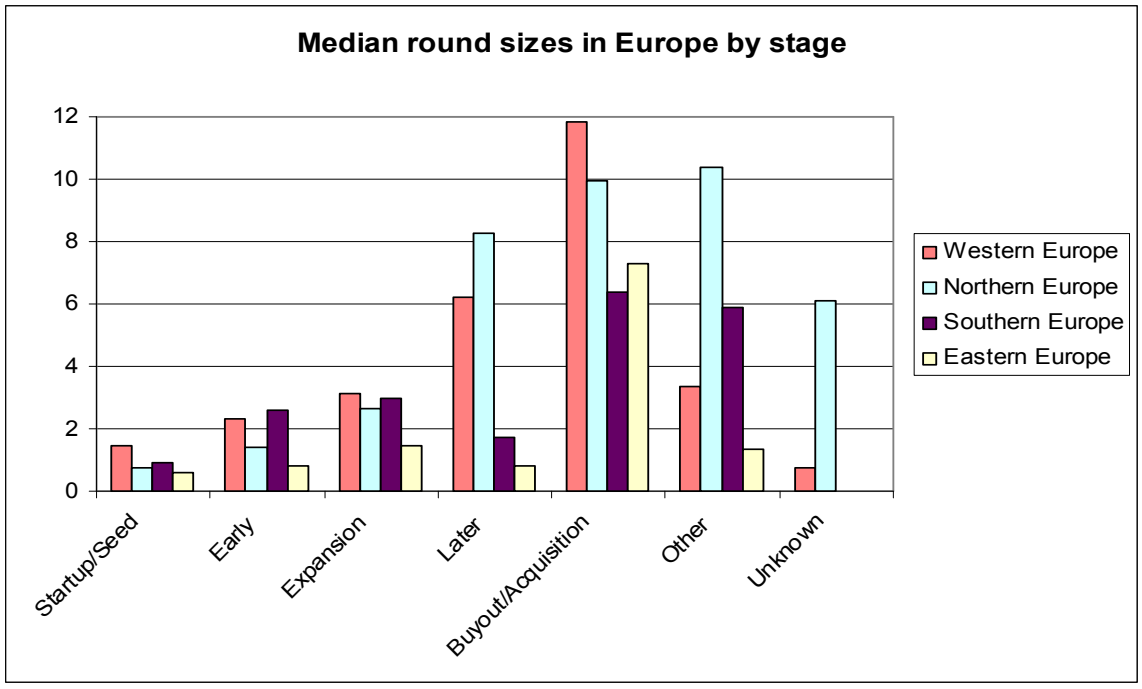

Figure 24 Median round sizes by stage and by location in Europe

The private equity markets in Canada and the U.S. seem to be relatively equivalent concerning the median round sizes. This gives support for the decision to treat America as a single private equity market in the study concerning performance determinants in chapter Performance Determinants 4.1. The only significant difference is in the size of later stage investments, which seem to be considerably larger in Canada. Respective mean and quartile statistics were also analyzed and the results were essentially the same.

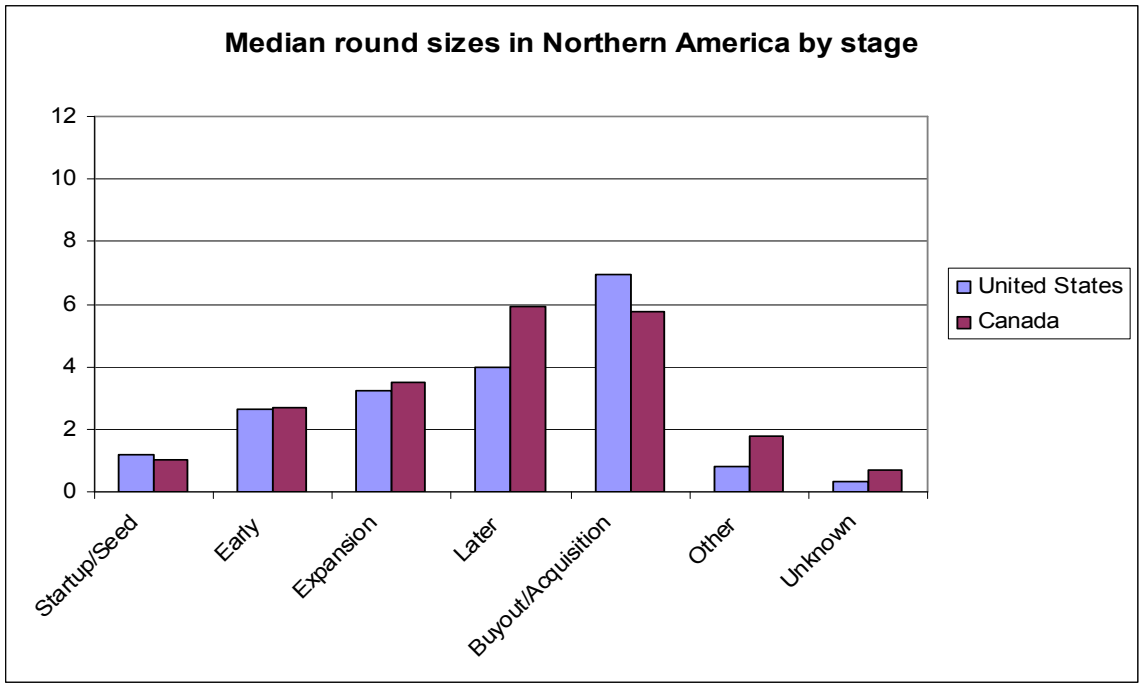

Figure 25 Median round sizes in the U.S. and Canada by stage

Even though the data showed no significant difference in the investment round sizes between Europe and America, the total investment sizes during the whole lifetime of the companies are significantly bigger in North America. The difference is most remarkable in expansion and later stages. There are a few possible explanations for the difference in total investment sizes in spite of the similar single investment round sizes:

1. North American entrepreneurs bring venture money earlier in the companies so that they get more rounds before the ultimate exit. This makes the cumulative investment sum larger.

2. The cumulative investment amounts in Europe are underestimated in the data due to missing valuations from earlier investment rounds.

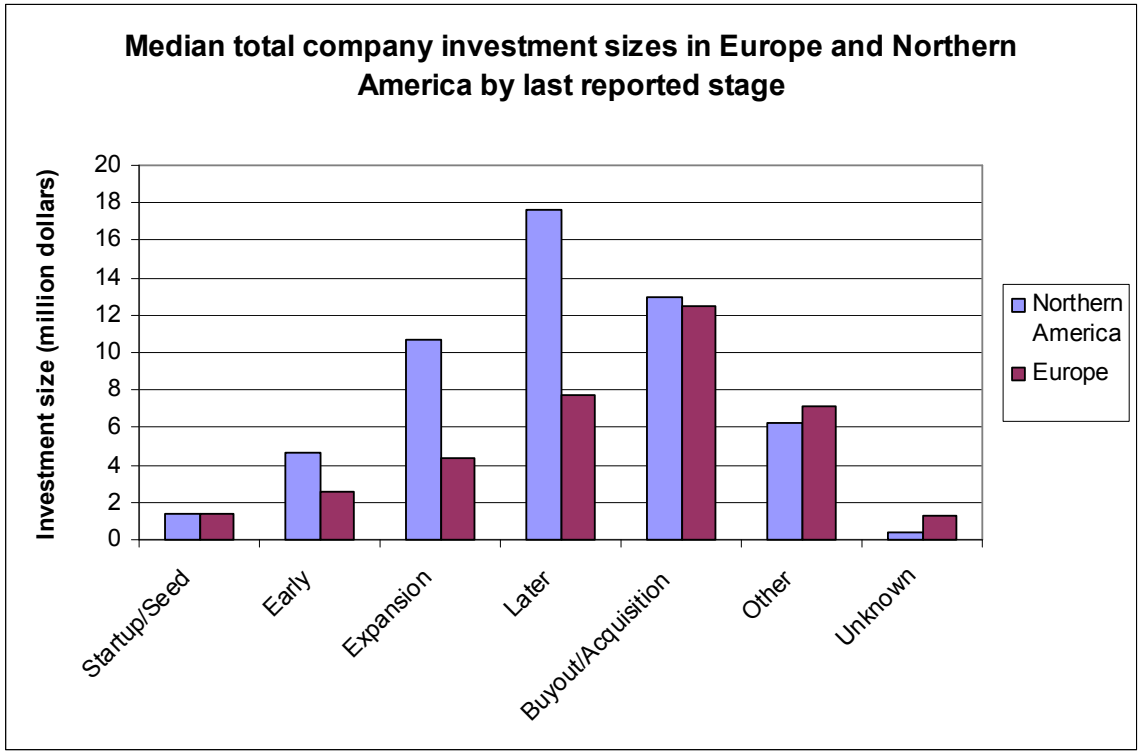

Figure 26 Median total investments in the company during its lifetime by last reported stage in Europe and North America

The relative sizes of the total cumulative investments in different parts of Europe and North America are distributed essentially in the same way as the single investment rounds. Western and Northern Europe have the highest investment sums, whereas Southern and Eastern Europe have the smallest sums. The differences between the U.S. and Canada are relatively small.

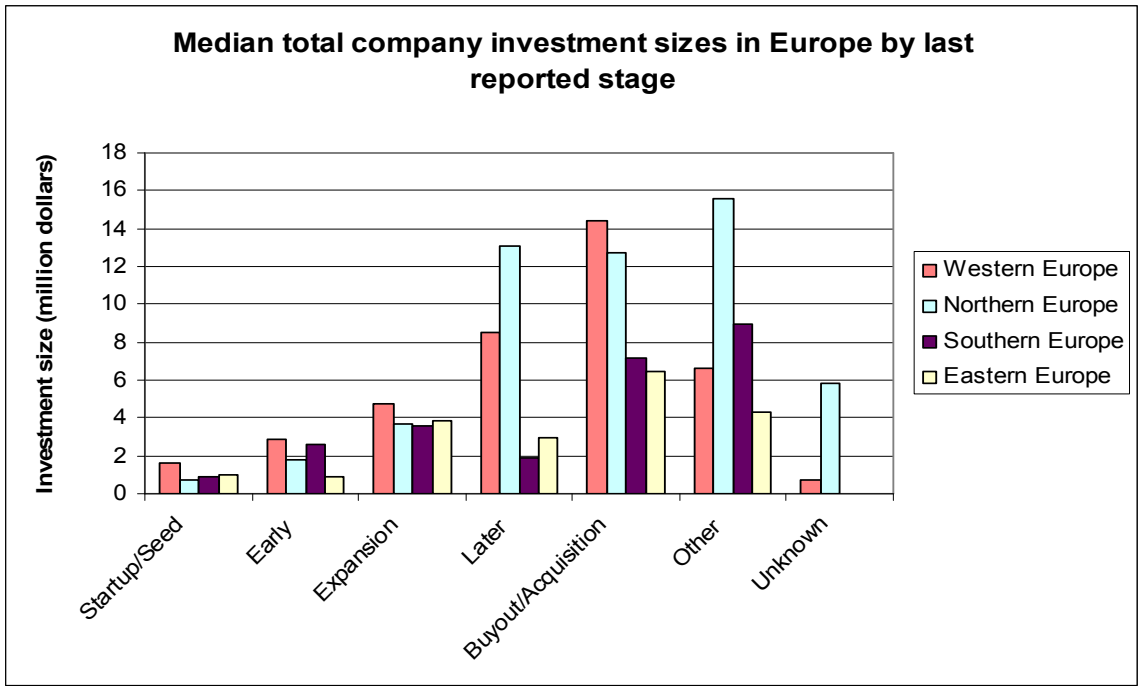

Figure 27 Median total investments in the company during its lifetime by last reported stage in Europe

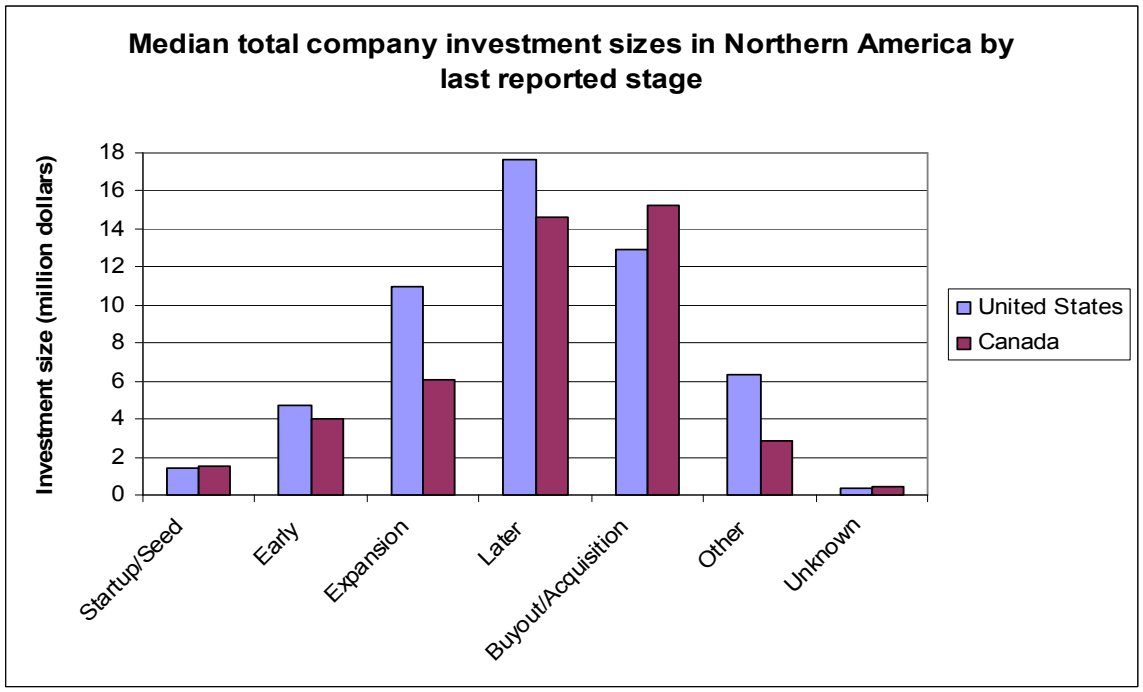

Figure 28 Median total investments in the company during its lifetime by last reported stage in North America

The total cumulative investment sums per company vary significantly across different industries (Figure 29). American VCs invest most money in communications and biotechnology companies. Also investments in computer, semiconductor and medical/health companies are significantly larger compared to non-high-technology companies. The differences are surprisingly clear: the median size of investments in communications companies is three times as big as the investments in non-high-technology companies. Interestingly, the ranking in Europe is totally different. European VCs seem to put most money in biotechnology companies and least money in computer companies. The most striking difference between Europe and North America is that non-high-technology investments are larger in Europe even in absolute terms.

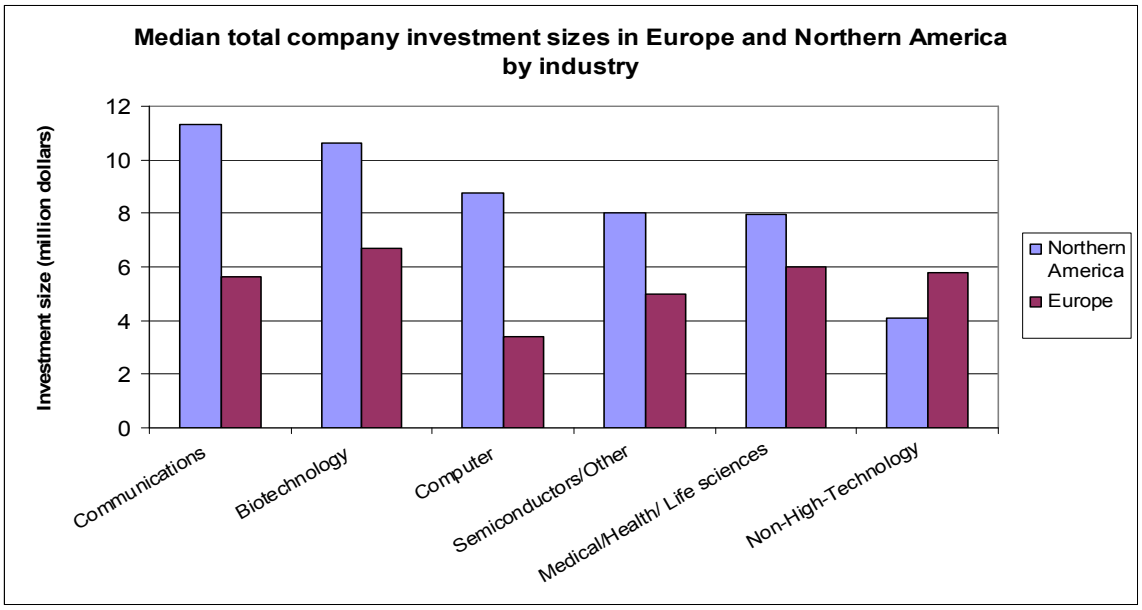

Figure 29 Median total investments in the company during its lifetime by industry in Europe and North America

The general perception in the private equity industry is that American VCs are faster to exit or liquidate their poor performing investments compared to European VCs. Our data gives some support for this statement. The median time between the first and last investment is longer in Europe for companies with last investment during early stages and shorter for companies in later stages (Figure 30). The data can be interpreted so that the latter ones are

more successful than the former ones. Therefore, the data indicates that American VCs are better at selecting the most successful companies. They also keep investing in them and abandon the poor performing companies faster. European VCs, on the other hand, seem to stick equally long to all portfolio companies, regardless of their success and development. However, some of the observed differences can also be attributable to the missing previous investment rounds for the European companies.

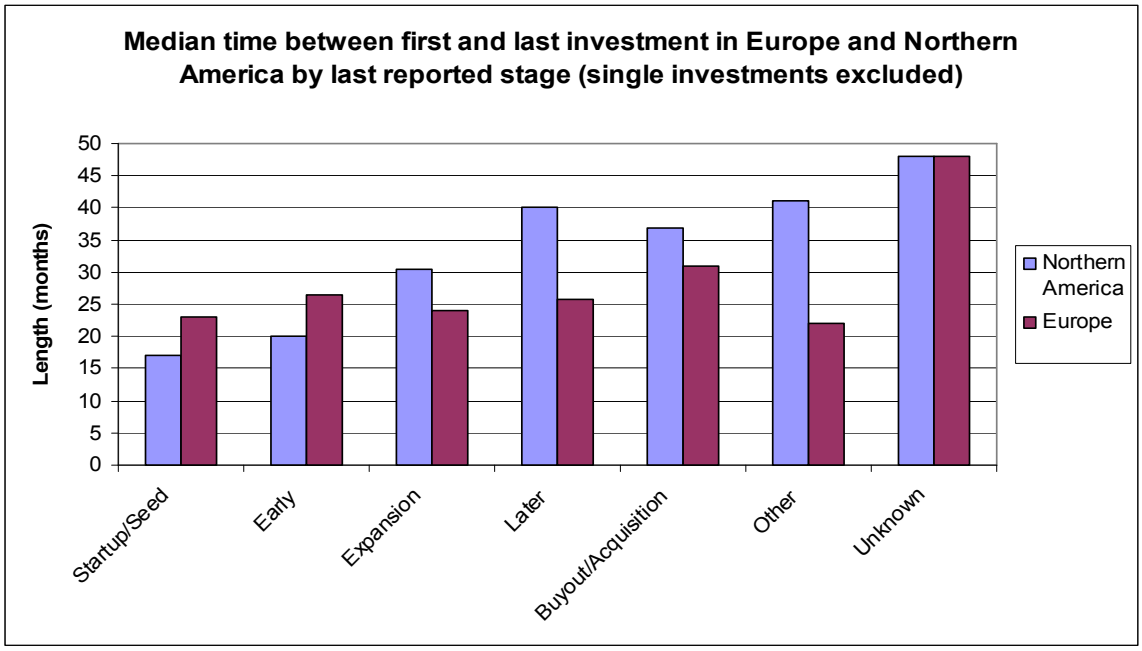

Figure 30 Investment lengths in Europe and in North America

4.2.3. Valuation Curve

According to the qualitative study, there might be a difference in the valuation curve of European and American venture capital. Our data does not give support to the statement (Figure 31). The average valuations seem to develop almost identically in Europe and North America. The only exception is that the valuations for American later stage companies are clearly higher than in Europe. The median valuations are somewhat higher in North America compared to Europe, but the difference is clearly smaller than the general perception of the industry experts.

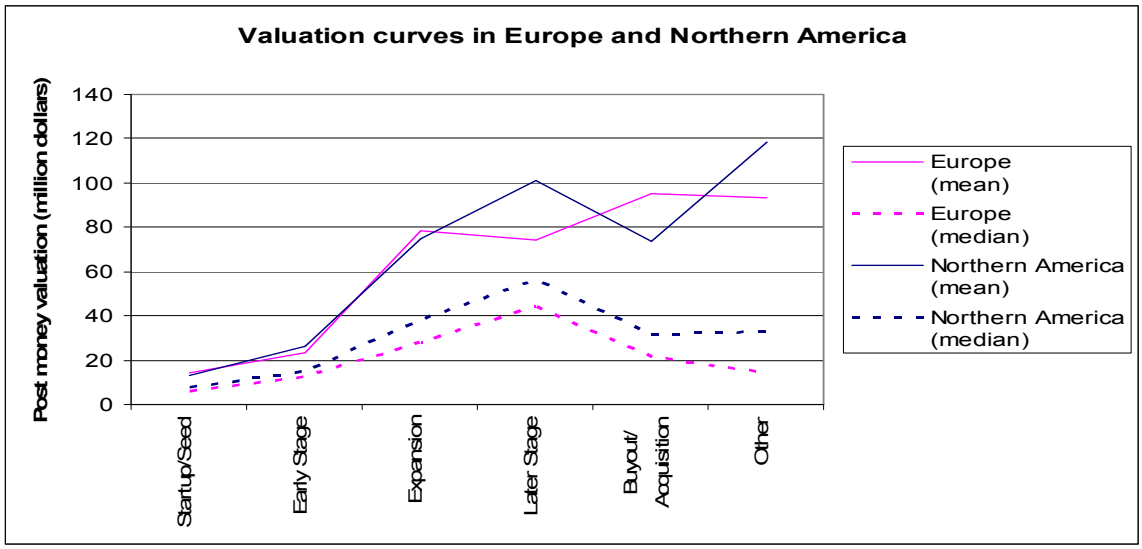

Figure 31 Valuation curves in Europe and North America (Thomson Venture Economics aggregate report on undisclosed valuation data / NVCA)

4.2.4. Fund Characteristics

The data in Venture Economics shows that there was a significant difference in the mean size of venture funds in Europe and North America during the 1990s and early 2000s (Figure 32). However, the latest statistics indicate that the difference has decreased radically or even disappeared. In general, there has been a rising trend in the fund sizes in both market areas. It is possible that the larger fund size of the North American funds is partially accountable for the performance gap between Europe and North America.

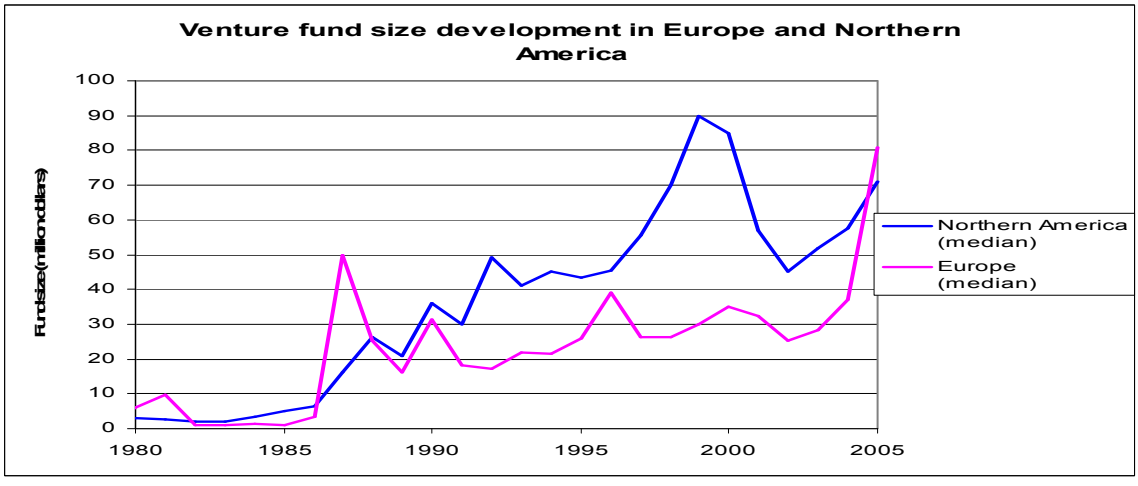

Figure 32 Median venture fund size development in Europe and North America

The returns for venture capital investments vary significantly over time. Thus, the right timing is crucial in venture capital. It seems that the North American venture funds have succeeded somewhat better in timing their vintage years (Figure 33). This is probably a consequence of experience and better capabilities, but also of the diverse overall development of the market conditions in the two market areas.

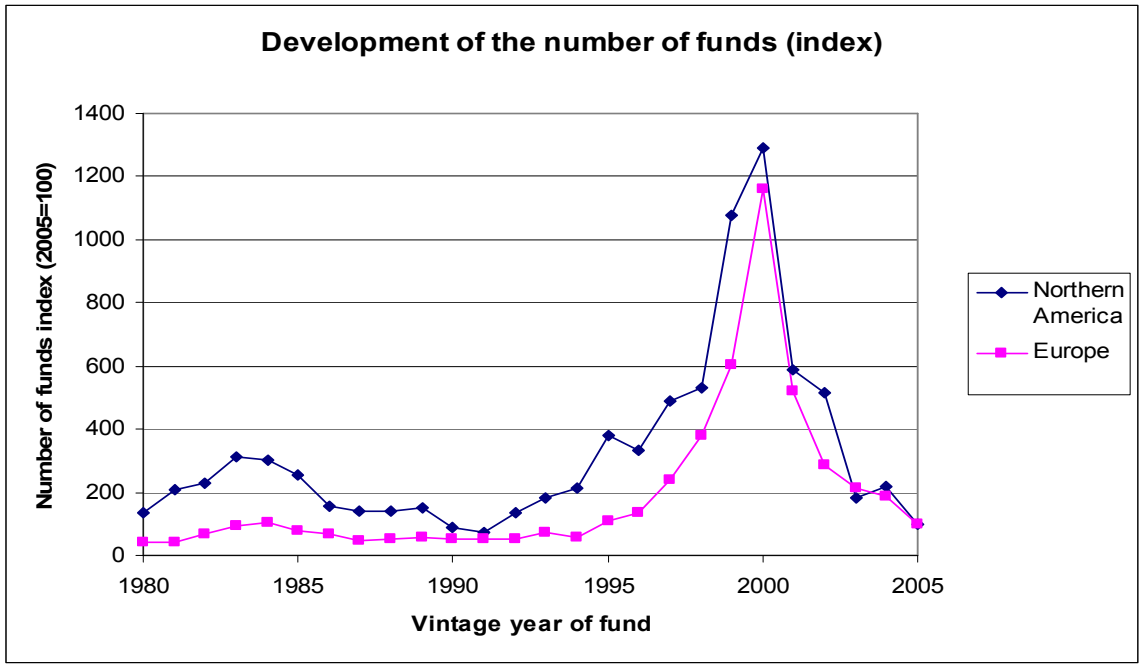

Figure 33 Number of venture funds in Europe and North America compared to year 2005

The U.S. venture capital industry is far more mature compared to Europe. Therefore, it is logical to assure that American VCs are more experienced. Our data indicates that this statement has been true in the past, but the situation has changed dramatically after the stock market crash in 2000 (Figure 34). The average sequence number of the funds raised increased remarkably in 2004. The interpretation is that the extremely difficult times in venture capital industry forced the inexperienced and poor performing VC firms to exit the industry. This phenomenon seems to be more significant in Europe since the difference between vintage years 2000 and 2004 is a lot bigger. However, the situation may soon

change if the market situation improves and new (and inexperienced) VC firms enter the market. Nevertheless, it is clear that the experience gap between Europe and North America will not be as significant anymore as it was in the past. Therefore, if the poor performance of the European venture capital in the past is attributable to the experience gap, at least to some extent, the situation can be expected to change in the future.

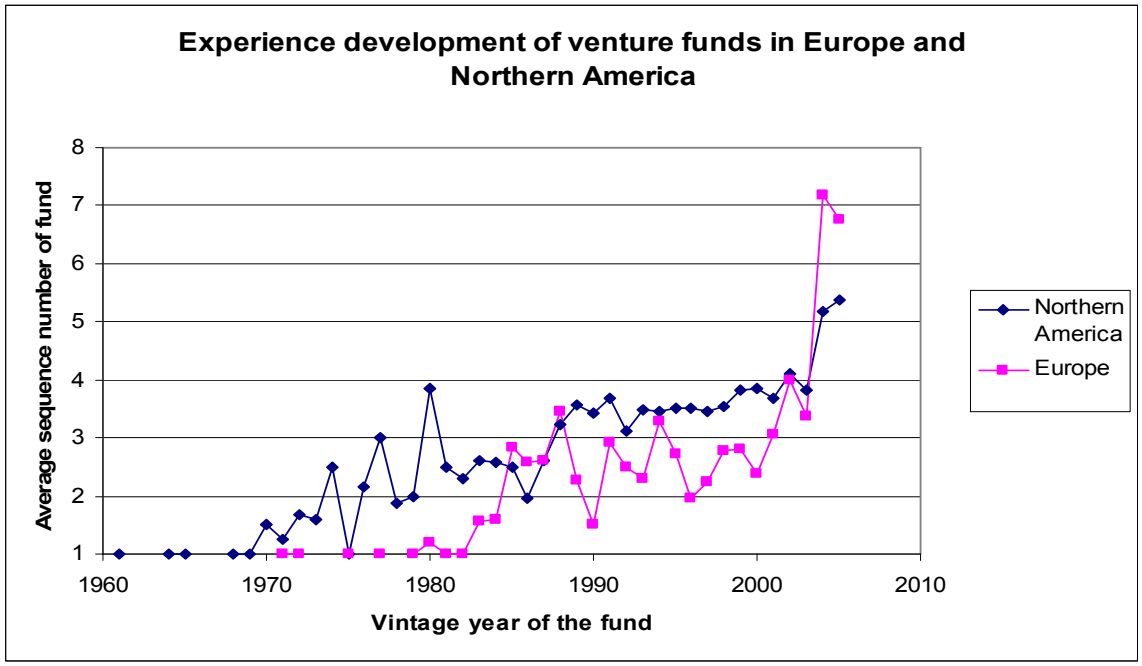

Figure 34 Experience development in Europe and North America

According to the data there is a clear difference in the amount of syndication in Europe compared to North America. American venture funds with a vintage year between 1990 and 2005 had on average 4 – 5 syndicate partners in every investment round, whereas the same figure for European funds were only 2 – 3 (Figure 35). The econometric model indicated that syndication has a positive and statistically significant impact on fund performance. Therefore, it can be concluded that the lower level of syndication is partially attributable for the observed performance gap between European and North American venture capital.

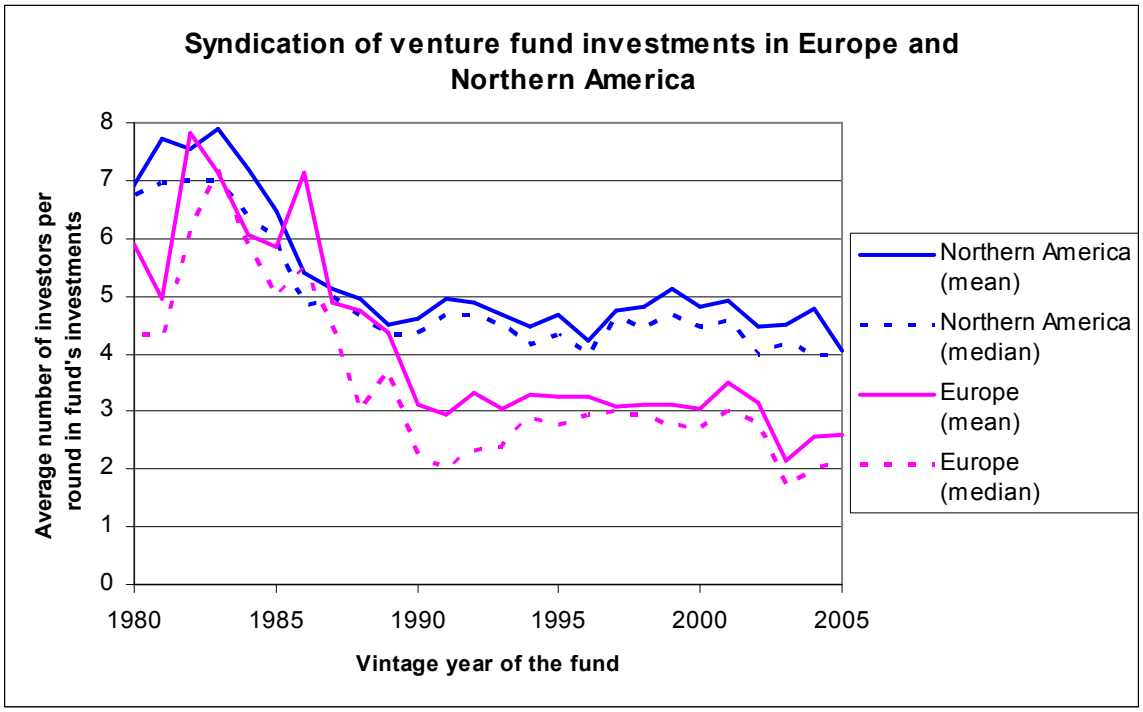

Figure 35 Syndication development in Europe and North America

The data indicates that there is a difference in the distribution of the different fund types. There are almost twice as much corporate affiliated venture funds in North America than there is in Europe. On the other hand, funds categorized in the "other types" category are more common in Europe. Corporate ventures performed better than other fund types. Consequently, the higher share of corporate ventures in North America is partially attributable for the observed performance gap between European and North American venture capital.

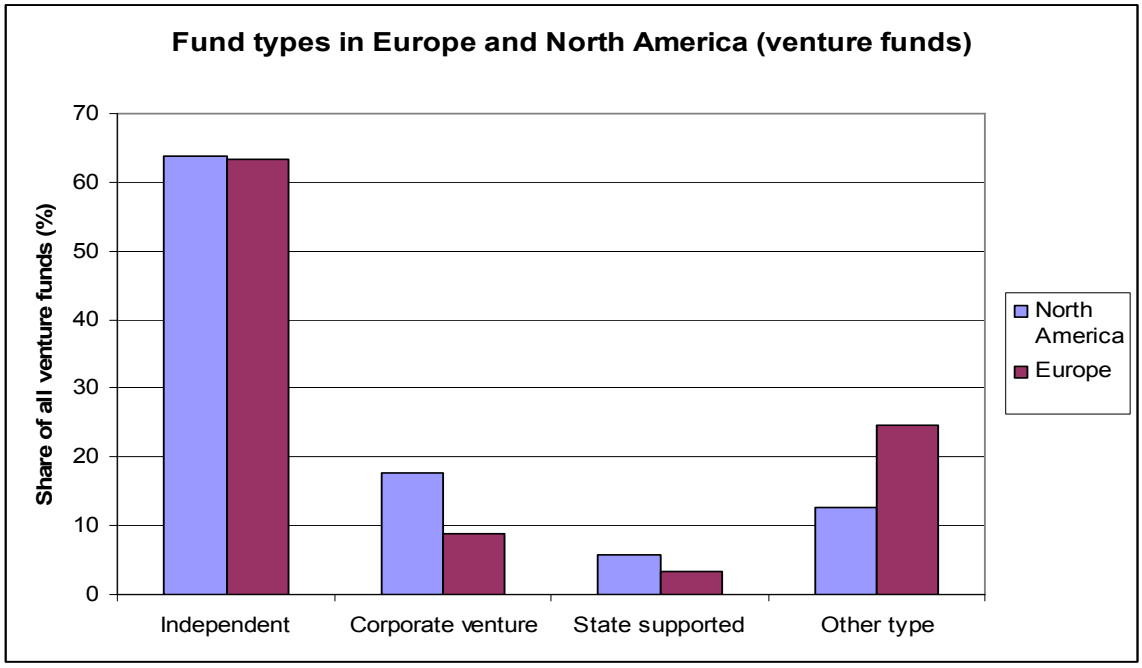

Figure 36 Fund type distribution in Europe and North America

4.3. Synthesis of the Quantitative Study

The value of the regression coefficients cannot be compared directly with each other due to the different characteristics of the variables. In order to be able to assess and objectively compare the importance of the variables that affect venture capital performance, it is necessary to combine the information of the regression coefficient and the standard deviation of the variables. Therefore, a new variable indicating the effect of the variable is calculated using the following equation:

Equation 6 $\text{Effect} = \text{Regression coefficient} \times \text{Standard deviation}$

This is essentially the same method as using standardized betas to assess the relative effects of the variables. However, the standard deviations of the variables were calculated using the whole Venture Economics database (not only the Private Equity Intelligence funds included in the econometric model). Therefore, the model specification does not allow the direct use of standardized betas. Nevertheless, standardized betas were calculated for the

sample including only funds with performance information and this method found to provide essentially the same ranking for the importance of the variables.

In order to assess the importance of different determinants, the coefficients obtained in model 2A were used. The model 2A was used because that specific model was assumed to describe the venture capital performance determinants most accurately. According to the model, the most important variables affecting performance are Corporate venture (D)[3], B2B companies (% of investments), Syndication, Expansion stage (% of investments), IT and high-tech (% of investments), and Logarithm of fund's sequence number.

The ranking of the variable indicating the fund's location is one of the most significant findings of this study. The home location of the fund (Northern America or Europe) is almost insignificant compared to many other performance determinants.

[3] D = Dummy variable

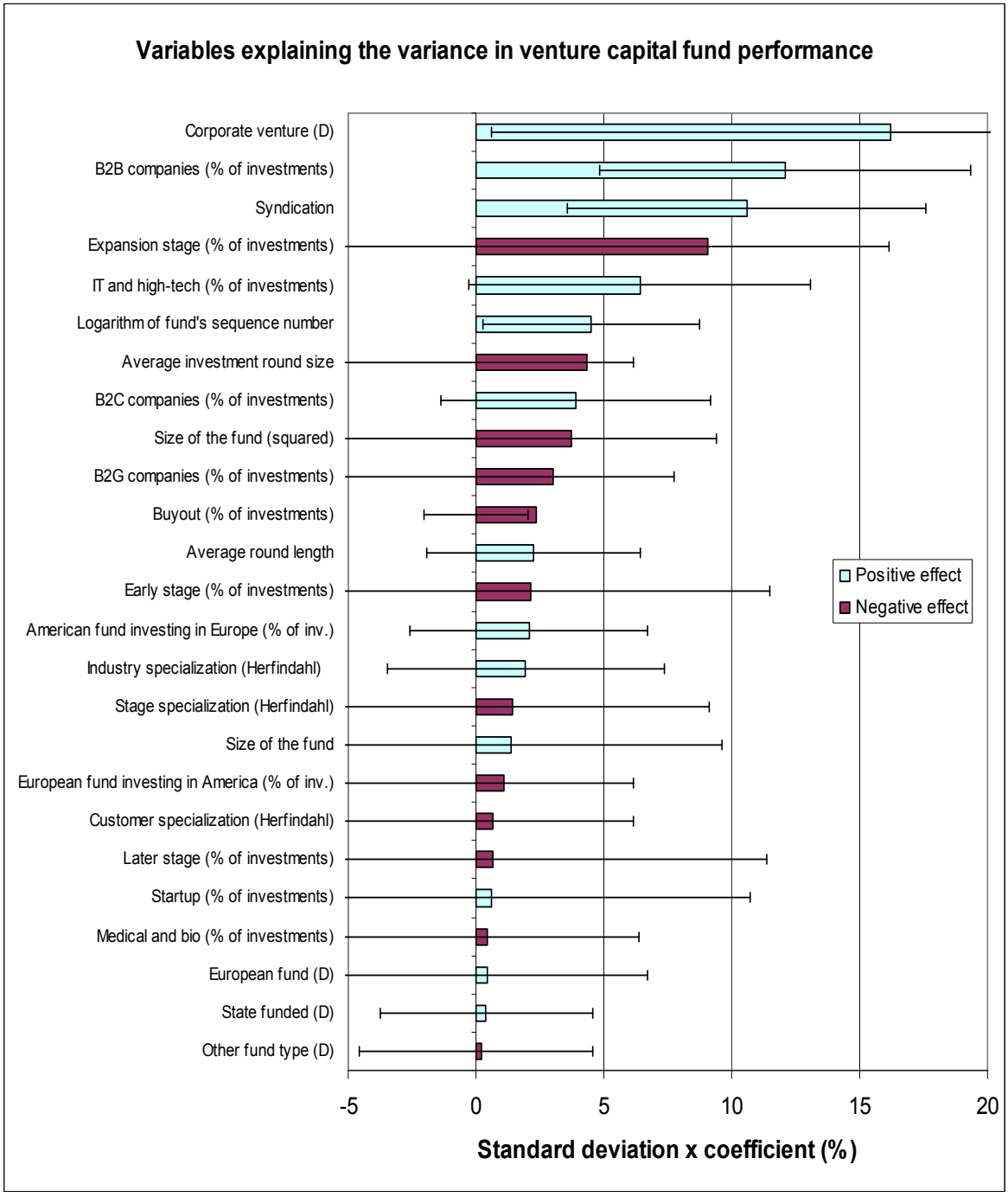

Figure 37 Variables explaining performance of venture capital funds

One of the objectives of this study was to try to explain the observed difference in the performance of European and Northern American venture funds. Variables that explain the difference must have two characteristics:

1. A significant impact on performance
2. Different mean value in for European and Northern American funds

In order to assess how much each variable attributes to the performance difference, a new variable that describes the effect on performance difference is calculated using the following equation.

Equation 7 $\text{Effect on performance difference} = (\text{Mean (Europe)} - \text{Mean (Northern America)}) \times \text{Coefficient}$

The lower amount of syndication in Europe seems to be the most important reason for the observed performance gap between Europe and Northern America (Figure 38). According to the model, if the European funds would syndicate as much as their American counterparts, their expected annual net IRR return would increase by 6 % (from about 9% to 15%).

Another important variable is the share of corporate ventures of all funds which is estimated to reduce the European net IRR returns by 4 % compared to Northern America. Also the higher amount of investments in expansion stage companies and lower amount of investments in IT and high-tech companies decreases the expected profitability of Europe compared to Northern America. Furthermore, European funds investing in America seem to perform poorer than other European funds. An interesting finding is that only about 1 % of the gap is explained by the better experience of the American funds.

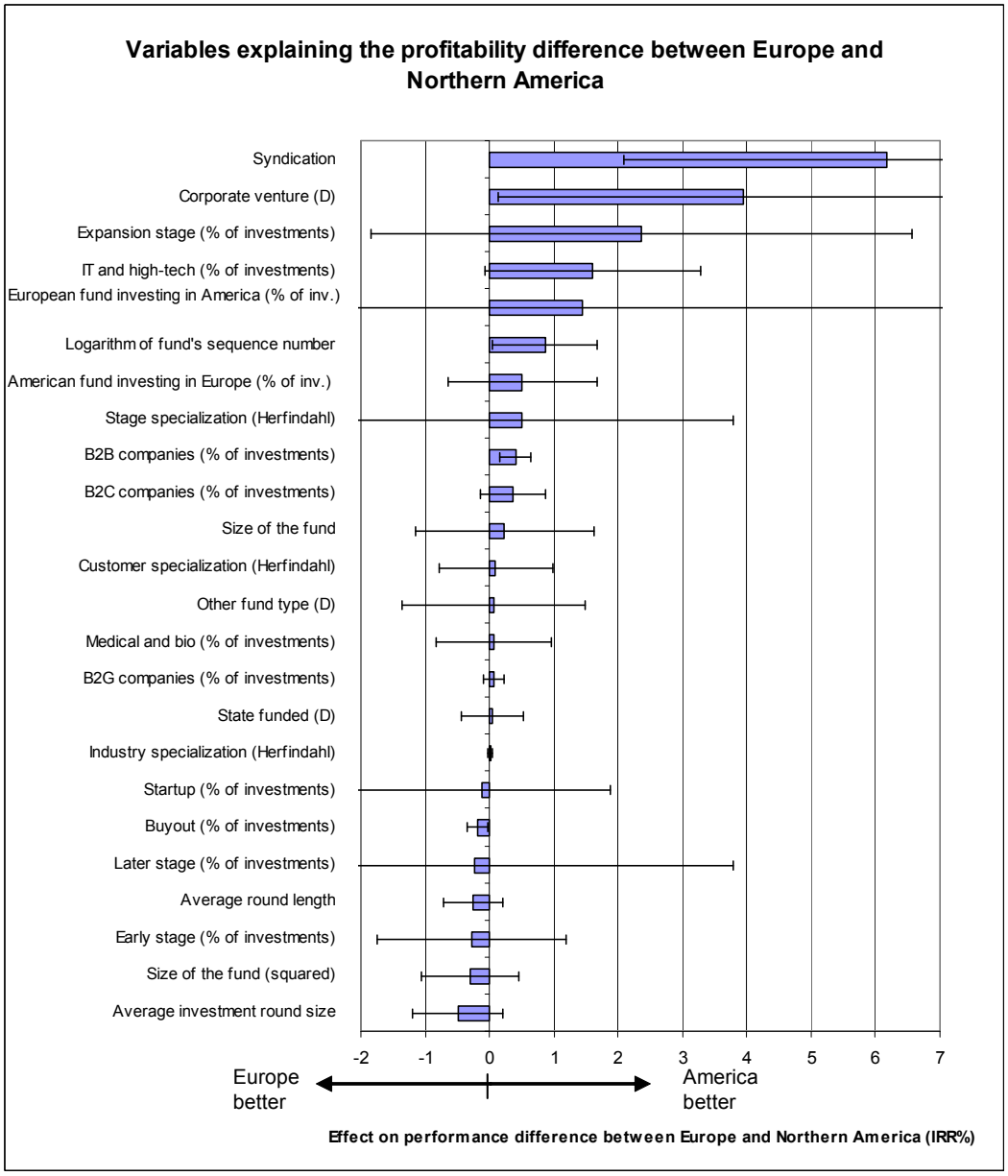

Figure 38 Variables explaining the performance difference between Europe and Northern America

5. RELIABILITY AND VALIDITY OF THE RESULTS

The reliability and validity of the empirical studies of this thesis are discussed in this chapter. Reliability refers to the accuracy of the empirical results. In other words, a reliable measure should always produce similar results if the same issue is studied repeatedly. Poor reliability is a consequence of measurement errors.

Validity refers to the ability of the selected research method to measure the issues that it is supposed to measure. Validity implies reliability (accuracy). A valid measure must be reliable, but a reliable measure need not be valid.

5.1. Reliability

This thesis employed three different research methods: literature review, qualitative study and two quantitative studies. The use of several distinctive research methods ensures that possible measurement errors are most likely recognized through inconsistency in the results of the different methods.

The reliability of the qualitative study is somewhat questionable due to the relatively small size of the sample. Nevertheless, the answers of the interviewees were generally in line with each other, which increases the confidence in the reliability of the study. In addition, the potentially poor reliability of the qualitative study was fully recognized during the research and, consequently, the findings of this study were always analyzed carefully and confirmed if possible.

The reliability of the quantitative is quite good. One concern regarding the reliability of the quantitative study comes from the quality of the data utilized in the quantitative models. However, the data was analyzed critically and some clearly erroneous data points were excluded from the sample. In general, there is no reason to believe that the poor quality of the data would have had significant impact on the results obtained in the study. The quantitative study is replicable due to the fact that all the data utilized is available in public or commercial databases.

Most of the empirical results of this study are in line with previous research and the general perceptions in industry. This increases the confidence in the results of the study. Consequently, the reliability of the thesis is regarded as good.

5.2. Validity

The conducting of an extensive literature review and several interviews of industry experts ensured a good and rich overall picture of the private equity markets. Consequently, I am confident that all relevant phenomena and concepts were identified and fully understood in theory and practice.

The persons interviewed in the qualitative study were experts of private equity. Therefore, there is no reason to doubt that they would not have been able to understand the stated questions and answer them according their best possible knowledge. The semi-structured nature of the interviews also ensured that the interviewees were able to provide additional information not directly included in the domain of the interview questions. This ensures that all relevant issues were analyzed in the study.

The existence of selection bias in the quantitative study would decrease the validity of the study. Therefore, the Heckman sample selection methodology was utilized in the regression analysis to ensure that no selection bias was present in the study. This helps to ensure that the results represent the whole European and North American venture capital reported in Venture Economics, instead of just describing the characteristics of funds in the selected sample.

One possible source of decreased validity is the generalization of some findings. This is mainly due to the lack of available data and research on European venture capital. However, this problem should concern only the literature review, since all other studies were designed to describe the situation in Europe as well as in North America.

The results of the respective research approaches are in line with each other and most of the previous research. Consequently, the validity of the results obtained in this thesis is regarded as good.

6. CONCLUSIONS

This chapter concludes the study by summarizing and discussing the main results, giving recommendations to different stakeholders (investors, venture capitalists, and policy makers), and forecasting the future of venture capital. In addition, the chapter also proposes new avenues for further research and discusses the limitations of this thesis.

6.1. Summary of the Results

This thesis examined why the observed returns from VC investments have been lower in Europe than in Northern America. The thesis utilized three different studies in order to be able to answer the stated research questions. The three studies supported each other and together offered a wide and versatile view on the performance of private equity and especially venture capital. The studies examined the determinants of venture capital performance, the factors accountable for the performance gap between Europe and North America, the future of venture capital, and the possibilities to improve the performance of European venture capital.

The qualitative study indicated that the differences in the characteristics and modes of operation between European and American venture capital companies are not as significant as is the industry's general perception. However, there are some differences in the venture capital markets and in the ways venture funds operate. American venture capital funds seem to utilize more external advisory boards and have closer relationships with big corporations. American VCs also get access to a larger deal flow due to the larger markets. This also enables a narrower focus without having too few investment opportunities.

The first part of the quantitative study statistically analyzed the effects of the venture capital performance determinants identified earlier in this thesis. The study utilized one of the largest databases ever used in academic research to examine venture capital performance on the fund-level. Two commercial databases were combined for this purpose. The thesis is able to give support to some results presented in earlier research papers or opinions of the industry experts, but it also corrects some common misconceptions about

the industry. It also enables the examination of some determinants that have not been analyzed quantitatively ever before.

The econometric model presented gave support for the finding of previous researchers that venture capital investments in high-tech, bio, and medical sectors yield higher returns than investments in non-high companies. Furthermore, corporate ventures seem to outperform independent venture funds. An interesting finding is that investments in B2B (business-to-business) companies seem to provide above average returns significantly. The effect of the portfolio companies customer focus has not been studied before. The widely accepted facts that high rate of syndication and good reputation increase performance are also supported. The results concerning fund specialization were consistent with the hypotheses: narrow industry focus increases and narrow stage focus decreases performance.

The aggregate performance of venture capital performance has been lower in Europe than in Northern America. One of the main motives of this thesis was to examine if this observed performance gap could be explained with the different characteristics of the funds and their investments. The conclusion is that the observed performance gap is attributable to the different characteristics of the funds analyzed in this study. Therefore, the poorer performance of European venture funds is not due to their location but due to their other characteristics.

The second part of the quantitative study compared the fund characteristics between Europe and North America. The conclusion was that the differences between Europe and Northern America are not very significant. This is somewhat surprising and inconsistent with the views of the industry experts. Nevertheless, some clear differences between Europe and Northern America could be identified. American venture funds syndicate more often and invest more in companies in the IT sector compared to European funds. In addition, corporate affiliated funds are more common in Northern America. Furthermore, an important difference could be seen in the cumulative investment sizes per portfolio company. The entrepreneurs seem to get more money in America; the figures are about twice as high compared to Europe.

The most important venture capital determinants identified in this thesis are the structure of the fund (corporate venture vs. independent), the share B2B (business-to-business) investments, and the amount of syndication. Contrary to the common perception, the effect of the location of the fund (Europe or Northern America) was found to be insignificant.

The variables attributable to most of the performance gap between Europe and Northern America were (effect on IRR difference between Europe and Northern America in brackets) syndication (6 %), corporate ventures (4%). In addition, the poor performance of European venture funds investing in America, lower share of IT and high-tech investments the higher amount of stage specialization, and lower amount of investments in B2B (business-to-business) companies decreased the average profitability of European venture capital.

The view suggested by some industry experts concerning the difference in the valuation curves between Europe and North America was supported by the development of the investment sizes across stages. If the phenomenon is true, it would lead to relatively lower returns for European early stage investments and higher returns for later stage investments. However, contrary to the views of some industry experts, the econometric model did not indicate that the early stage investments would yield relatively lower returns in Europe.

6.2. Discussion of the Results

The observed performance gap between European and American venture capital is an interesting question. The econometric model shows that the performance gap is not due to any location effect but is attributable to the different characteristics of the funds in Europe and Northern America. This result is surprising since the common perception is that the poorer performance of European venture capital had been caused by the characteristics of the market area, rather than by the characteristics of the funds. Furthermore, it should be emphasized that there are many determinants of the venture capital performance that are more important than the fund's location. Therefore, the location of the fund should not be used as the main criterion for selecting venture funds to invest in.

Most industry experts assessed the importance of the economic environment to highly significant for the performance of venture capital. However, due to the selected research approach and limited resources, the model constructed in this study did not include any of the identified economic environment related performance determinants except for the vintage year of the funds. Therefore the impact of including these environment related determinants in the model is unknown.

An important issue to bear in mind is that the results of the econometric model describe the situation for venture capital funds with a vintage year of 1998 or older. Therefore, one should not draw too drastic conclusions just based on the model. This concerns particularly the differences between Europe and North America. The general perception in the industry is that the European venture capital has developed dramatically during the 1990s and 2000s. Therefore, it is highly likely that most of the differences between the two continents depicted in this study have decreased or at least will decrease in the future.

6.3. Implications and Recommendations

6.3.1. Investors

The thesis showed that there are significant differences in the capabilities and experience of different venture capital firms that affect the performance of the funds. These differences are by far more important than the location of the fund or its investment targets. Therefore, institutional investors should carefully evaluate the funds that they invest in so that they can maximize their expected rate of return.

This thesis also supports the common perception that the well-known and highly appreciated venture capital firms yield above average returns. However, the funds managed by these firms are very popular and they are often able to choose their investors themselves. This means that investing in these funds is not possible without contacts and a good reputation as an investor. Therefore, every institutional investor should have a clear investment strategy which it will execute. Sometimes the long term benefit of the investor may also require investments in some funds due to strategic reasons. One possibility to get

access to prestigious funds is to keep investing in venture capital also during the difficult times in the industry. This is wise also due to the nature of the venture capital cycle. Venture funds usually have a lifetime of ten years, which means that investment made in boom times are likely exited during down times and with poor valuations if we take into consideration the cyclical nature of world economy.

6.3.2. Venture Capitalists

According to the study, corporate affiliated venture funds seem to yield significantly higher returns compared to independent VCs. This is most likely due to the support offered by the corporate parent. Changing the fund structure is quite difficult and often practically impossible. Nevertheless, this finding may still offer important implications for independent VCs willing improve their performance. It is possible to benefit from the apparent advantages of a corporate partner by developing strategic partnerships with large corporations without changing the structure or primary funding source of the fund. The qualitative study indicated that American VCs often have strategic partnerships with one or more corporations. They benefit from the collaboration by getting strategic advice in their investments, achieving support through synergies with the corporation and the portfolio companies (e.g. sales channels, OEM relationships, etc.), and getting technological help for the companies from industry experts.

The econometric model gave support for the common perception that syndication increases fund performance. Syndication offers several advantages that may be attributable to the increase in performance. These benefits include increased deal flow, access to additional resources, lower risk and improved reputation. However, some industry experts emphasized that syndicating highly potential investments is not always sensible without the possibility to get some of the aforementioned benefits. In addition, syndication is usually more beneficial for the less experienced and less capable party in the syndicate.

Specialization is important because it makes the fund more lucrative for investors due to diversification aspects and because it may increase fund returns. Specialization enables the development of special skills but, on the other hand, it also decreases deal flow. Therefore,

there is an optimal rate of specialization that is a compromise of the aforementioned aspects. In addition, the optimal rate of specialization depends on the market situation. Being in a large market (particularly the U.S.) enables a more narrow focus without reducing the deal flow too much. The study indicates that the best way to specialize is to specialize in a certain industry. On the other hand, stage specialization seems to lower performance.

6.3.3. Policy Makers

An active and flourishing venture capital industry is beneficial for every economy. It helps and encourages the entrepreneurs to start and develop their own businesses and to help them grow into large companies. This boosts the national economy, creates new jobs and increases the economic dynamism in the markets. The EU needs more innovative and high-growth companies to drive economic growth. European companies also require a more efficient financial environment to address their financing needs. Therefore, the importance of venture capital should be understood and policy actions should be implemented to support its development. To be able to get the private equity markets working correctly and effectively, the market must be profitable for all stakeholders (limited partners, general partners, and entrepreneurs).

There are several different alternatives to support the venture capital industry. Direct support is needed to help the venture funds investing in seed stages. According to the economic model, the returns for the investors for seed and startup stage investments are not significantly different from other stages. Nevertheless, the small investment amounts mean small management fees (in absolute terms) and make it difficult for the VCs to cover all their operation costs. According to the industry experts, the later stages should be able to function effectively in free competition and do not need any public support. According to several industry experts, the public support always distorts the market and hampers free competition. Therefore, public support should be focused only to the seed and startup stages where it is necessary. Furthermore, the support should be made equally available for

all players in the market, so as not to interfere with the free competition. In addition, the support should be incentive based to encourage funds to maximal performance.

Supporting the venture capital through indirect measures is also crucial. The most urgently needed change in Europe is the unification of the various national laws and regulations concerning venture capital industry and especially taxation. The currently effective national barriers hinder free competition and make the operation of a pan-European fund costly and difficult. The lowering of the capital gains and income taxation is also necessary for the development of European venture capital and also the economy as a whole. Removing or weakening of the regulations concerning employment reductions to increase the labor market dynamism would also be beneficial.

The lack of a common stock market for growth companies in Europe decreases the profitability of venture capital by making IPOs more difficult. The current local markets are not able to provide enough liquidity for small stocks. Therefore, the European Union should support the establishment of a common stock market in order to generate enough trading volume to guarantee liquid markets for all shares. Therefore, the measures suggested by EVCA (2005, p. 6) appear useful from the perspective of supporting the emergence of a pan-European trading platform:

1. The harmonization of listing criteria across exchanges. Specifically, standardized criteria regarding requirements for minimum total assets, years of trading history, and number of independent directors;

2. The promotion of the cross-exchange platform through the marketing of sector indices and their inclusion in the financial press throughout Europe;

3. The involvement of additional non-domestic market makers willing to commit capital in the trading of small cap growth company shares;

4. The development of simple connectivity for investment banks in remote locations;

5. The implementation of low-cost settlement systems;

6. A streamlining of regulatory procedures for IPO filings similar to the "light touch" model adopted by AIM and more recently by Alternext;

7. Discrete and confidential listing approvals for secondary offerings;

8. The adoption of fair acquisition and minority squeeze out regulations and provisions.

6.4. The Future of Venture Capital

The general perception is that the venture capital industry has just started to recover from one of most difficult times during its existence. Therefore, all experts saw the future as bright and expected the industry to grow during the next few years. Most respondents had already seen positive signs in the market concerning venture investments. The stock markets have risen steadily around the world which has also increased the valuations in the exit markets. In addition, the amount of money raised by the private equity funds have increased. The positive attitudes regarding the future of venture capital are consistent with the resent academic research papers (e.g. Gordon, 2004, p.27¸ Diller and Kaserer, 2005, p.3)

The biggest problems in the industry at the moment is the difficult situation in the listing markets and the problems in fundraising. Nevertheless, the listing markets have already started to open in Europe and the rapid development of AIM (stock market for growth companies in London) was seen as a really positive sign. On the other hand, the problems in fundraising were due to the extremely poor performance of some funds a few years ago. Some venture fund managers were afraid that it will take really long before people forget the past and start to invest in venture capital again.

The trend in private equity industry has been towards larger fund sizes. This trend is likely to continue. However, since the private equity industry is also growing as a whole, there is no indication that the industry would be heading in the direction of concentration. The view of the industry experts was that new venture firms are likely to enter the market after the difficult years, which will tighten the competition in the industry. Nonetheless, this was

seen as a normal cycle of the venture industry and was not seen as a major threat for the current players.

6.5. Limitations of the Study

This thesis is conducted by using several different research approaches, the latest statistical methods, and most comprehensive sources of data available. Regardless of this, the study, like all studies, has its limitations. However, these limitations have been identified and have been taken into account when analyzing the results as far as possible.

In this thesis risk is not taken into account directly. At first this may seem like a major problem, as according to the principles of financing theory the risk level of the investment affects the expected rate of return. However, the connection between risk and returns is not as clear in private equity as it is in public equity side. Therefore, leaving the risk out of the scope of this study has been a well-thought decision. Meyer and Mathonet (2005) comment on risk in the following way:

"Theoretically, risk can be controlled quantitatively, by adjusting the returns for risk in the way that the financial markets price risk. However, there is no efficient risk-adjusted pricing for primary private equity fund investing, as risks in this asset class are not well understood. The lack of data, the blind pool nature of the investments, and the fact that the whole universe is one of the highest risk categories make differentiation and quantification of risks difficult. For buy-and-hold investments, the quality of the asset determines the returns to the investor. Within the private equity universe, we can only use the non-quantitative approach to controlling for risk by constraining managers to equal-risk assets within or with the same risk as their peer group. It is neither possible nor meaningful to adjust for risk so long as the investments are restricted to institutional quality private equity funds."

Meyer and Mathonet, 2005

The quantitative data utilized in this thesis describes the historical characteristics of private equity, meaning that some of the information is relatively old and possibly not relevant in

the current market situation. However, this is should not be seen as a weakness, since the aim of the study was to examine the performance determinants of venture capital industry and be able to explain the observed variation in historical returns. In other words, the thesis does not aim to predict future performance at least directly, which is a far more difficult a task to do. However, an issue that may cause some concerns is the fact that the quantitative study constructed in this thesis assumes that the performance determinants of venture capital have remained essentially the same during the past few decades. This is quite a bold assumption, which does not necessarily hold. However, the limited amount of performance data available does not allow a more detailed model construction method to be used.

Even though the performance data utilized in this thesis is one of the most comprehensive data sets ever used in publicly available academic research to study private equity performance, the sample size is still relatively small. The lack of an adequate amount of data points prevents from examining the effect of performance determinants that have only a small influence on returns. In addition, the data provided by Venture Economics includes only a limited amount of information per venture capital fund. Consequently, all interesting fund (or other) characteristics could not be calculated.

The coverage of the American data is far better than the European data. If there is selection bias in the data, and successful VC funds are more eager to report their returns, the bias might be higher on European data. This kind of selection bias is only present in the figures that are reported by the fund managers themselves, not in the figures reported by limited partners. Since most of the reporting limited partners are from the U.S., it might be that the proportion of voluntarily reported figures is larger in Europe leading to more severe selection bias. However, also successful limited partners may also be more willing to report their investment performance due to psychological reasons even though they do not directly benefit from reporting good performance. Nevertheless, the performance figures were compared with data from Venture Economics and no indication of any biases could be identified. On the other hand, there might also be some bias in the U.S. data, since Venture Economics has most comprehensive information on large venture funds that are members of the NVCA, whereas smaller funds are members of the regional organizations. The lack

of biases in the data collection procedure was also confirmed by contacting the experts at Private Equity Intelligence.

The dataset includes return figures only on the fund level. Therefore, the success determinants of individual investments were evaluated using the aggregate (fund level) performance and the average investment characteristics of that particular fund. Much more reliable information could be obtained on the effect of e.g. portfolio company characteristics if the cash flows (or profitability) of the individual investments would be available.

The definitions of the venture stages are not always clear. In this thesis there is a great dependence on the quality of the data in Venture Economics. Fortunately, there are no reasons to expect any biases in the categorization of the stages (e.g. differences between Europe and North America).

The general idea in building hypotheses is to base them on logical thinking and theoretical reasoning. Nevertheless, due to the complex and ambiguous nature of the relationships in venture capital, some of the hypotheses used in this thesis are partly based on earlier empirical evidence. The used data set and research approach is unique in the academic research of venture capital. However, the underlying data is at least to a large extent the same as for the former studies. Therefore, confirming hypotheses taken from the outcomes of earlier studies is not an entirely correct research method. Nonetheless, this cannot be seen as a major issue due to the aforementioned clear differences of this study compared to earlier studies.

6.6. Avenues for Further Research

This thesis is designed and conducted in order to answer the stated research questions, taking into account the limitations in resources and data availability. During the course of carrying out the thesis, several fruitful further research areas were identified. These areas could not be studied in the domain of this research project, were identified. Some of these ideas are discussed in this chapter.

This thesis concentrated mainly on examining the performance of venture capital. Even though the study also analyzed the differences in the characteristics of venture capital between Europe and America, this could have been done more thoroughly by only focusing on this particular subject. This could reveal some new and interesting differences between the two market areas.

The major shortcoming of the econometric model constructed in this thesis is that it does not include any other economic environment related performance determinants than the vintage years of the funds. Constructing a model that examines the effects of these variables would increase the understanding of the differences in venture capital performance and activity in different parts of the world. However, this would have required a somewhat different research approach and consequently could not be implemented within the scope of this study.

The source for private equity performance used in this study (Private Equity Intelligence) has a relatively small amount of information on European fund returns. Conducting essentially the same study with additional fund performance data from especially Europe from large institutional investors or fund-of-funds investors would increase the confidence in the findings and results presented in this thesis.

7. REFERENCES

Black, B. and Gilson, R. 1998. Venture Capital and the Structure of Capital Markets: Banks versus Stock Markets. Journal of Financial Economics 47, 243-277.

Brouwer, M. and Hendrix, B. 1998. Two Worlds of Venture Capital: What Happened to U.S. and Dutch Early Stage Investment? Small Business Economics 10, 333-348.

Cochrane, J.H. 2005. The Risk and Return of Venture Capital. Journal of Financial Economics 75(1), 3-52.

Coller Capital. 2006. Global Private Equity Barometer WINTER 2005-06. London, UK.

CPR Private Equity. 2003. Venture Capital : America in a New Cycle / Europe in the Learning Curve. CPR Private Equity.

Cumming, D. and Walz, U. 2004. Private Equity Returns and Disclosure around the World. RICAFE Working paper No. 9.

Cumming, D., Fleming, G. and Suchard, J-A. 2005. Venture capitalist Value-Added Activities, Fundraising and Drawdowns. Journal of Banking & Finance 29, 295-331.

Das, S.R., Jagannathan, M. and Sarin, A. 2003. Private Equity Returns: An Empirical Examination of the Exit of Venture-Backed Companies. Journal of Investment Management 1(1), 1-26.

De Clercq, D and Dimov, D.P. 2004, Explaining venture capital firms' syndication behaviour: a longitudinal study. Venture Capital 6(4), 243-256.

Diller, C. and Kaserer, C. 2005. What Drives Cash Flow Based European Private Equity Returns? – Fund Inflows, Skilled GPs and/or Risk? RICAFE Working paper No. 15.

DowJones VentureSource. 2005. Venture Capital Industry Overview.

European Commission. 2003. Green Paper: Entrepreneurship in Europe.

European Commission. July 2005. Improving Opportunities for Initial Public Offerings on Growth Stock Markets in Europe. Report from the workshop held on 24 May 2005 in Brussels

European Private Equity & Venture Capital Association. October 2005. Fulfilling the Promise of Venture-backed High Potential Companies – Why We Need to Fix Small Cap Markets in Europe. An EVCA High Tech Committee Paper

European Venture Capital Association (EVCA). 2005. www.evca.com. Retrieved 27.3.2006.

Gilson, J.G. and Black, B. 1999. Does Venture Capital Require an Active Stock Market? Journal of Applied Corporate Finance (winter 1999), 36-48.

Giot, P. and Schwienbacher, A. 2005. IPOs, Trade Sales and Liquidations: Modeling Venture Capital Exits Using Survival Analysis. Working paper.

Gompers, P.A. 1996.Grandstanding in the Venture Capital Industry. Journal of Financial Economics 42, 133-156.

Gompers, P.A., and Lerner J. 1997. Risk and Reward in Private Equity Investments: The Challenge of Performance Assessment. Journal of Private Equity 1, 5-12.

Gompers, P.A., and Lerner J. 1999a. An Analysis of Compensation in the U.S. Venture Capital Partnership. Journal of Financial Economics 51, 3-44.

Gompers, P.A., and Lerner, J. 1999b. The Venture Capital Cycle. Massachusetts: MIT.

Gompers, P.A., and Lerner J. 2000. Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations. Journal of Financial Economics 55, 281-325.

Gompers, P.A. and Lerner, J. 2001. The Venture Capital Revolution. Journal of Economic Perspectives, 15(2), 145-168.

Gordon, R.J. 2004. Why Was Europe Left at the Station When America's Productivity Locomotive Departed? Working paper.

Gorman, M. and Sahlman, W.A. 1989. What Do Venture Capitalists Do? Journal of Business Venturing 4, 231-248.

Gottschalg, O., Phalippou, L. and Zollo, M. 2004. Performance of Private Equity Funds: Another Puzzle? INSEAD working paper

Hale, A. 2005. The Demise of the European Software Industry: Two Minute Warning. Russell Reynolds Associates.

Heckman, J. J. 1979. Sample Selection Bias as a Specification Error. Econometrica 47(1), 153-162.

Hege, U., Schwienbacher, A. and Palomino, F. 2003. Determinants of Venture Capital Performance: Europe and the United States. Working paper.

Hellmann, T.A. 2002. A Theory of Strategic Investing. Journal of Financial Economics 64, 285-314.

Hellmann, T.A. and Puri, M. 2000. The Interaction between Product Market and Financing Strategy: The Role of Venture Capital. Review of Financial Studies 13(4), 959-984.

Hellmann, T.A. and Puri, M. 2002. Venture Capital and the Professionalization of Start-up Firms: Empirical Evidence. Journal of Finance 57(1), 169-197.

Hellmann, T.A., Lindsey, L., and Puri, M. 2004. Building Relationships Early: Banks in Venture Capital. NBER Working Paper No. 10535.

Hochberg, Y., Ljungqvist, A. and Lu, Y. 2005. Whom You Know Matters: Venture Capital Networks and Investment Performance. Forthcoming in Journal of Finance.

Hsu, D., 2002. “The Evolution of Organizational Practices at an Early Venture Capital Firm: A Study of American Research and Development. Working paper.

Huber, P. J. 1967. The behavior of maximum likelihood estimates under nonstandard conditions. In Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability. Berkeley, CA: University of California Press 1, 221–223.

Johnson, R.A. and Wichern, D.W. 2002. Applied Multivariate Statistical Analysis, Fifth Edition. Prentice-Hall.

Jones, C. and Rhodes-Kropf, M. 2004, The Price of Diversifiable Risk in Venture Capital and Private Equity, Columbia University working paper.

Jääskeläinen, M., Maula, M., and Seppä, T. 2006 Allocation of Attention to Portfolio Companies and the Performance of Venture capital firms. Entrepreneurship Theory and Practice 30 (2), 185-206.

Kanniainen, V. and Keuschnigg, C. 2003. The Optimal Portfolio of Start-Up Firms in Venture Capital Finance. Journal of Corporate Finance 9, 521-534.

Kanniainen, V. and Keuschnigg, C. 2003b. Start-Up Investment with Scarce Venture Capital Support. Journal of Banking and Finance forthcoming.

Kaplan, S.N. and Schoar, A. 2005. Private Equity Performance: Returns, Persistence, and Capital Flows. Journal of Finance 60(4), 1791-1823.

Kaserer C. and Diller C. 2004. European Private Equity Funds – A Cash Flow Based Performance Analysis. Working Paper.

Keuschnigg, C. 2003. Optimal Public Policy for Venture Capital Backed Innovation. CEPR Working Paper No. 3850.

Ljungqvist, A. and Richardson, M. 2003. The Cash Flow, Return and Risk Characteristics of Private Equity. National Bureau of Economic Research, Working Paper 9454.

Lockett, A., Murray, G. and Wright, M. 2002. Do UK Venture Capitalists Still Have a Bias Against Investment in New Technology Firms. Research Policy 31, 1009-1030.

MacMillan, I.C., Kulow, D.M. and Khoylian, R. 1988. Venture Capitalists' Involvement in Their Investments: Extent and Performance. Journal of Business Venturing 4(1), 27-47.

Manigart, S., De Waele, K., Wright, M., Robbie, K., Desbrieres, P. and Sapienza, H.J. 2002. Determinants of Required Return in Venture Capital Investments: A Five-Country Study. Journal of Business Venturing 17(4), 291-312.

Mason, C.M. and Harrison, R.T. 2002. Is it Worth it? The Rates of Return from Informal Capital Investments. Journal of Business Venturing 17, 211-236.

Maula, M. V. J. 2001. Corporate venture capital and the value-added for technology-based new firms. Doctoral dissertation, Helsinki University of Technology, Institute of Strategy and International Business, available at http://lib.hut.fi/Diss/2001/isbn9512260816/.

Maula, M. V. J. & Murray, G. C. 2002. Corporate venture capital and the creation of US public companies: the impact of sources of venture capital on the performance of portfolio companies, in: R. D. Nixon (Ed.) Creating Value: Winners in the New Business Environment. Oxford: Blackwell Publishers. 164 – 187.

Megginson, W.L. 2004. Towards a Global Model of Venture Capital. Journal of Applied Corporate Finance 16(1).

Megginson, W.L. and Weiss, K.A. 1991. Venture Capitalist Certification in Initial Public Offerings. Journal of Finance, 879-903.

Meyer, T., Mathonet, P-Y. 2005. Beyond the J Curve: Managing a Portfolio of Venture Capital and Private Equity Funds. John Wiley & Sons.

Minniti, M., Bygrave, W. D., and Autio, E. 2005. Global Entrepreneurship Monitor 2005 Executive Report.

Murray, G. 1999. Early-Stage Venture Capital Funds, Scale Economies and Public Support. Venture Capital 1(4), 351-384.

Murray, G.C. and Lott, J. 1995. Have UK Venture Capital Firms a Bias Against Investment in New Technology Based Firms? Research Policy 24, 283-299.

Murray, G.C. and Marriott, R. 1998. Why Has the Investment Performance of Technology-Specialist, European Venture Capital Funds Been So Poor? Research Policy 27, 947-976.

Rosentein, J., Bruno, A.V., and Taylor, N.T. 1993. The CEO, Venture Capitalists and the Board. Journal of Business Venturing 8, 99-113.

Sahlman W.A. 1990. The structure and governance of venture-capital organizations. Journal of Financial Economics 27, 473-521.

Sapienza, H.J. 1992. When Do Venture Capitalists Add Value? Journal of Business Venturing 7(1), 9-27.

Sapienza, H.J., Manigart, S. and Vermeir, W. 1996. Venture Capitalist Governance and Value Added in Four Countries. Journal of Business Venturing 11, 439-469.

Seppä, T. and Maula M. 2002. Certification and Bargaining Power in Venture Capital: The Impact of Investor Prominence on Company Valuations. Financial Management forthcoming.

Söderblom, A. 2005. Factors Determining the Performance of Early Stage High-Technology Venture Capital Funds. Working paper. Stockholm School of Economics.

The Royal Swedish Academy of Sciences. 2000. The Scientific Contributions of James Heckman and Daniel McFadden, available at http://www.kva.se/KVA_Root/files/newspics/DOC_2003815141953_29385274244_ecoadv00.pdf

Venture Economics and Bannock Consulting, 1997. International Investment Benchmarks Report. Venture Economics. Newark, NJ/Bannock Consulting, London.

Venture Economics. 2006. www.ventureeconomics.com. Retrieved 27.3.2006.

Wang, C.K. and Ang, B.L. 2004. Determinants of Venture Performance in Singapore. Journal of Small Business Management 42(4), 346-363.

White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica 48, 817–830.

Woodward, S.E. and Hall, R.E. 2003. Benchmarking the Returns to Venture. Working paper.

8. APPENDICES

8.1. Appendix 1: History of Venture Capital

The first forms of venture investing can be traced back to the late 1930s, when wealthy families in the U.S. started to invest their capital in small growing companies. Laurance Rockefeller pioneered early stage venture financing that later led to the foundation of Venrock Associates, a famous venture firm, in 1969 (www.venrock.com). However, the formal birth of America's venture capital industry is usually traced to the American Research and Development Company that began operating in New York City shortly after the end of World War II. The first U.S. venture capital company (ARD) was founded in Boston in 1946. After the Small Business Investment Act in 1958, the government supported Small Business Investment Companies (SBICs) were established. Each dollar of equity invested allowed the SBICs to leverage four low interest government dollars in debt. Before the late 1970s the total pool of venture capital was quite small and most of the active funds were sponsored either by financial institutions (i.e., Citicorp Venture Capital) or non-financial corporations such as Xerox. The main sources of venture capital differed from the current situation as most of the money came from the corporate backers of the funds or from wealthy individuals or family trusts (Megginson, 2004, p.7; Brouwer and Hedrix, 1998, p. 333).

Two important policy changes in the U.S. in the late 1970 led to a significant boost in the venture capital investing as the funding increased from $68.2 million in 1977 to $978.1 million in 1978[4]: (Megginson, 2004, p.7)

1. In 1978, Congress lowered the top personal income tax rate on realized capital gains from 35 to 28 percent.

□

[4] Measured in 1987 dollars

2. In 1979, the Labor Department relaxed its "Prudent Man Rule", thus effectively authorizing pension fund managers to allocate up to five percent of fund assets to private equity investments.

The dramatic influence of these policy actions goes to show how important role the legal and fiscal environment play in the development of private equity markets.

The venture capital industry was further boosted by new capital gains tax reductions and, resultingly, topped $5.1 billion in 1983. In the beginning of 1980s venture capital spread to Europe, where it had a flying start, particularly in the Netherlands and in the UK (Brouwer and Hedrix, 1998, p. 333). After a period of stagnation in the late 1980s and early 1990s the private equity funding in U.S. climbed to an astonishing amount of $106.8 billion in 2000 during the new economy hype (Megginson, 2004, p.7). This boom was experienced all over the world as the global investors committed more than $180 billion at the peak in 2000. After the burst of the bubble in 2001, the venture capital investments have dropped markedly, but still remain moderately high compared to, for example, early 1990s.

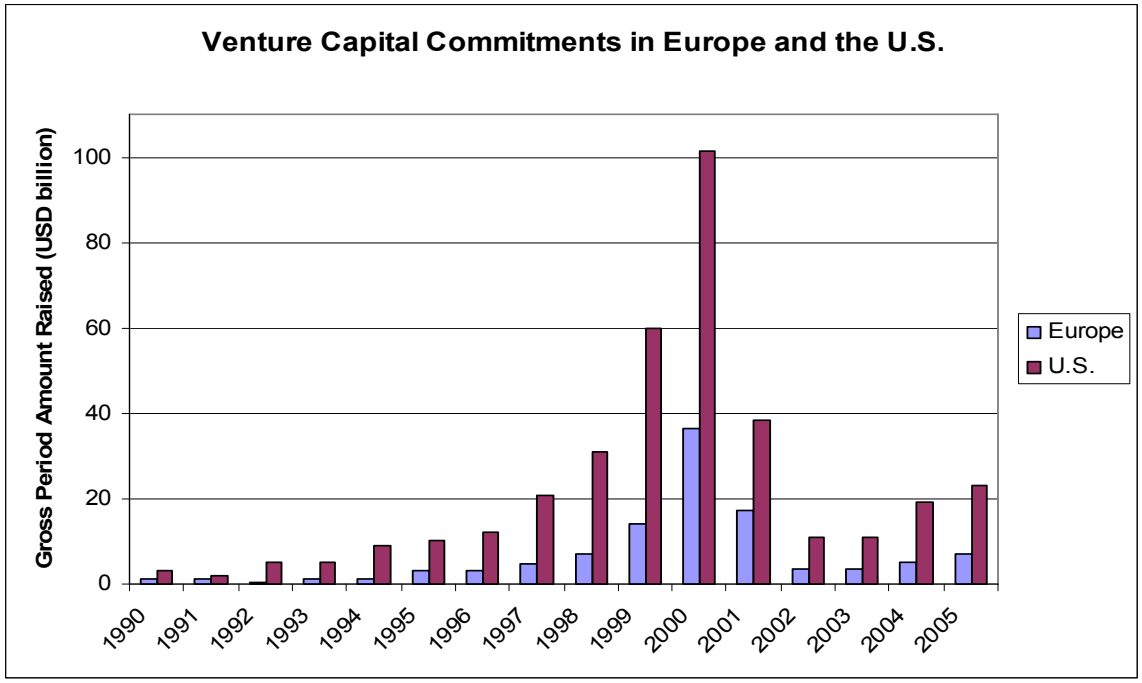

Figure 39 Venture capital commitments in Europe and the U.S.

8.2. Appendix 2: Interview Agenda for Qualitative Study

Part I: Questions concerning your company/fund

1. Overall strategy
• What is your investment strategy (geographical, stage, and industry focus)? Why have you chosen this strategy? • Have you changed it or are you planning to change it? Why / Why not? • What is your core competence? What is your competitive edge over other VC firms?
2. Investments
• What is your deal flow and what is the hit rate of it? • What are the most important things that you consider when making the investment decision? • Which do you prefer; being a lead investor or syndicate partner? Why? • What is the most common reason for a negative investment decision? • What is your typical investment amount to a company in the first investment round? What about the cumulative amount during all investment rounds?
3. Monitoring / staging
• What is the typical length of the first investment round? • What kind of goals/milestones do you set for the companies? How are they monitored? How do they trigger? • How do you react to unsatisfactory development? • In what kind of situations do you decide to cut further funding? How often does this happen?
4. Interaction with portfolio companies
• How much time and effort do you spend helping and advising your portfolio companies (e.g. hours/week)? Leading investor / syndicate partner? • Can you describe your way of board working? • What is the maximum number of companies that one partner can handle? • What kind of assistance do you offer / are you asked for as a manager most often?

5. Experience
• How many funds has your company raised during its lifetime? • How many years of experience does the current fund management team have? • Do you have experience in handling a full lifecycle of a fund (collecting the fund managing it, closing it), is this a same person? • What is the most proper experience / education / know-how for your work? • What is your turnover in your own personnel in your company? • How are the managers financially committed to their work? • Do you use external expertise in your operations? What kind? • What would you change in your operations in your next fund?
6. Return expectations
• What is the minimum return multiple you require for your investment in a company? • Does this multiple vary between industries, stages or other variables?

Part II: Questions concerning the VC industry

8. VC capabilities
• Do you think that there are large differences in the capabilities of different VCs? • Can you describe the differences? • How much do you think that the capability of the VC affects the fund returns? Do you think that the historical returns correlate with future performance?
9. Operating as a VC in America vs. Europe
• What are the biggest differences between the VC markets in America and in Europe? • Can you identify any differences in the way American and European VCs operate? What are they and why do they exist? • Do you think that the optimal way of operating as a VC is different in America and in Europe? How and why?
10. Exit markets
• How do you rank the different exit alternatives (IPO, trade sale, sale to another VC)? Why? What are the benefits and drawbacks of the alternatives? • Can you identify any differing characteristics between America and Europe?
11. Future
• How do you see the future of the early stage funds? • How do you see the future role of venture capital in financing new ventures, will it grow, decrease or stagnate? • How would you change the legal environment or government policies to boost the VC activity?

Part III: Variables affecting fund returns

Below is a list of variables that are estimated to influence a fund's returns. These performance determinants are gathered from academic research papers and expert interviews. Regarding the list:

- Do you agree with the stated effect and importance of the listed variables?
- Can you think of any other variables?

Determinant	Estimated importance	Estimated effect on returns
Portfolio company related		
Management	High	Investments in portfolio companies with experienced entrepreneurs yield higher retuns
Investment stage	Medium	Seed investments yield lower returns
Industry	Medium	Investments in high-tech, biotech, and medical sectors yield higher returns
Business type (product business vs. service business)	?	?
Venture investment characteristics related		
Contract type	Low	Investments in which convertible securities are used yield higher returns
Stage financing	Low	Short financing rounds translate into a more effective use of the abandonment decision, and hence to higher returns
Syndication	Low	Syndicated investments yield higher returns
Investment size	Low	Large investments decrease relative costs, and yield higher returns
Investment length	Low	Longer investments yield lower returns
Venture fund related		
VC's capabilities	High	Success in the past increases expected returns
Industry specialization	High	VCs focused on certain industry yield higher returns
VC's reputation	Medium	Experienced and respected GPs get better deals and thus also higher returns
Fund size	Medium	The relation between fund size and returns is concave
Growth rate	Medium	Fast VC fund growth results in lower returns
Portfolio management	Medium	Fast liquidation of unsuccessful companies and focus on the best companies yields higher returns
VC's participation in portfolio companies	Low	Active participation in portfolio companies increases returns
Exit focused development	Low	Funds that develop their companies to maximize their exit value yield higher returns
Geographical focus	Low	Narrow geographical focus yields lower returns
Fund length	Low	Funds with determined length yield higher returns

(Continued on next page)

Determinant	Estimated importance	Estimated effect on returns
Funding source related		
Financing from public sectors	High	Venture funds with commitments from the public sector yield lower returns
Fund structure	High	Independent VCs yield higher returns than public or captive VCs
Economic environment related		
Stock markets	High	Investment in countries with active stock markets enable successful IPOs and higher returns
Level of entrepreneurship	High	Entrepreneurs offer attractive investment opportunities resulting in higher returns
Private equity raised during vintage year	High	The prices of portfolio companies rise resulting in lower returns
Macro economic situation on exit year	High	Good economic situation increases valuation resulting in higher returns
Maturity of the VC market	High	Investments in mature VC markets yield higher returns
Potential market size	Medium	Investments in countries with large home market ease the growth phase and yield higher returns
Education level	Medium	High education level increases returns
Public opinion on entrepreneurs	Medium	A culture where success brings glory and failure is not a shame provides better returns
Legal environment	Low	Investments in countries with common law yield higher returns
Flexibility of labor markets	Low	Investments in countries with flexible labor markets lead to higher profit
R&D spending	Low	Investments in countries with high R&D spending compared to GDP yield higher returns
Capital gain tax	Low	Investments in countries with high capital gain taxes lead to lower profits

8.3. Appendix 3: Categorization of Private Equity Fund Types

Independent
Evergreen Funds
Independent Private Partnership
Partnership not classified
Public Venture Funds
Corporate venture
Direct Investor-Service Provider
Direct Investor/Non Financial Corp
Non Financial Corp. Affil or Subsid. Partnership
Venture/PE Subsidiary of Non Financial Corp.
Venture/PE Subsidiary of Other Companies NEC
Venture/PE Subsidiary of Service Providers
Non Financial Corp. Affil or Subsid. Partnership
State supported
SBIC Affiliated with Non Financial Corp
SBIC Affiliated with University/Endowment/Found
SBIC Affiliated with Commercial Bank
SBIC Affiliated with Commercial Bank
SBIC Private Partnership
MESBIC
Public SBIC
SBIC Affiliated with Other Financial Institution
SBIC Investment Co not classified
Community Development Program
Govt Agency Affil. or Subsidiary Partnership
National Government Program
State Program
Other
Direct Investor - Commercial Bank Affil/Subsid.
Direct Investor-Financial Corp.
Direct Investor-Investment/Merchant Bank
Investment Adv.Firm Partnership (Non Fund of Fund)
Non partnership Business Development Program
Direct Investor-Endowment/Foundation
Endowment/Foundation Affil. or Subsid. Partnership
Venture/PE Subsidiary of Endowment/Foundation
Commercial Bank Affil. or Subsidiary Partnership
Insurance Affil. or Subsid Partnership
Other Fin.Institution Affil or Subsid. Partnership
Venture/PE Subsidiary of Commercial Bank
Venture/PE Subsidiary of Insurance Company
Venture/PE Subsidiary of Other Fin. Institution
Investment Bank Affil. or Subsidiary Partnership
Venture/PE Subsidiary of Investment/Merchant Bank
Investors not classifed
Direct Investor-Corporate Pension Fund
Direct Investor-Public Pension Fund
Other Fin.Institution Affil or Subsid. Partnership
Venture/PE Subsidiary of Commercial Bank
Venture/PE Subsidiary of Investment/Merchant Bank
University Program
Not included
Direct Investor-Entrepreneur
Direct Investor-Family Groups
Direct Investor-General Partner/Fund Manager
Direct Investor-Individuals
Direct Investor-Investee Company Management
Direct Investor-Companies not Classified
Fund of Fund Partnerships
Partnerships for Secondary Portfolio Purchases

8.4. Appendix 4: Correlations of the Variables

	European fund (D)	American fund investing in Europe (% of inv.)	European fund investing in America (% of inv.)	Startup (% of investments)	Early stage (% of investments)	Expansion stage (% of investments)	Later stage (% of investments)	Buyout (% of investments)	Stage specialization (Herfindahl)	IT and high-tech (% of investments)	Medical and bio (% of investments)	Industry specialization (Herfindahl)	B2B companies (% of investments)	B2G companies (% of investments)	B2C companies (% of investments)	Customer specialization (Herfindahl)	Average investment round size	Average round length	Logarithm of fund's sequence number	Syndication	Size of the fund	Size of the fund (squared)	Corporate venture (D)	State funded (D)	Other fund type (D)
Other fund type (D)	0.09	0.05	0.08	-0.09	-0.06	0.08	0.07	0.01	0.11	-0.02	-0.01	0.00	0.01	-0.01	-0.02	0.07	0.06	0.01	0.04	0.09	0.10	0.10	-0.10	-0.10	1.00
State funded (D)	-0.04	-0.03	-0.04	0.00	-0.01	0.00	-0.01	0.06	-0.04	-0.03	-0.03	-0.08	-0.01	0.05	0.03	-0.03	-0.05	0.04	-0.05	-0.04	-0.04	-0.02	-0.06	1.00	
Corporate venture (D)	-0.05	0.00	-0.01	-0.03	-0.04	0.05	0.03	-0.06	-0.04	0.08	-0.07	0.08	0.04	0.05	-0.06	0.05	0.03	0.00	-0.14	0.08	-0.01	0.00	1.00		
Size of the fund (squared)	-0.03	0.02	-0.02	-0.07	-0.05	0.09	-0.02	0.02	0.06	-0.03	-0.02	0.00	-0.03	-0.01	0.00	0.01	0.24	0.01	0.04	-0.03	0.86	1.00			
Size of the fund	-0.05	0.05	-0.02	-0.12	-0.06	0.13	-0.03	0.03	0.05	0.02	-0.04	0.04	-0.04	-0.02	0.05	-0.03	0.33	-0.02	0.12	-0.05	1.00				
Syndication	-0.22	-0.04	0.08	-0.06	-0.17	0.05	0.24	0.01	-0.08	0.18	0.01	0.08	0.07	-0.03	-0.12	0.06	0.22	-0.17	0.08	1.00					
Logarithm of fund's sequence number	-0.09	0.00	-0.01	-0.04	-0.05	0.02	0.05	-0.02	-0.01	0.01	0.03	-0.04	-0.01	-0.02	0.01	-0.04	0.09	-0.08	1.00						
Average round length	0.07	0.07	-0.01	-0.01	0.03	0.01	-0.09	0.09	0.05	-0.19	0.04	-0.11	-0.06	0.02	0.00	-0.02	-0.08	1.00							
Average investment round size	-0.06	0.08	0.02	-0.27	-0.13	0.21	0.17	-0.07	0.13	0.11	-0.07	0.22	-0.02	0.00	0.09	0.00	1.00								
Customer specialization (Herfindahl)	0.06	0.05	0.06	-0.09	-0.01	0.10	0.06	-0.22	0.47	0.12	-0.16	0.35	0.37	-0.13	-0.21	1.00									
B2C companies (% of investments)	-0.09	0.01	-0.07	-0.09	-0.01	0.06	0.03	0.01	0.07	-0.18	0.01	0.02	-0.54	-0.02	1.00										
B2G companies (% of investments)	0.00	0.02	0.01	-0.01	-0.01	0.02	-0.02	0.04	-0.04	-0.01	-0.03	-0.06	-0.04	1.00											
B2B companies (% of investments)	0.07	0.03	0.04	0.00	0.02	-0.01	0.00	-0.03	-0.03	0.33	-0.24	0.06	1.00												
Industry specialization (Herfindahl)	0.02	0.05	0.07	-0.14	0.03	0.12	0.09	-0.28	0.41	0.37	-0.17	1.00													
Medical and bio (% of investments)	0.04	0.03	0.05	0.10	0.02	-0.11	0.00	-0.04	-0.05	-0.72	1.00														
IT and high-tech (% of investments)	-0.06	-0.04	0.00	-0.06	0.04	0.04	0.05	-0.08	0.02	1.00															
Stage specialization (Herfindahl)	0.20	0.08	0.07	-0.19	-0.08	0.36	0.00	-0.33	1.00																
Buyout (% of investments)	-0.06	-0.01	-0.05	0.05	-0.04	-0.10	-0.06	1.00																	
Later stage (% of investments)	-0.11	0.00	0.04	-0.25	-0.26	-0.24	1.00																		
Expansion stage (% of investments)	0.16	0.04	0.06	-0.49	-0.50	1.00																			
Early stage (% of investments)	-0.02	-0.01	-0.04	-0.10	1.00																				
Startup (% of investments)	-0.03	-0.05	-0.05	1.00																					
European fund investing in America (% of	0.58	-0.05	1.00																						
American fund investing in Europe (% of i	-0.09	1.00																							
European fund (D)	1.00																								

8.5. *Appendix 5: Econometric Model Results for Buyout Funds*

Table 9 Heckman selection model results for buyout funds

	Model 3A (All)		Model 3B (America)		Model 3C (Europe)	
Variables	IRR	Selection	IRR	Selection	IRR	Selection
European fund (D)	-59.750 *	-0.719 **				
American fund investing in Europe (% of inv.)	-24.510		-68.667			
European fund investing in America (% of inv.)	428.591				-434.050	
Stage specialization (Herfindahl)	39.368		14.218			
IT and high-tech (% of investments)	0.735		31.469			
Medical and bio (% of investments)	15.186		38.320			
Industry specialization (Herfindahl)	-37.242		-30.294			
B2B companies (% of investments)	69.900 *		-15.349		63.811	
B2C companies (% of investments)	58.044 *		18.241			
Customer specialization (Herfindahl)	-12.181		17.217			
Average investment round size	0.083		-0.193			
Average investment total length	-0.556 +		-0.510			
Logarithm of fund's sequence number	23.011 *		6.309			
Syndication	12.744 *		-2.912		-3.896	
Bonacich index during vintage year	***		-102.191			
Size of the fund	29.893	1.419 ***	-163.309	2.590 ***		
Size of the fund (squared)	-23.327		45.937			
Other fund type (D)	-8.734	-0.690 *	35.934	-0.767 *	-27.159	-4.419 **
Vintage in 1970-79 (D)		-5.032		-5.036		
Vintage in 1980-89 (D)		-0.399 +	50.599	-0.542 *		0.538
Corporate venture (D)		-4.774		-4.628		
Fund's sequence number		0.111 ***		-0.050		0.410 ***
Vintage year dummies	included		included		included	
Constant	-115.884 *	-1.364 ***	159.948	-1.294 ***	0.297	-2.994 ***
Observations	40	264	27	186	7	74
Type	Heckman twostep		Heckman twostep		Heckman twostep	

Significance: *** = 0.1%, ** = 1% * = 5%, + = 10% (1-tailed significance used because all variables are based on hypotheses)

8.6. Appendix 6: Econometric Model Results for All Private Equity Funds

Table 10 Regression and Heckman selection model results for private equity (buyout+venture)

	Model 4A	Model 4B		Model 4C (no Bonacich)	
Variable	IRR	IRR	Selection	IRR	Selection
European venture fund (D)	-11.521 *	-19.824 *		-20.476 **	
European buyout fund (D)	1.322	-0.802		-6.211	
American buyout fund (D)	2.568	8.331		6.797	
Other stage (D)	1.205	4.325		0.029	
American fund investing in Europe (% of inv.)	3.645	7.406		2.767	
European fund investing in America (% of inv.)	12.794	0.858		-1.720	
Stage specialization (Herfindahl)	-1.573	-4.270		-10.603 +	
IT and high-tech (% of investments)	10.151 *	11.436 *		11.686 *	
Medical and bio (% of investments)	4.406	5.266		5.318	
Industry specialization (Herfindahl)	5.551	5.121		11.414 *	
B2B companies (% of investments)	16.665 **	15.696 *		18.481 **	
B2G companies (% of investments)	-5.065	11.878		8.095	
B2C companies (% of investments)	4.505	3.483		5.873	
Customer specialization (Herfindahl)	8.009	9.437		1.849	
Average investment round size	-0.060 *	-0.071 +		-0.068 +	
Average investment round length	0.152 *	0.160 +		0.107	
Logarithm of fund's sequence number	0.488	4.274 *		7.787 ***	
Bonacich index during vintage year	48.755 ***	50.293 ***		***	
Syndication	1.066	1.300 +		1.673 *	
Size of the fund	14.881 +	41.420 **	1.247 ***	39.158 **	1.282 ***
Size of the fund (squared)	-5.492	-11.099 *		-12.189 *	
Corporate venture (D)	65.374 *	45.040 *	-1.265 ***	19.179	-1.024 ***
State funded (D)	-3.064	-2.321		-4.633	
Other fund type (D)	-2.421	-11.236 *	-0.582 ***	-8.648 *	-0.549 ***
Vintage in 1960-69 (D)			-0.802 *		-0.896 *
Vintage in 1970-79 (D)			-0.680 ***		-0.771 ***
Vintage in 1980-89 (D)			-0.243 ***		-0.228 ***
European fund (D)			-0.710 ***		-0.583 ***
Fund's sequence number			0.063 ***		0.048 ***
Venture fund (D)			-0.217 ***		-0.208 ***
Vintage year dummies	included	included		included	
Constant	-27.194 **	-80.520 *	-0.931 ***	-67.380 +	-0.835 ***
Observations	597	597	3596	674	3673
R-squared	0.21				
Type	Regression	Heckman twostep		Heckman twostep	

Significance: *** = 0.1%, ** = 1% * = 5%, + = 10% (1-tailed significance used because all variables are based on hypotheses)

8.7. Appendix 7: Econometric Model Results with Different Vintage Samples

Table 11 Consistency of Heckman selection model results across last vintage of funds included in the sample

	Vintage -1998	Vintage -1999	Vintage -2000	Vintage -2001	Vintage -2002
Variable	IRR	IRR	IRR	IRR	IRR
European venture fund (D)	-17.884 *	-16.433 *	-16.545 **	-15.139 **	-10.840 *
European buyout fund (D)	-20.496 +	-10.987	-14.257 +	-10.089	-9.859
American buyout fund (D)	-7.659	-5.765	-8.813 +	-8.009 +	-8.552 +
Other stage	-5.729 +	-3.249	-3.002	-3.680	-4.031 +
American fund investing in Europe (% of inv.)	6.842	-0.820	5.558	14.190 *	16.658 **
European fund investing in America (% of inv.)	2.364	3.875	5.929	8.432	2.038
Startup (% of investments)	15.199	18.098 +	16.060 +	14.938 +	16.364 *
Early stage (% of investments)	-4.724	-12.609 +	-18.845 *	-20.736 **	-19.651 **
Expansion stage (% of investments)	-14.887 +	-16.419 *	-20.485 **	-20.201 **	-18.296 **
Later stage (% of investments)	7.796	0.313	-3.417	-7.973	-9.152
Buyout (% of investments)	9.226	6.480	6.027	6.633	8.995
Stage specialization (Herfindahl)	-5.910	-1.807	-0.306	0.688	1.038
IT and high-tech (% of investments)	12.728 **	8.288 *	5.558	4.291	2.679
Medical and bio (% of investments)	3.346	3.467	2.838	-0.978	-3.738
Industry specialization (Herfindahl)	9.889 +	4.743	3.046	0.714	2.472
B2B companies (% of investments)	15.759 **	12.004 *	9.499 *	10.589 *	10.282 *
B2G companies (% of investments)	25.465	73.797 +	36.765	9.330	-1.152
B2C companies (% of investments)	5.553	4.014	2.248	2.305	1.240
Customer specialization (Herfindahl)	4.947	2.486	0.994	-2.557	-3.949
Average investment round size	-0.095 *	-0.075 *	-0.035	0.020	0.018
Average investment total length	0.100	0.081	0.050	0.034	0.007
Logarithm of fund's sequence number	7.878 ***	5.242 ***	4.661 ***	4.128 ***	4.436 ***
Syndication	1.787 **	1.773 **	1.699 **	1.665 **	1.745 **
Size of the fund	36.262 *	23.303 +	10.326	4.784	5.336
Size of the fund (squared)	-10.971 *	-4.576	1.125	1.358	1.107
Corporate venture (D)	21.393 +	12.604	11.403	9.388	7.862
State funded (D)	-2.852	0.316	0.207	-1.300	-0.562
Other fund type (D)	-6.896 +	-7.286 +	-5.261 +	-3.945	-3.376
Vintage year dummies	included	included	included	included	included
Constant	-67.861 *	-54.978 +	-42.712 +	-32.172	-31.514
Observations	674	792	944	1030	1076
Type	Twostep	Twostep	Twostep	Twostep	Twostep

Significance: *** = 0.1%, ** = 1% * = 5%, + = 10% (1-tailed significance used because all variables are based on hypotheses)