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Understanding the Swedish Venture Capital market - and what determines the success of investments

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Abstract

- Title:** Understanding the Swedish Venture Capital market – and what determines the success of investments
- Course:** BUSP70
- Authors:** Anton Norrman and Viktor Savén
- Keywords:** Venture Capital, Exit determinants, Swedish Venture Capital market, Private VC, Governmental VC, clusters, proximity, high growth industry, investment duration
- Purpose:** The purpose of this study is to investigate if and how characteristics of the Swedish VC industry affect the exit outcome in VC investments
- Methodology:** A quantitative approach using a binary logistic regression model supported by marginal effects calculations
- Theoretical framework:** Information asymmetry, Agency theory, Theories related to Venture Capital, Theories related to the Swedish Venture Capital market
- Empirical foundation:** A sample of 233 Venture Capital exits during the time period 2000-2014
- Conclusion:** The main findings of this study are that the likelihood of achieving a successful exit increases if the investing firm is private and if the geographical distance between investing firm and investee is limited. Furthermore, it is possible to conclude that the Swedish Venture Capital industry share several features with international counterparts, although the importance of the IPO for the overall funding of the industry is negligible. Instead the Swedish Venture Capital industry has been and will likely continue to be driven by governmental intervention

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1. Introduction

This chapter will offer an introduction to the topic at hand and the fundamental research problem will be discussed. Further, the purpose of the study will be presented along with the research question and the research contribution.

1.1 Background

Skype, a communication software firm was during 2011 sold to Microsoft for SEK 54 billion in a trade sale (DN, 2011). The rumored IPO of Spotify is estimated at around SEK 66 billion¹ (Reuters, 2014) implying that it would be one of the largest IPOs ever by a Swedish firm if it were to happen (Bloomberg, 2015). QlikTech started its journey in Lund in 1993. 17 years later its shares were trading on the New York Nasdaq exchange. Lars Björk CEO, became historical as the second swede to list a firm in New York (SvD, 2013).

Since the start of the new millennia, Sweden in general and Stockholm in particular has evolved into one of the most prominent technological hot spots in the world. Companies such as Skype, Spotify and QlikTech are just a few prominent examples of entrepreneurial firms (EF) who share a common denominator. They were all at one point or another backed by Venture Capital (VC) investors. The Swedish VC market has since the 1980s evolved into a vital institution which combined manages funds of around SEK 100 billion (SVCA, 2014; Isaksson, 2006). However, the VC industry is not what it used to be. The “dot com” crash as well as the more recent financial crisis has reduced the industry to a fraction of what it was some 15 years ago (Söderblom, 2012).

According to an annual review conducted by the Swedish Private Equity & Venture Capital Association (SVCA) and tillväxtanalys, the Swedish VC market in 2013 received SEK 2.0 billion in investments distributed to around 220 EFs, implying that the declining trend observed ever since 2008 (SEK 4.8 billion) was broken (SVCA, 2014). The same pattern can be observed in Europe where VC investments declined from SEK 58.7 billion² in 2008 to

¹ Translated from USD to SEK using the exchange rate as of 2015-05-13: 1 USD = 8.29 SEK

² Translated from EUR to SEK using the exchange rate as of 2015-05-13: 1 EUR = 9.32 SEK

SEK 31.6 billion² in 2013 (EVCA, 2014) and in the US where investments declined from SEK 248.6 billion¹ in 2008 to SEK 79.0 billion¹ in 2013 (NVCA, 2014).

The cyclicity of the VC industry is strongly correlated with the economy in general (Gompers & Lerner, 1999) and the availability of well-functioning equity markets that facilitate exits through IPOs (Ogden, Jen & O'Connor, 2003). The importance of having a viable exit route is further significant due to accountability issues between VC managers and their capital providers. Without the opportunity to exit investments, the VC industry would cool off as investors would look elsewhere to place their capital (Black & Gilson, 1998; Jeng & Wells, 2000). Furthermore, as young firms often lack the ability to pay dividends to its investors, capital gain from successful exits become the most important source of income for VC firms (Cumming & MacIntosh, 2003a). Thus, the exit as a mechanism is perhaps the most important factor in the entire venture capital cycle and it has effect on all other parts, from fundraising to contracting (Gompers & Lerner, 2004).

1.2 Problem discussion

VC firms have historically shared a common desire, that of taking firms public. The IPO has been, and perhaps still is, the strongest driver for the fundraising of the VC industry (Jeng & Wells, 2000) and it is often considered to be axiomatically better than other exit routes for all EFs and under all circumstances (Povaly, 2006). Such is the case for the US market.

Internationally, evidence from Singapore (Wang & Sim, 2001), and from Canada (Cumming & MacIntosh, 2003a&b) suggest that the exit is a strong driver not only in the US but internationally as well. However, in Singapore no relation was found between the general level of equity valuation of the economy and the likelihood of VC investments being exited through IPOs, a relationship considered to be strong in the US. In Canada, the predictive power of the authors' model was weaker than in the US due to economic, legal and institutional reasons.

With the US being arguably the country in the world that is the most heavily reliant on the equity markets for financing (Nobes & Parker, 2012) and both Singapore and Canada following not far behind (both classified as Anglo-Saxon, and thus thought to be similar to the US, in terms of legal framework and main source of financing), even small differences

between the countries raises some interesting questions regarding the situation in non-Anglo-Saxon countries such as Sweden where market characteristics are very different and the VC industry is much less developed, an argument supported by Black & Gilson (1998) who scrutinize differences between stock-market centered and bank centered economies.

The “IPO-centered” model for understanding VC has worked in the past, and perhaps still works on certain markets and under certain assumptions. However, recent literature has shed new light on the issue, discussing it from new perspectives in terms of understanding that differences in the characteristics of domestic markets will lead to the evolution of slightly different VC markets. It is therefore interesting to conduct this study on the Swedish market to challenge what we thought we knew and to investigate this issue considering settings that previously has been unexplored.

1.3 Purpose

The purpose of this study is to investigate if and how characteristics of the Swedish VC industry affect the exit outcome in VC investments. The exits for the purpose of this study being IPO, trade sale, secondary buyout, buy-back and write-offs where the four initial exits are pooled to one category named return generating exits, thought to proxy for successful exits.

We will investigate investments, both conducted and exited between 2000 and 2014, a period during which the VC market, both in Sweden and internationally has seen extensive volatility and undergone somewhat of a transformation.

There have been a few attempts to explain exit outcomes with national traits (Wang & Sim, 2003; Cumming & MacIntosh, 2003a&b; Cumming, 2008), but none to our knowledge have investigated the Swedish market.

1.4 Research question

To investigate if and how certain characteristics, attributable to the Swedish VC market, relate to exit outcomes, the following research question will be central to this study:

- What characteristics of the Swedish VC market affect, and how do they do so, the exit outcome for VC investments?

1.5 Research contribution

This study contributes to the existing body of research in two ways. First, it explores a market that has not seen this kind of research previously. Given the somewhat special features of the Swedish market, with governmental VC (GVC) firms and a fairly low dependence on the stock market for financing, it is our belief that such research could potentially offer insights, not only applicable to the narrow VC literature, but to the entire Swedish financial system and its policy makers.

Second, our self-collected dataset offers a comprehensive review of the current state of the Swedish VC industry as a whole.

2. Theoretical framework

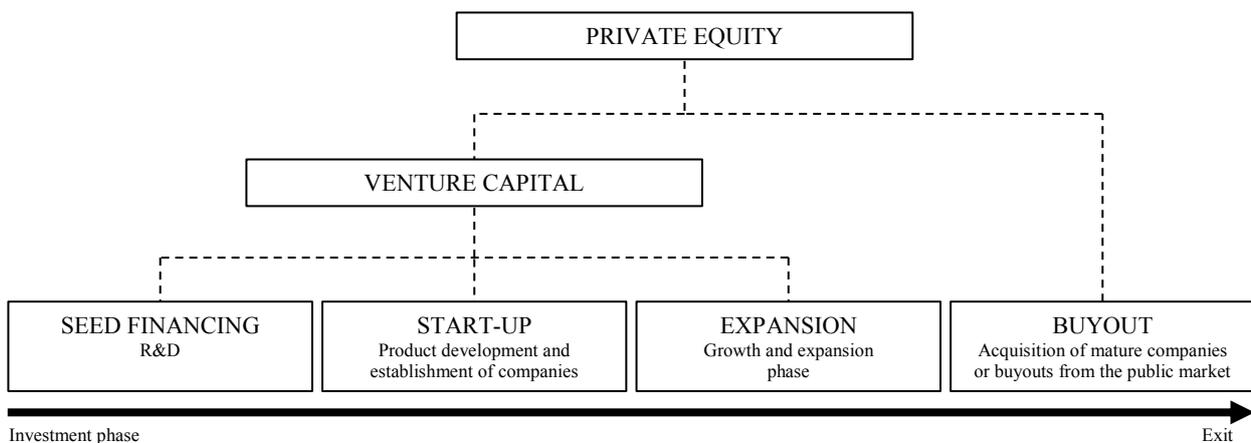
This chapter will provide a foundation consisting of relevant theories and previous empirical research conducted on the topic. The chapter aims to enrich the readers' knowledge and perception of Venture Capital and the challenges that are relevant to the industry. Finally, the chapter will serve as a starting point in relation to the coming analysis.

The literature on, and in relation to VC is vast. For the purpose of this study we will first define and explain VC from a theoretical perspective before turning to the Swedish VC market, which exhibits some important differences when comparing it to international markets where most of the research on exit determinants has been conducted. The chapter will end with a summary of previous relevant studies and a summary of the posed hypotheses.

2.1 Background to Venture Capital

VC is essentially a subset to Private Equity (PE), which in turn is defined as capital infusions in privately owned firms that are not loans (Nyman, Lundgren & Rösiö, 2012). PE can then be divided into buyout and VC. A VC investment is defined as an investment in a privately owned, early stage and high growth firm, whereas a buyout is an investment in a mature firm. *Figure 1* below illustrates the relationship between PE, VC and buyout.

Figure 1. Venture Capital



Inspired by figure 1, Riksbanken 2005

Separating VC from buyout is not completely clear cut as there are no strict lines that dictate when a firm makes the transition from being early stage to being mature. However, there are some distinguishing features of VC that are not usually present in buyouts. Mitchell (2009) mentions eight potential differences for example cash flow in the targeted firm, profitability of the targeted firm and the source of the funds used to acquire the target. To generalize, one could argue that VC firms go for cash poor, unprofitable targets and invest only the funds made available by the VCs investors, whereas buyout firms go for firms with excess cash flow that have proven a profitable business model and investments are often a mixture between internal equity and debt of some kind.

2.2 The role of the VC firm

The fundamental “raison d’être” for the VC industry can be derived from one of the most influential ideas within the finance literature, the pecking order theory (Myers & Majluf, 1984). According to said theory information asymmetry between stakeholders create moral hazard and adverse selection problems which in turn increases the investors demand for premiums. It has further been shown that young EFs can be associated with extreme levels of information asymmetries compared to larger and more mature firms (Casser, 2004). In such a situation, VC firms can act as a financial intermediary, enabling a better flow of both information and capital between EFs and investors (Healy & Palepu, 2001).

By acting as a financial intermediary, thus mitigating agency problems, the VC can increase the likelihood of achieving a successful exit outcome (Cumming & Johan, 2008). Jeng & Wells (2002) summarize these costs as being due to adverse selection and moral hazard, the cost of administration, information gathering and search efforts.

The role of the financial intermediary mainly focuses on banks (Myers & Majluf, 1984). However, banks are not optional intermediaries for young firms that lack the financial strength to provide sufficient collateral in order to get a loan. And as a consequence, the VC industry emerged to bridge the gap and facilitate financing for young, early-stage, firms (Jeng & Wells, 2000).

2.2.1 Active assistance

The first way that VC firms add value to their investees is through active assistance. A VC firm can offer strategic, financial, recruitment and marketing advice as well as introduce the EF to instances such as investment banks, legal councilors and suppliers (Blach & Gilson, 1998; Cumming, 2008; Cumming & Johan 2008; Cumming & MacIntosh, 2003a). The key factor is the knowledge and experience that accumulate in VC firms. By sharing said knowledge and experience the VC can guide the EF and help them through predictable problems that are commonly faced by young firms moving from prototype development to a viable business.

2.2.2 Certification

A second way to add value, somewhat related to the first, is through certification. The VC can ensure the quality of the EF simply by investing in it, which results in lower information asymmetry between the EF and new investors, once the VC decide to exit their investment (Black & Gilson, 1998; Cumming, 2008; Cumming & Johan, 2008; Cumming & MacIntosh, 2003a). VC financing can thus increase the credibility of the EF in terms of relations with third parties, such as suppliers and customers, whose contribution and collaboration can be crucial to the success of the EF.

The impact of these two initial roles is coherent with the fact that reputable VCs facilitate IPO exits more often (Cumming, 2008).

2.2.3 Monitoring and control

VCS also play an important monitoring and control function towards the EF and other parties involved. The monitoring can be performed by frequent informal visits to the EF, meetings with customers and suppliers and through active involvement in strategic decision making of the firm. The demand for control is often disproportionate to the size of the equity investment with investors claiming a majority share of the board positions without holding a majority share of the equity for instance. The aspect of control is often detailed in the contracts between the VC and the EF and almost exclusively involves board representation (Black & Gilson, 1998; Cumming & MacIntosh, 2003a; Lerner, 1995). The monitoring and control

function implies that VCs can invest in firms without stable cash flows and/or tangible assets as security, something that banks require in order to facilitate financing on their behalf (Lerner, 1995). Finally, strong control arrangements can act in the same way that loan covenants would. By having a majority stake in the board it is possible to replace the entrepreneur if performance lags, increasing the accountability for the financial performance (Black & Gilson, 1998).

2.3 VC exit routes

Investments have to at some point be terminated in order to generate cash flows and returns to the VCs and their investors (Jeng & Wells, 2000). There are five primary routes a VC can exit an investment; through an initial public offering (IPO), a trade sale (TS), a secondary buyout (SBO), a management buy-back (MBB) or through a write-off (WO). Each type of exit has its own execution process and requirements, and poses different advantages as well as disadvantages. The common view of literature is that IPOs along with an entry to a stock exchange market is the ultimate form of exit for VCs, but Povaly (2006) underlines that each case is unique and dependent on the firm's stage of development, its outlook and potential buyers. Povaly (2006) further suggests that this might not be the situation for European VC firms given the less liquid capital markets observed in Europe compared to the US. Instead European VCs have favored an acquisition exit i.e. exiting through a sale to another firm either strategic or financial. Given that Sweden is highly reliant on banks for financing (Nobes & Parker, 2012), it is likely fair to assume that IPO will not be the primary exit route for the investments included in this study.

2.3.1 Initial public offering

An IPO is a transaction in which a firm sells a portion of its shares to public investors by typically entering a stock exchange market. The shares that are sold can be offered by large shareholders such as founders, angel investors or VCs but are generally newly issued shares. This because it is important that founders and other early stage investors remain as shareholders to signal an optimistic view of the firm. In order to enforce this, it is common that large shareholders are restricted from selling shares during a certain time-period during and after an IPO, commonly ranging from six months to two years (Cumming & MacIntosh, 2003a). Generally, exits that include a large number of new owners such as the IPO, are

associated with more difficult information asymmetries to overcome, since the dispersed owners neither have the tools nor expertise to carry out a due diligence process to ensure the quality of the firm (Cumming & Johan 2008). This implies a problem for VCs since studies have shown that IPOs are typically the form of exit that can raise the largest amount of money and thus also be the most profitable exit route.

2.3.2 Trade sale & secondary buyout

The most common way for VCs to exit an investment in Europe is through a trade sale or a secondary buyout. The only factor that separates the two is that a trade sale focuses the process towards a strategic buyer, competitor or business partner, while a secondary buyout implies selling to another financial investor (EVCA, 2014). The deal is usually structured by investment banks that identify and analyze potential acquirers, and given the results of this, a number of different process styles can be considered that accomplish different objectives (Povaly, 2006). The different processes are characterized by the number of parties involved, where a Pre-emptive bid approaches a single logical buyer, a Targeted solicitation involves 2-8 selected candidates, a Managed auction targeting 8-15 candidates and a Public auction where there is an unlimited scope of bidders. Choosing a process with fewer parties involved generally implies higher control and makes it possible to manage and execute quicker. By having a higher control, you reduce the risk of valuable business information being exploited. Povaly (2006) further argues that as the number of potential buyers increase, there is a higher probability of business disruption, competitive tension and increased complexity of the transaction process.

Finally, acquisition exits, conducted by either a strategic or a financial buyer are associated with less information asymmetry problems (compared to an IPO) since the acquiring firm generally has the financial strength, expertise and time to carry out a thorough due diligence process (Cumming & Johan, 2008).

2.3.3 Management buy-back

A buy-back transaction is when an investor sells back its equity investment to the entrepreneur. This occurs when an investor see a limited potential upside in an early stage investment, that typically still has a relatively low valuation. The transaction is usually

executed through a put option on the equity, which was structured when the initial investment was made. There are also cases where entrepreneurs use buy-backs as a form of leveraged buyout, but such transactions are rare (EVCA, 2014). The transaction is often swift since parties involved are well informed of the firm's current status, which limits the need of in depth due diligence of the firm and other time consuming processes such as negotiations about warranties and indemnity provisions (Povaly, 2006).

2.3.4 Write-off

If an EF has not developed as planned and the VC no longer sees a potential upside in the firm, they can choose to write-off the investment in their books. However, even though a write-off is considered an exit route, it does not necessarily mean that the VC disposes its equity part since some of these EFs might have small streams of cash flows. Unfortunately, these cash flows are not sufficient to maintain the VCs active involvement (Cumming & MacIntosh, 2008).

2.4 The Swedish Venture Capital market

The Swedish VC market was in a sense born in the year 1973 with the creation of the very first Swedish VC firm - Företagskapital (Karaömerlioglu & Jacobsson, 2000), at that time semi-private. During the 1970s' the Swedish government started using VC as a tool to get the country out of the economic down cline experienced throughout the decade. Thus, the Swedish VC industry was essentially created by the Swedish government. During the early 1980s' the industry grew, both from the creation of new GVCs but also thanks to the establishment of the first private VC (PVC) firms. Furthermore, the Over-The-Counter market was created to facilitate the trading of shares in smaller companies, thus increasing their access to capital (Isaksson, 2006). Towards the end of the decade the Swedish economy was once again facing a financial crisis with falling stock prices and increasing interest rates. This led to a collapse of the VC market (Söderblom, 2012). The stagnation lasted into the 1990s, but towards the middle of the decade the industry experienced its second boom period. Once again, the government played a part in the rebound of the market. With the creation of Atle and Bure the government infused SEK 6.5 billion into the VC market, a figure that can be compared to SEK 4.7 billion, which was the size of the entire industry in 1987 (Karaömerlioglu & Jacobsson, 2000). Furthermore, tax reductions were introduced for

venture investors and some restrictions for certain pension funds were eased (Baygan, 2003). The now booming market climaxed around the year 2000 and by then around 200 firms were managing around SEK 120 billion (Isaksson, 2006). The years following the crash in the early 2000s' once again reduced the Swedish VC industry by both forcing young VCs into bankruptcy as well as shifting the focus of the survivors to investment in later stages (Söderblom, 2012).

2.4.1 Governmental VC firms

As mentioned, the Swedish government has used VC as a tool at several occasions and the Swedish VC industry has become heavily influenced by that. Many other countries have also recognized the economic benefits of having governmental intervention in the VC industry, that drive the fundraising during bad times (Jeng & Wells, 2000). Brander, Egan & Hellmann (2008) estimate that 50% of all venture capital invested in Canadian enterprises originates from government-sponsored VC funds, and EVCA (2014) state that 35% of total VC funds raised in Europe during 2014 originated from government agencies.

However, GVC has endured heavy critique from researchers who claim that they are not as effective and profitable as PVC. The critique is built upon the fact that most GVCs are restricted by statutory covenants that limit their investment scope, leading to some investments not being optimal from a pure VC perspective (Cumming & Johan, 2008). Another critique is that GVC investments might "crowd out" PVC investments, meaning that researchers are unsure if GVCs increase the size of the market or whether they replace investments from, superior from a theoretical perspective, private firms (Brander, Egan & Hellmann, 2008).

The purpose of the Swedish GVCs is to act as a complement to the PVC market and thus increase the access to capital for firms that cannot receive capital from PVCs (Riksrevisionen, 2014). The need for this stems from an assumption of a market failure that creates a financing gap for young EFs that do not operate in the "right" industry or in the "right" place geographically for instance. Swedish GVC thus strives to be beneficial to the society and to facilitate a more equal VC market across the country by creating regional and/or industry specific VC funds. One feature that clearly distinguishes the Swedish GVCs from its private counterparts is the low emphasis on financial returns. It is in fact only Fourtiertransform AB

that has a clearly defined goal of generating market-like returns to its owners. In general, focus is instead on acting as a complement to the market, contributing to sustained development and benefiting regional entrepreneurship.

2.4.2 Entrepreneurial clusters

EFs with similar characteristics tend to pop up close to each other. Silicon Valley (California, USA) is probably the most recognized VC and EF cluster, which during the last decades has developed success stories such as Intel, Apple and Sun Microsystems. Florida & Kenney (1988) explain clusters by arguing that even though VCs are not absolutely necessary in order to facilitate high technology EFs, they definitely work as a catalyst by lowering barriers associated to the entry of a market. Because of the previous stated argument, clusters with VCs attract EFs and technical personal which in turn attracts new VCs. The result of this phenomenon can be seen as a self-reinforcing cycle of new enterprise formation, innovation, and economic development (Florida & Kenney, 1988). The theory is consistent with Lerner (1996) finding that the success of high growth firms active in the GVC program SBIR (Small Business Innovation Program) was limited to ZIP codes with substantial VC activity and new firm creation.

As mentioned in the very first section of this thesis, VC investments in Sweden are highly regionally concentrated. The Stockholm region has become a world-leading technology hub fostering many now global Information and Communication Technology (ICT) firms (Baygan, 2003). Gothenburg has experienced a similar situation with the creation of Lindholmen Science Park, located close to the city center and close to Chalmers University of Technology (Bergsjö & Björk, 2013). Finally, the university towns of Lund and Uppsala serves as important clusters where the University holding companies act together with private actors to facilitate a vivid entrepreneurial environment especially within Life Science (Baygan, 2003; Sölvell, 2015).

2.4.3 Geographical proximity

VCs engagement as monitors and their ability to actively participate in decision making is associated with substantial transaction costs. If these transaction costs are successfully limited, the VCs involvement in their investment will naturally increase. Lerner (1995)

investigates the relation between VCs and EFs by their geographical proximity and finds that it is an important determinant of VC board membership. More specifically, the study finds that VCs with offices within 5 miles of the EFs headquarter is twice as likely to being an active partner and have seats on the board compared to VC firms that are distanced by 500 miles or more.

With the Swedish VC industry historically being highly regionally concentrated along with GVCs poised to increase the geographical diversity of entrepreneurship it is fair to assume that investment have been made, and most likely will continue to be made, where the VC and the EF are situated geographically far apart. With the growing reputation of the universities of Linköping and Umeå for instance, entrepreneurship has sparked in these communities but the VC industry has yet to adapt, with most VC firms still operating in the major cities (Baygan, 2003). Investments in companies emerging in new places are thus interesting as it is questionable if the investing VC is able to fulfil its value-add commitment as discussed in section 2.2 *The role of the VC firm*.

2.5 Summary of previous relevant studies

“Information Asymmetries, Agency Costs and Venture Capital Exit Outcomes”

Cumming and Johan (2008) investigate venture capital exits and the relation to how information asymmetry and agency costs affect the exit outcome. The authors state that if VCs are able to successfully mitigate information asymmetry faced by the new owners and are able to mitigate agency costs connected to the transaction, a more successful exit will be achieved. The study is based on a dataset consisting of all VC-backed IPOs, acquisitions, secondary sales, buy-backs and write-offs in Canada between the years 1991 to 2004.

In order to study the effects of information asymmetry and agency costs, the authors present three main hypothesis, (1) IPOs and acquisitions which are considered successful exits will to a greater extent be associated with limited partnership VCs (2) corporate VCs will to a greater extent be associated with acquisitions, and (3) government VCs will be associated with inferior exit routes such as secondary sales, buy-backs and write-offs. The study also tests if common equity investments, to a higher degree are associated with IPOs given the argument that control should be retained within the EF, along with a mix of other firm characteristic hypothesis that is affected by information asymmetry and agency costs.

The authors find that VCs in Canada has had less successful exit outcomes compared to VCs in Australasia, Europe and the US. The authors state that this is a result of the structure of the VC industry in Canada, where 50% of capital under management derives from LSVCCs (labor-sponsored venture capital corporations). They explain this by arguing that LSVCCs are characterized by inefficient statutory contractual corporate governance covenants that forces investments to be made in companies that are not ideal from a VC perspective. Another finding is that acquisitions are more likely for corporate VCs, Life Science and other high-tech firms, which is in line with prior conducted research.

“Venture-Capital Exits in Canada and the United States”

Cumming & MacIntosh (2003a) conduct a study on VC exit determinants in Canada and the United States between 1992 and 1995. The study is the first theoretical and empirical analysis on the full spectra of different exit routes. The authors rank the different alternatives and argue that performing an IPOs is the most profitable exit route, followed by acquisitions, secondary sales, buy-backs and lastly write-offs which is considered the least profitable alternative. The authors state that VCs will try to achieve the highest possible price upon exiting their investment in order to maximize their earnings, and consider mitigating information asymmetry between parties involved in a transaction to be vital in order to achieve the highest possible value.

The study focuses on different EF characteristics and their correlation with different exit outcomes, and presents three hypotheses; (1) higher quality EFs (defined by a higher market-to-book ratio) will be exited by (in decreasing order of likelihood) IPOs, acquisitions, secondary sales, buy-backs and write-offs, (2) a longer duration of a VC investment increases the probability (in decreasing order of likelihood) IPOs, acquisitions, secondary sales, buy-backs and write-offs, and (3) high-technology EFs will (in decreasing order of likelihood) be exited by IPOs and acquisitions, then secondary sales, buy-backs and write-offs.

The authors test the hypothesized relationships using a multinomial logit methodology and find mixed evidence for hypothesis 1, no evidence for hypothesis 2 and weak evidence for hypothesis 3. The result from hypothesis 1 was the most interesting and supports the author’s theory that higher quality firms in terms of market to book ratio increases the probability of an IPO, and as the ratio increases the overall probability of a successful exit route increases.

However, ranking the other different exit alternatives was not possible except for write-offs, which was highly correlated with a low market to book ratio.

“Exit strategies of venture capital-backed companies in Singapore”

Wang & Sim analyze the VC industry in Singapore and determinants that affect VC exit routes. The study relies on VC exit data collected from 1990 to 1998 and is unique since earlier studies never have focused on an emerging market. The VC industry in Singapore is still in an early stage compared to countries in the west, but compared to similar developing countries they have come a long way.

In order to analyze the VC market and when a successful exit is achieved, the authors decide to focus on IPOs, not because it necessarily is the optimal form of exit but because it requires considerations from both the VC and the investees. The authors present seven hypotheses; (1) the level of equity valuation is positively related with the likelihood that the venture capitalists will exit via an IPO, (2) high technology investee companies will experience higher probability of IPO-exits than their non-high technology counterparts, (3) the investee firm's potential is positively related with the likelihood that the venture capitalists will exit via an IPO, (4) Family-owned investee companies will experience higher probability of IPO-exits than their non-family- owned counterparts, (5) younger venture capitalists will perform a higher number of IPO-exits than their older counterparts, (6) The frequency of venture financing is positively related with the likelihood that the venture capitalists will exit via an IPO, and, (7) the total amount of venture financing is positively related with the likelihood that the venture capitalists will exit via an IPO.

The authors find that equity valuation is independent of the likelihood that the venture capitalist will exit via an IPO which they explain by the immature market timing in Singapore. The results also reveal that high technology firms and firms with high growth potential tend to exit via an IPO and the authors explain this by reasoning that an IPO facilitates large future capital infusions which often is needed in such firms. Another finding is that the potential of the firm in terms of sales is positively related with the likelihood of an IPO, but they found no significant correlation between a firm's ROE and by performing an IPO. The hypothesis that family owned companies to a larger extent performs IPOs could not be rejected but there were no significant results that could prove that young VC firms perform more IPOs than their older counterparts. Finally, the authors found no connection between the

frequency of financing rounds and IPOs, but found the amount of venture financing to be positively correlated with IPOs.

2.6 Summary of hypotheses

This segment provides a summary of the hypotheses formulated in regard to the existing body of literature and the explanatory variables tested in this study.

H1: Ceritis paribus, investment by PVC firms will experience higher likelihood of achieving a successful exit

H2: Ceritis paribus, investments where the VC and the EF are located close to each will experience higher likelihood of achieving a successful exit

H3: Ceritis paribus, investments where the EF is located in entrepreneurial clusters will experience higher likelihood of achieving a successful exit

3. Methodological approach

This chapter outlines the methodological approach used in this study. The purpose is to clarify how the data was collected, which variables will be used in our regression analysis and describe the econometric techniques used. The chapter will end with a critical discussion on the methodological approach.

Given the purpose of this study, a quantitative approach is preferred over a qualitative. Previous research conducted within the same field and with a similar purpose have strongly favored a quantitative approach (Cumming, 2008; Wang & Sim, 2001; Cumming & Johan, 2008), where data is collected either through questionnaires or through the use of databases. Such an approach have several benefits, perhaps the most prominent being the possibility to run statistical analysis on the data in order to quantify relationships between variables (Bryman & Bell, 2003).

We will conduct a binary logistic regression supplemented with marginal effects calculations. This should provide insight both as to how the variables relate, and of what magnitude the relationship is.

This study will also follow what is known as a deductive research approach (Bryman & Bell, 2003) where hypotheses are formulated based on, and in coherence with existing theory. Thus, the data collection and the results of the study will be driven by existing theory which is then revised based on if the hypotheses were accepted or rejected. For the deductive approach to be effective one must therefore be well oriented in the entire existing body of literature in order not to make false inference.

3.1 Data collection

There have been two main ways of obtaining data observed in previous research on this topic. First, through the use of questionnaires sent to VC fund managers asking for information regarding previous exits. Second, data has been self-collected through a database containing information on VC investments. This study will use the second approach and more specifically the database Zephyr. Zephyr is a well-known database commonly used by

scholars, which adds credibility and reliability to our sample. The use of a database also increases the replicability of the study.

For the variables used in this study we will mainly rely on Retriever Bolagsinfo (Retriever), a comprehensive database of annual reports from Swedish firms both listed and un-listed, to find financial data for the EFs. Further, we will complement that with internal information from firm websites and press releases if necessary. Retriever is the most prominent source of financial reports for unlisted firms in Sweden and we consider it to be the most comprehensive source of financial data for such firms. All data points used are those of the most recent available annual report at the time of the event.

3.1.1 Selection criteria

The two subsections below describe how the final sample was obtained. The reason for the two-stage approach is simply that we found that it was not possible to obtain the sample through a single search in Zephyr. Further, we found that investing firms are somewhat reluctant to disclose information on especially write-offs, which implied that we had to manually search for such exits in annual reports and third party press releases.

3.1.1.1 First cut

The list below shows the criteria used to obtain the first cut of our sample through Zephyr.

1. The transaction is labeled as “Venture Capital” in Zephyr
2. The investment was done between 2000-01-01 and 2014-12-31
3. The target firm is based in Sweden
4. The investing firm is based in Sweden

This search returned a list of 531 deals involving 1288 investments.

3.1.1.2 Second cut

The list below shows the criteria used to reduce the list of transactions obtained from the first cut to our final sample. Beside the information provided by the EFs and the VCs in their

annual reports and public statements we relied on Zephyr for information on exits covered by the scope of the database as well as websites such as *crunchbase.com* and *agentum.no*, both prominent and reliable sources of VC information, to find information regarding exits.

1. The investment was exited between 2000-01-01 and 2014-12-31
2. When several investment rounds to the same EF was found in the sample, the earliest one was used, excluding add-on investments done by the same VC firm
3. Only investments done by Swedish firms with “investment activities” listed as an area of operations were included

This returned our final sample of 233 exited investments in 150 different Swedish EFs done by 83 different VC firms.

3.1.2 Sample

In accordance with what is reported in SVCA (2014), our sample indicates that ICT and Life Science are the dominating industries in terms of attracting VC investments. However, in recent years Cleantech firms have also been attracting the investors’ interest. In terms of geography our sample also indicates that the majority of the VC investments go to EFs in and around the three major cities together with the university-cities Lund and Uppsala.

Comparing the sample used in this study to that of SVCA (2014) thus leads us to believe that the sample at hand reflects the Swedish VC industry in a thorough and highly reliable way. Any small discrepancies between our sample and what is suggested by SVCA can likely be explained by the fact that the definition of what constitutes a VC investment versus a Buyout is vague at best (*Appendix 1* displays all the investments that are included in the sample).

3.1.3 Time frame

The time frame spans from 2000 until 2014. It is our belief that this period is highly interesting because of the fact that the VC industry has gone through significant metamorphosis since the year 2000, as discussed earlier in this thesis. Further, the economic climate since the start of the new millennium has been highly volatile with events such as the “dot com” bubble in the early 2000s’, the financial crisis starting in 2008 and the recent

sovereign debt crisis taking place in several Eurozone countries during the last few years, all driving the evolution, or perhaps the involution, of the international economy.

Additionally, finding financial data on the EFs rely on the availability of such information in Retriever and it is common that 2000 is the first year available thus making it a suitable time frame in terms of data access as well.

3.2 Variables

3.2.1 Dependent variable

As this study investigates the factors that drive successful, return generating exits in Sweden, the dependent variable is exit type. This binary variable will be 1 if the exit was one of the return generating ones and 0 if it was write-off.

Because of the heavy bias towards trade sales and write-offs, together comprising 86% of the included exits (see section *4.1 Descriptive statistics* for a thorough description of the sample), the multinomial approach used by some previous research becomes ineffective in terms of providing statistically significant and reliable results. Therefore, we merged the four return generating exits (IPO, TS, SBO and MBB) into one category that we call “return generating exits”. This category will be compared to the existing category write-off. This approach will be similar to that of Cumming (2008), Cumming & Johan (2008) Wang & Sim (2001) who all focus on analyzing determinants of successful exits, but where the definition of what a successful exit is differs from study to study.

Table 1 (see section *4.1 Descriptive statistics*) illustrates in what ways the return generating exits are similar and where they might be slightly different. Overall it is clear that the four return generating exits share characteristics that set them apart from the investments exited through write-off and we therefore feel confident that this approach will be reliable and reflect the situation of the Swedish VC industry. For a comprehensive discussion on each of the five possible exits see *2.3 VC exit routes*.

3.2.2 Explanatory variables

In this study the explanatory variables will be related to different characteristics that are unique in some respect to Sweden and the Swedish VC industry. To the authors knowledge there has been no previous attempt to explain exit type with these variables on the Swedish market.

3.2.2.1 Private VC

Separating between PVC and GVC firms is done through the adaptation of a characterization done by Riskrevisionen (2014). The difficulty lies in classifying firms that might be partly owned by the government through one of its four fully owned VC firms being Almi Företagspartner AB, Inlandsinnovation AB, Fourtiertransform AB and Industrifonden. To that list, one could also add the sixth AP-fund which also can be considered as a VC-investor. For simplicity and replicability we classified all VC firms classified as governmental by Riskrevisionen (2014) as GVCs (see *Appendix 2* for the complete list of GVCs) and all others as PVCs, thus disregarding the possibility of including a third category of hybrid funds discussed for instance in Cumming & MacIntosh (2003a). The fundamental difference between the private players and the governmental ones is the focus on profit. Public VC firms are heavily profit-driven whereas their governmental counterparts might have different objectives such as facilitating growth in local communities and in industries that do not attract capital from other players.

The variable is constructed as a dummy variable that take the value of 1 if the investing firm is privately owned and 0 otherwise. The approach is similar to that of (Brander, Egan & Hellmann, 2008).

3.2.2.2 Entrepreneurial clusters

The emergence of entrepreneurial clusters has been in tandem with the emergence of the VC industry and it can facilitate both deal flow and monitoring. A local VC industry might not be necessary to facilitate high technology entrepreneurship, but it creates tremendous incentives for start-up firms.

The Swedish market for start-up firms is heavily clustered, especially the Stockholm region as shown in a report by the OECD (Baygan, 2003). Stockholm-Kista emerged in the beginning of the 2000s' as a global leader in technological innovation and the university-cities of Lund and Uppsala are both prominent in Life Science.

The variable is constructed as a dummy variable that take the value of 1 if EF is situated in Stockholm, Uppsala, Göteborg, Malmö or Lund and 0 otherwise.

3.2.2.3 Geographical proximity

This variable builds on the fundamental theory on VC namely the benefits of governance and experience. These aspects are theoretically transferred from the VC to the EF as supplementary benefits besides the infusion of the capital itself. This in turn is thought to increase the probability of achieving successful exits through enhanced due diligence (decreased adverse selection costs) and increased value-added activities (decreased moral hazard costs).

For the purpose of this study, the variable is constructed as a dummy variable that take the value of 1 if the VC and the EF are situated within 100 km (thought to represent driving distance) of each other and 0 otherwise. It is the authors' belief that this will capture the same effects as mentioned above if such effects are present on the Swedish market.

3.2.3 Control variables

The control variables used in this study comprise of variables that previously have been used to explain exit outcomes (Cumming, 2008; Cumming & Johan, 2008; Cumming & MacIntosh, 2003a; Wang & Sim, 2001). They can be broken down into three groups. 1) Firm-specific variables such as the natural logarithm of assets, EBIT margin and return on equity, 2) industry/market variables such as an industry dummy and two yearly dummies to capture the effects of the crises of 2002 and 2008 and 3) investment specific variables which in this study only is represented by the investment duration.

3.2.3.1 Size of assets

The size of the EF firm's assets is commonly used to explain exit outcomes. Cumming (2008) and Cumming & Johan (2008) suggest that minimum listing requirements for instance imply that larger EFs will experience greater likelihood of exit through IPO. Furthermore, as assets increase it becomes easier for the new owner to correctly value the business and to monitor the firm, thus lowering the cost of potential information asymmetries between the VC and the new owner. Smaller firms will therefore be more prone to information asymmetry, which lowers the probability of achieving a successful exit.

The variable will be measured as the natural logarithm of the EFs assets at the time of the exit. We choose to use logarithm since the variable otherwise would have been too volatile in terms of the difference between the largest firm and the smallest firm.

$$Size = \text{Natural logarithm of assets at exit}$$

3.2.3.2 EF Quality

The quality of the EF is another factor that is commonly used to explain exit outcomes (Cumming, 2008; Cumming & MacIntosh, 2003a; Wang & Sim, 2001). As quality is a somewhat loose and undefined concept there have been several different approaches to proxy for it.

We will use two proxies for EF quality, EBIT margin and return on equity (ROE). Our approach is inspired mainly by Wang & Sim (2001) who use sales and ROE to proxy for quality or potential as they define it. Given that many of the EFs present in our sample are early-stage, and thus lack any sales at all, we instead use EBIT margin and ROE.

EBIT margin is measured as EBIT divided by sales at the time of the exit. In most cases this number turned out negative since EBIT usually was negative. This however does not affect the statistical efficiency of the variable.

$$EBIT_MARGIN = EBIT \% \text{ at exit}$$

Return on equity is measured as net income divided by total equity at the time of the exit. As with EBIT margin this variable was negative in many cases.

$$ROE = \text{Net income} / \text{Total equity at exit}$$

3.2.3.3 High growth industry

The primary industry of operations is also an important exit determinant. Cumming (2008); Cumming & Johan (2008); Cumming & MacIntosh (2003a); Wang & Sim (2001), all test the effect of industry of operations. Operating in a high-growth industry is thought to spark the interest of investors thus increasing the likelihood of achieving a successful exit. For the purpose of this study, high-growth industries are assumed to be ICT, Cleantech (CT) and Life Science (LS) and the variable is constructed as a dummy which takes the value of 1 if the EF is operating in one of the mentioned industries.

$$HIGHGWT = 1 \text{ if ICT, CT or LS and } 0 \text{ otherwise}$$

3.2.3.4 Yearly exit dummies

To capture the effect of the “dot-com” bubble and the more recent financial crisis, two dummy variables are included. The first taking the value of 1 if the exit was done in 2002 and the second taking the value of 1 if the exit was done in 2008. This approach was for instance used by Cumming (2008) and Cumming & Johan (2008).

$$2002EXIT = 1 \text{ if exit was done in 2002 and } 0 \text{ otherwise}$$

$$2008EXIT = 1 \text{ if exit was done in 2008 and } 0 \text{ otherwise}$$

3.2.3.5 Investment duration

Finally, investment duration is also thought to impact the exit outcome. Cumming & MacIntosh (2003a) hypothesize that the longer the investment duration the greater the likelihood for a successful exit. However, Cumming & Johan (2008) note that short investment durations could imply that initial contracts between the VC and the EF could be endogenous to the exit outcome.

Looking at *Table 1* (section 4.1 *Descriptive statistics*) one might suspect that investments exited as buy-backs could be affected by initial contracts given its significantly shorter average duration compared to the other exit routes. However, since the share of buy-backs is low, any potential issue should be negligible.

Being aware of the issue above, the variable is still included and measured as investment year minus exit year.

$$Duration = Investment\ year - exit\ year$$

3.3 Econometric techniques

When studying factors behind decision making it is common to use binary choice or qualitative response models, the most basic such model being the linear probability model (Brooks, 2014). The binary choice framework builds on the fact that dependent variables can be discrete, which in the most simple case means being binary or simply put taking the value of either 0 or 1.

3.3.1 Binary logit model

The linear probability model has one major limitation; it can produce probabilities less than 0 and greater than 1, which of course is theoretically impossible. To overcome this issue we turn to the logit model which builds on the logistic function, shown below, that transforms the regression model so that its fitted values are bound within 0 and 1 (Brooks, 2014).

$$F(z_i) = \frac{e^{z_i}}{1 + e^{z_i}} = \frac{1}{1 + e^{-z_i}}$$

The control variables will be added one at a time until we end up with the estimated logit model in this study is as shown below, where P_i is the probability that $y_i = 1$.

$$P_i = \frac{1}{1 + e^{-(\alpha + \beta_1 * PRIVATEVC_i + \beta_2 * 100KM_i + \beta_3 * CLUSTER_i + \beta_4 * HIGHGWT_i + \beta_5 * 2002EXIT_i + \beta_6 * 2008EXIT_i + \beta_7 * Size_i + \beta_8 * EBITMARGIN_i + \beta_9 * ROE_i + u_i)}}$$

Since the model is not linear it cannot be estimated with OLS. Instead maximum likelihood is used which also implies that the coefficient values returned from the regression analysis cannot be thought of as magnitude of the relationship. To get to that one must manually calculate the marginal effects since EViews (the software package used for the statistical tests in this study) does not have a built in function for this.

3.3.2 Marginal effects

In order to analyze the magnitude of the relationships obtained from the above stated regression one must calculate what is known as the marginal effects. The reason for this is as mentioned above the logistic function. Unlike when dealing with linear regression one cannot interpret a 1-unit increase in for example x_{2i} to cause a $\beta_2\%$ increase in the probability of $y_i = 1$. Instead a 1-unit increase in x_{2i} will in logistic regression imply a $\beta_2 F(x_{2i})(1 - F(x_{2i}))$ increase in probability.

In order to calculate $F(z_i)$ we set the explanatory variables to their mean values and use the coefficient estimates obtained by the binary logistic regression. Finally each coefficient is multiplied with $F(z_i)$ and $1 - F(z_i)$ to obtain the marginal effects of each single variable.

3.4 Reliability and validity

Reliability is crucial to any given study. It essentially means that the results are replicable (Bryman & Bell, 2003). There are two potential sources of reliability problems for this study. First, relying on secondary data could cause a problem since we cannot ensure the quality of the data. However, given the prominence of Zephyr and Retriever, both well considered and trustworthy, we believe that any reliability problem would be limited in regard to these databases. The second source of potential problems is the high reliance on manual investigation. However, all the information included in this study is publicly available which implies that anyone trying to replicate this study should come up with the same sample although the task of doing so would be tedious.

Validity is also an important concept for studies such as this one. In short, it means that something is adequate and legitimate (Bryman & Bell, 2003). For the purpose of this study

this can be interpreted as the right variables being used, measuring what should be measured given the existing body of literature. Since the variables included in this study are in accordance with said body of literature the validity of this study should be considered to be high.

The econometric approach of this study resembles what previously has been done on the subject, which means that the model itself is reliable and valid. Appropriate robustness tests have also been conducted and they are described in the following sections. Finally, we have used robust covariances when running regressions, an option which ensures that standard error estimates are robust to heteroskedasticity (Brooks, 2014).

3.4.1 Model adequacy

To ensure that the model is correctly specified, a goodness-of-fit test and an expectation-prediction evaluation were conducted. The detailed results of these tests are found in *Appendix 3*.

The Hoshmer-Lemeshow test for goodness of fit returned a HL-statistic of 6.7086 with a corresponding p-value of 0.5684 implying that we cannot reject the null-hypothesis of the model not fitting the data. Thus we conclude that the specified model fits the data in an acceptable way.

The expectation-prediction evaluation gave similar indications. The specified model was able to correctly estimate 87.9% of the observations in the sample which is considered to be a high number.

3.4.2 Multicollinearity

Multicollinearity occurs when the explanatory variables are highly correlated with each other. This could potentially create problematic regressions to analyze as they would be highly biased (Brooks, 2014).

To ensure that multicollinearity was not an issue a correlation matrix was created where the explanatory variables were included (*Appendix 4*). The common cut-off point is 0.8 and

considering that the highest correlation found between variables in this study was 0.42, we conclude that multicollinearity is not an issue.

3.4.3 Exclusions and missing observations

In obtaining our sample there were some investments where important information was missing. To ensure against false inference these deals were therefore excluded from the sample. As an example we excluded investments that were conducted by Atle and Bure and that were still active at the point of these VCs bankruptcy/restructuring. Even though the investments were handed over to a new VC and later exited we decided to exclude them on the basis of them not being exited by the original VC, and the change of VC because of the bankruptcy/restructuring cannot be considered to be a secondary buyout. A second more straight forward example is the case of a few firms that simply could not be found. They were mainly receiving investments in the early 2000s' and after that there is no record of their existence in Retriever or the investing VC's annual reports or website.

A second issue is that of missing observations in the firm specific control variables, especially for the investments exited through a write-off. It was not uncommon that a firm being facing bankruptcy, and thus a write-off exit, stopped reporting a few years before the exit was final which implies that there is no data for the year prior to the actual event.

3.4.4 Limitations

The main limitation of this study is the unbalanced nature of the exits at hand. Had the sample been more evenly distributed it would have been possible to conduct multinomial logistic regression which potentially could have shed more light on the issue of exit determinants. A second limitation is the lack of a unison source of information. Ideally all investments and exits would have been available in the same database, something that would have increased the reliability of the study.

4. Empirical results

In the following chapter the results from the regression analysis and the marginal effect calculations are presented. Descriptive statistics of the sample used in the study will begin the chapter, after which the regression results will be presented.

4.1 Descriptive statistics

Table 1 shows a breakdown of the final sample used in the study. The top half displays the situation in numerical terms and the bottom part in percentage. As mentioned previously the bias towards trade sales and write-offs become apparent. Together the two aforementioned exit routes comprise of 86% of the sampled exits. Also worth noting is that the three explanatory variables tested in this study all have very high frequency, 77% of the exited investments were backed by PVCs, 84% of the exited investments were investments in EFs situated in entrepreneurial clusters and 70% of the exited investments were between VCs and EFs that were situated close to each other.

Table 1. Sample breakdown

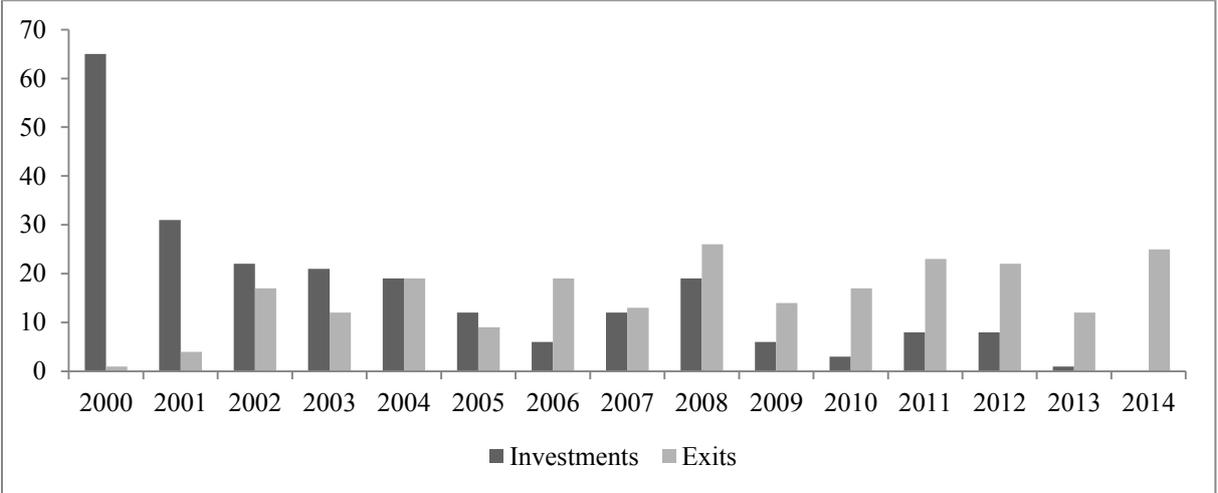
	OBSERVATIONS	PRIVATEVC	CLUSTER	PROXIMITY	HIGHGWT	2002EXIT	2008EXIT	DURATION	SIZE	EBITMARGIN	ROE
IPO	4	3	4	3	4	0	0	6,75	18,65	-725%	-22%
TS	117	95	99	80	87	1	16	5,05	17,04	-1092%	-273%
SBO	19	15	18	14	13	0	2	5,95	17,00	-1190%	-89%
MBB	10	8	7	8	3	3	2	2,30	16,31	-2681%	-226%
WO	83	59	68	59	57	13	6	4,17	16,04	-3811%	-202%
	233	180	196	164	164	17	26	4,72	16,86	-1638%	-233%
RGE	150	121	128	105	107	4	20	5,03	17,03	-1238%	-239%
WO	83	59	68	59	57	13	6	4,17	16,04	-3811%	-202%
	233	180	196	164	164	17	26	4,72	16,86	-1638%	-233%

	OBSERVATIONS	PRIVATEVC	CLUSTER	PROXIMITY	HIGHGWT	2002EXIT	2008EXIT
IPO	2%	75%	100%	75%	100%	0%	0%
TS	50%	81%	85%	68%	74%	1%	14%
SBO	8%	79%	95%	74%	68%	0%	11%
MBB	4%	80%	70%	80%	30%	30%	20%
WO	36%	71%	82%	71%	69%	16%	7%
	100%	77%	84%	70%	70%	7%	11%
RGE	64%	81%	85%	70%	71%	3%	13%
WO	36%	71%	82%	71%	69%	16%	7%
	100%	77%	84%	70%	70%	7%	11%

Furthermore, comparing the four individual return generating exits to the compiled category, it is clear that trade sales dominate the impact on *RGE* given its large share in the sample. It also becomes clear that the compiled category, in relation to write-offs, in fact reflects the expected discrepancy between what can be thought of as successful versus unsuccessful exits.

Chart 1 show how the sample is distributed over time. Worth noting is the large spike in investments in the beginning of the sample, coherent with the situation of the VC industry before the “dot-com” bubble burst. Exits on the other hand are fairly stable during the sample except for the first two years which of course can be explained by considering the average investment duration of 4.72 years (Table 1). The same logic can be applied to explain the fact that there are only a few exited investments where the investment took place during the two last years of the sample.

Chart 1. Investment and exits during time frame



4.2 Regression results

The table below illustrates the regressions leading up to the final model analyzed in this study. The very first regression (1) comprising only of the explanatory variables did not show any signs of significance. None of the variables were statistically significant (below 10%) and the McFadden R-squared of only 0.94% implies a bad fit. Adding the industry dummy variable did not change the situation in any significant way.

Table 2. Regression output

Equation:	Expected relationship	1	2	3	4	5	6	7	8
Dep. Var:		EXIT	EXIT	EXIT	EXIT	EXIT	EXIT	EXIT	EXIT
C		0.122396 (0.7648)	0.074771 (0.8690)	0.000756 (0.9987)	-0.039659 (0.9315)	-0.258881 (0.6117)	-10.328074 (0.0011)***	-16.526406 (0.0181)**	-17.771831 (0.0030)***
PRIVATEVC	+	0.496154 (0.1362)	0.487055 (0.1462)	0.710193 (0.0395)**	0.678571 (0.0512)*	0.634171 (0.0740)*	1.411320 (0.0117)**	2.216347 (0.0008)***	1.835512 (0.0110)**
CLUSTER	+	0.149259 (0.7178)	0.150081 (0.7079)	0.257711 (0.5250)	0.337592 (0.4174)	0.351851 (0.4028)	0.481228 (0.3956)	0.317282 (0.6813)	0.649778 (0.4079)
PROXIMITY	+	-0.046930 (0.8876)	-0.051158 (0.8734)	0.038483 (0.9082)	-0.021294 (0.9499)	-0.026468 (0.9378)	0.904012 (0.0933)*	1.751224 (0.0121)**	1.544269 (0.0322)**
HIGHGWT	+		0.081122 (0.7868)	-0.034264 (0.9146)	-0.062706 (0.8438)	-0.086755 (0.7868)	-0.319556 (0.5677)	0.194704 (0.7868)	0.370591 (0.5903)
_2002EXIT	-			-2.158993 (0.0003)***	-2.100997 (0.0005)***	-1.928900 (0.0020)***	-2.066506 (0.0639)*	-2.540434 (0.0504)*	-3.062242 (0.0387)**
_2008EXIT	-				0.545749 (0.2742)	0.526262 (0.3032)	0.012337 (0.9847)	-0.700575 (0.3790)	-0.711885 (0.4588)
DURATION	+					0.054016 (0.2970)	-0.130609 (0.0977)*	-0.242232 (0.0189)**	-0.169071 (0.1570)
SIZE	+						0.658651 (0.0002)***	1.024931 (0.0125)**	1.076561 (0.0028)***
EBITMARGIN	+							0.009641 (0.0859)*	0.009414 (0.0579)*
ROE	+								-0.036599 (0.4617)
Observations:		233	233	233	233	233	157	135	124
R-squared:		0.0094	0.0097	0.0609	0.0649	0.0680	0.1546	0.2678	0.2889
***, ** and * indicate significance at the 1%, 5% and 10% level respectively									

The third regression (3) gave the model a slightly better fit with a McFadden R-squared of 6.09%. Furthermore the dummy variable *2002EXIT* aimed to capture the effect of the bursting “dot-com” bubble proved to be significant with a negative relationship, which it remained across all specifications. In the third regression *PRIVATEVC* became significant with a positive relationship, which it too remained for the remainder of the specifications.

The fourth (4) and fifth (5) regressions did not improve the model in any crucial way. McFadden R-squared increased slightly but none of the previously insignificant coefficients became significant.

In the sixth (6) regression, the first variable supposed to proxy for EF quality was added. This had a few implications. First, it increased the McFadden R-squared to 15.46% which is a large leap from the previous level. Second, *PROXIMITY* and *DURATION* became significant with positive and negative relationships respectfully, and *SIZE* itself was significant with a positive relationship. Finally, it reduced the testable sample from 233 to 157 because of the fact that the variable was missing data (see section 3.4.3 *Exclusions and missing observations* for details).

Adding *EBITMARGIN* in the seventh (7) regression further strengthened the model and increased the McFadden R-squared to 26.78% which for the first time implies a good fit objectively speaking. It too reduced the sample size slightly and although the addition of *EBITMARGIN* did not make any new variables significant (apart from being so itself with a positive relationship), it changed the sign of both *HIGHGWT* and *2008EXIT* to the expected one, implying that all variables except *DURATION* was suggesting the expected relationship.

The final regression (8) added *ROE* which raised the McFadden R-squared to 28.89%. The variable itself was not significant and in the final regression the previously significant variable *DURATION* became insignificant. *ROE* was not significant and showed an unexpected negative relationship with *EXIT*.

The regression analysis indicates that both *PRIVATEVC* and *PROXIMITY* have positive, significant at the 5%-level, relationships with exit route. This implies that investments done by PVCs are associated with greater likelihood of generating a return at exit compared to GVCs, and that investments where VC and EF are situated close to each other are associated with greater likelihood of generating a return at exit compared to VCs and EFs being far apart.

However, the large impact of the three final control variables suggests that the quality of the EF is the dominating factor in terms of achieving return generating exits. It is also evident that the bursting “dot-com” bubble in 2002 had a large impact on the entire VC industry that year.

4.3 Marginal effects

The marginal effects were calculated as described in section 3.3.2 *Marginal effects* and indicate the magnitude of the relationship found in section 4.2 *Regression results*. The calculations suggest that investments by PVCs are 12.7% more likely to be exited as a return generating exit compared to investments by GVCs, this relationship is expected and significant to the 5%-level.

Table 3. Marginal effects

	β_i	\bar{x}_i	$\frac{\delta Y}{\delta x_i}$
C	-17.77	NA	NA
PRIVATEVC	1.84	0.77	12.7%
CLUSTER	0.65	0.84	4.5%
PROXIMITY	1.54	0.70	10.7%
HIGHGWT	0.37	0.70	2.6%
2002EXIT	-3.06	0.07	-21.2%
2008EXIT	-0.71	0.11	-4.9%
DURATION	-0.17	4.72	-1.2%
SIZE	1.08	16.86	7.4%
EBITMARGIN	0.01	-16.38	0.1%
ROE	-0.04	-2.33	-0.3%
\hat{p}_i	0.93		
$1 - \hat{p}_i$	0.07		
***, ** and * indicate significance at the 1%, 5% and 10% level respectively			

Investments in EFs located in entrepreneurial clusters are 4.5% more likely to be exited as a return generating exit compared to investments in EFs outside said clusters. This relationship is expected however it is not statistically significant.

Investments where the VC and EF are situated close to each other are 10.7% more likely to be exited as a return generating exit compared to investments where VC and EF are far apart. This relationship is expected and significant to the 5%-level.

5. Analysis

The table below summarizes the expected and observed relationships from the final regression model. The table also shows whether or not the relationship is significant on the 1%, 5% and 10%-level respectively shown as ***, ** and *.

Table 4. Summary of results

Variable	Significance	Expected relationship	Observed relationship
Private VC	**	Positive	Positive
Cluster	-	Positive	Positive
Proximity	**	Positive	Positive
HighGwt	-	Positive	Positive
2002Exit	***	Negative	Negative
2008Exit	-	Negative	Negative
Duration	-	Positive	Negative
Size	***	Positive	Positive
EBIT margin	*	Positive	Positive
ROE	-	Positive	Negative

The results show that all significant variables are in line with what was expected considering previous research. This primarily suggests that the same factors determine success in Sweden as internationally. Being more specific and going slightly more in depth, there are several differences between the Swedish market and its international counterparts worth considering.

The results clearly suggests that the IPO as a possible exit outcome is not to be considered as important for Swedish VC investments as it is for investments in Anglo-Saxon countries where the equity markets are much more prominent sources of financing than what is the case in Sweden. Only 2% of the observed exits were IPOs which can be compared to 27% both in the US and Canada according to Cumming & MacIntosh (2003a). This is not entirely surprising as it has previously been suggested that European markets are less liquid in a sense, and more reliant on bank financing as discussed by Povaly (2006) and Nobes & Parker, (2012). This result however has implications for the efficiency of the Swedish VC industry. It

has been the historical belief that IPOs has been driving the evolution of the VC industry but the almost negligible share of IPOs included in this study would suggest that there has to be other drivers for the Swedish industry. What those drivers are is beyond the scope of this study but it is fair to assume that the governmental intervention in the Swedish VC industry has to some extent driven the evolution of the industry, an argument supported by the findings by Jeng & Wells (2000). Another factor likely to contribute to the small share of IPOs is the possibility of lock-up clauses, something that we understand is included in basically all contracts between EFs and VCs. These clauses restrict the VC from exiting their investment during a pre-determined period after the IPO and it thus likely implies that the possibility of finding a full exit by IPO on the Swedish market is very low.

The division of the observed exits is as mentioned highly biased towards trade sales and write-offs. Comparing the results to that of Cumming & MacIntosh (2003a) one can notice that the combined share of trade sales and IPOs in the US (54%) and in Canada (39%) is fairly similar to the combined share of 52% observed in this study. This would further strengthen the argument that trade sales are to be considered the most important exit for Swedish VC firms as the relative share of trade sales within the numbers given above is 50% in the US, 31% in Canada and 96% in Sweden.

Looking at the descriptive statistics illustrated in *Table 1*, and specifically the control variables, it is possible to note that the results are very much in line with what has previously been found out to determine successful exit outcomes. The low frequency of some exit routes however limits the statistical power of these relationships but the results indicate that the highest quality EFs exit by IPO and the worst quality EFs are often written-offs, looking at for instance the size of assets, EBIT margin and ROE.

The time period used in this study is also important to consider, given that the entire period has been heavily influenced by economic turmoil, which also impacted the VC industry significantly as it is dependent on a well-functioning economy and strong equity markets to facilitate exits. The fact that only the 2002 dummy variable turned out significant can likely be explained by considering the length of impact of an economic crisis and the lagged nature of most markets, where the initial impact can be experienced a few month after the event occurred.

The results show that investments done by PVCs are 12.7% more likely to be exited as a successful exit compared to investments by GVCs. This suggests that the knowledge and experience of PVCs is greater than that of GVCs, which implies that the assistance provided from VC to EF is improved if the investing firm is a PVC. This relates to what Cumming & Johan (2008) defines as GVCs being restricted by statutory covenants that determines the investment focus of the firm, something that can lead to GVCs making investments that are not ideal from a pure VC perspective. This can be interpreted as that GVCs risk lacking the necessary knowledge and experience when making investments and instead basing investments on the covenants that determine their investment scope.

The certification effect is also likely to be stronger in PVCs related to GVCs. This due to the fact that GVC is in Sweden considered to be market supporting. Assuming well-functioning markets, such a statement basically implies that GVCs are investing in the EFs that are left over, after the PVCs have screened the markets and chosen the best prospects. If such is the case, the certification effect of being backed by a PVC would be strong whereas being backed by a GVC actually could signal the direct opposite, weakness. Using the same argument, the results can be interpreted as that the Swedish GVCs successfully acts as a complement to the market. Given the low emphasis on generating economic returns, it would be highly surprising if the GVCs could match PVCs in terms of performing successful exits. Thus, the fact that GVCs are less likely to perform successful exits could mean that they have succeeded, which of course is somewhat of a paradox.

Furthermore, if the GVCs had in fact been able to match the success of PVCs, one could also have suspected that crowding out effects were present. Given the low share of GVC exits (23%) compared to the situation in Europe where 35% of the contributed funds to the VC industry come from GVCs (EVCA, 2014) there is little evidence of crowding out effects on the Swedish market. The low share is actually surprising given the time period of the study. Historically the Swedish government has used VC as a tool in times of trouble, something that suggests that the 23% observed in this study should have been slightly higher if that pattern would have been followed.

The monitoring and control should also be performed better by PVCs compared to GVCs. One argument to support that is the lack of a profit orientation in many GVCs. The lacking of such an orientation might imply that the accountability for financial performance is lower in

EFs backed by GVCs compared to PVCs, who have pressure to generate return on the funds investors' equity. The contractual aspect of the monitoring and control falls outside the scope of this study and can therefore not be analyzed in a thorough way, although it is the authors' belief that contractual covenants are stricter when dealing with a PVC compared to a GVC which also would imply that the PVCs ability to monitor would be better compared to the GVCs'.

The impact of being situated in an entrepreneurial cluster surprisingly turned out not to have a significant impact on the exit outcome of the investment. The results of the marginal effects calculations suggest that EFs situated in clusters are 4.5% more likely to achieve successful exits, although the model cannot reject the possibility of the relationship being 0 which implies that the statistical power is limited. One potential explanation to this is the construction of the variable itself and in particular the assumption that all EFs situated in Stockholm are part of what can be called the Stockholm-cluster. One could argue that Stockholm instead of being one single cluster, comprise of several smaller clusters. This could, although not necessarily, give different results in line with what was expected.

It was our belief, and still is that the approach used however is correct and gives a fair view of the Swedish market. The reasoning behind this is simple and is related to the very fundamental aspects of clusters. Clusters function by lowering barriers to entry primarily through facilitating efficient active assistance from VC to EF and by making the monitoring and control simple as the two parties are situated close to each other. The impact of these fundamental aspects of the relationship between VC and EF should thus not be limited by the fact that an EF might be situated a five minute drive from what has been determined a cluster. This theory, originally presented by Michael Porter is prominent, and it is undoubtedly possible to observe such patterns in Sweden. However, it is not surprising that the impact of the value-added activities conducted by VCs, thought to improve the likelihood of achieving a successful exit, are performed substantially better within clusters whose definition and scope are somewhat arbitrary set.

Another potential explanation for the weak statistical strength is the fact that the cluster theory mainly focus on the generation of new firms rather than the success of existing ones. Looking at the share of exits where EFs has been situated in clusters (84%), it is reasonable to assume that clusters in fact facilitate the emergence of new firms, as discussed earlier. However,

comparing the relative share of trade sales where EFs has been situated (85%) to write-offs where EFs has been situated (82%) within the sample it is further reasonable to assume that the benefits in terms of generating a successful exit are limited at best, with only 3%-points separating the two exit routes.

Related to clustering is the aspect of proximity. Proximity, unlike clusters, proved to have a significant positive impact on the likelihood of achieving a successful exit. Investments where the VC and the EF are situated within 100 km of each other are 10.7% more likely to achieve a successful exit compared to investments where VC and EF are far apart. This is as mentioned previously expected and it can likely be explained by considering the three areas where VCs add value to its investees. The impact of active assistance is likely improved if the VC can take a hands-on approach with the EF, something that in turn should be simpler if the distance between the parties is moderate. Lerner (1995) for instance found that proximity increases the likelihood of VCs serving on the board of EFs, which should benefit the EF because of the knowledge and experience shared between VC and EF at such meetings. Furthermore, proximity should imply that the impact of assistance should be improved. In cases where VC and EF are close, the VC likely has more contacts for instance to share (suppliers, buyers, consultants etc.) compared to situations where they are far apart.

The impact of certification is not axiomatically improved as proximity increases. The reason for this is that the certification effect relates to the pedigree of the VC firm. Thus, this effect should be unrelated to the geographical relation between VC and EF.

Finally, the monitoring and control is also likely to be improved as proximity increases, even though the control relationship is usually contractually determined. This since, as with assistance, the VC is likely to be more hands-on if the EF is close by.

With the above discussion in mind it is important to remember the large impact of the inclusion of the control variables. This obviously suggests that EF quality and size remain the strongest drivers of success. However, we have shown that both the nature of the VC itself (being private rather than governmental) and the proximity between VC and EF can improve the quality of the EF and thus improve the likelihood of achieving a successful exit.

6. Conclusions

The central question of this study was if and how exit outcomes for Swedish VC investments can be explained by characteristics of the Swedish VC market. Three key factors were identified and analyzed: PVC versus GVC firms, entrepreneurial clusters and the proximity between VC and EF.

Our results indicate that investments being conducted by PVCs and investments where the VC and EF are within 100 km of each other are associated with increased likelihood of the investment being exited successfully. Furthermore, there is weak evidence that suggests that EFs located in entrepreneurial clusters also are associated with increased likelihood of success. However, this relationship is not statistically significant.

The results also suggest that the funding of the Swedish VC market is highly driven by governmental intervention rather than the opportunity of achieving an IPO, which has been considered to be the strongest driver of the US VC industry. This implies both that the Swedish VC industry is less efficient than some international counterparts, but also that it has historically served and will surely continue to serve as an important catalyst for the Swedish economy.

The results, as mentioned, suggest that PVCs are superior GVCs in terms of achieving successful exits. This however does not mean that the Swedish system for GVCs is broken, instead it could imply the contrary. The Swedish GVCs have been assigned a role of being complements to the market, a role that they have recently been criticized for not fulfilling (Riksrevisionen, 2014). Such a role, in combination with the lack of a profit orientation should imply that GVCs will perform less successful exits than PVCs. However, the low frequency of exits outside entrepreneurial clusters (16%) suggests that the geographical aspect of being a complement to the market is an area where the Swedish government and the GVCs can improve. To fully understand the role of Swedish GVCs one would have to dig much deeper, however these results have implications despite their general nature. The current situation has led to, and will continue to lead to that GVC backed investments are more likely to fail than its private counterparts. It is up to the Swedish government to figure out if this is acceptable or not.

We further find weak evidence suggesting that EFs in clusters perform better exits than EFs outside clusters. Previous research (Lerner, 1996) has found clusters to have a positive relationship with success. One explanation of our findings could be the timing of this study. During the early 2000s' many ICT companies went bankrupt when the "dot-com" bubble burst. This undoubtedly struck clusters hard as many such companies were located in the Stockholm region at the time. The same logic can be applied to the recent financial crisis, which surely struck high-risk-high-reward types of firms operating in clusters in a significant way. Clusters will surely continue to be an important feature of the Swedish entrepreneurial climate, however our results suggest that investing firms should focus more on the EF and its qualities rather than superficial factors such as whether or not it is located in a cluster.

Proximity also turned out to have a significant positive effect on the success of VC investments. This likely is due to the very fundamental aspects of the value-add activities conducted by VCs to improve and certify the EFs quality. Given the evolution of the Swedish countryside this implies that VCs will need to adapt as previously rural areas become increasingly more urban which in turn sparks entrepreneurship. Being there, present on a local level should thus be something to consider for VC firms in the near future.

6.1 Suggestions for future research

After finishing this study we can conclude that we managed to bring insight to aspects of the Swedish VC industry, previously unexplored in this manner. Despite this, there are a few angles that we did not manage to explore and that make excellent leads for future research.

First, conducting a multinomial logistic regression of all five possible exit outcomes can likely improve our understanding of the factors that make the Swedish market unique. This would require a large dataset stretching back a long time, which unfortunately implied it was beyond the scope of this thesis.

Second, focusing in on the Swedish government's VC intervention is an area that during the process of writing this thesis sparked our interest. Analyzing whether or not the government fulfills its role as a complement to the market would be a very interesting angle that surely could have implications for future national policy in this area.

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Appendix 1: Sample

	VC firm	EF firm	Exit	Investment	Exit
1.	CREANDUM ADVISOR AB	13TH LAB AB	TS	2012	2014
2.	BIOLIN MEDICAL AB	ALCODIA AB	TS	2000	2004
3.	INVESTOR GROWTH CAPITAL AB	ALCODIA AB	TS	2000	2004
4.	ACR CAPITAL AB	ALICE SYSTEMS AB	TS	2002	2004
5.	AFFÄRSSTRATEGERNA I SVERIGE AB	ALPHA HELIX AB	IPO	2001	2010
6.	ALMI INVEST AB	ANACATUM DESIGN AB	TS	2012	2014
7.	LINKMED AB	ANAMAR AB	SBO	2008	2013
8.	BURE EQUITY AB	APPELBERG PUBLISHING GROUP AB	TS	2001	2006
9.	NORDSTJERNAN VENTURES AB	APTILO NETWORKS AB	SBO	2003	2011
10.	SKANDITEK INDUSTRIFÖRVALTNING AB	APTILO NETWORKS AB	SBO	2003	2011
11.	INDUSTRIFONDEN AB	AREXIS AB	TS	2003	2005
12.	STOCKHOLM INNOVATION & GROWTH CAPITAL AB	AUREOLA SWEDISH ENGINEERING AB	LIQ	2006	2010
13.	LEDSTIERNAN AB	AVISATOR AB	MBB	2000	2001
14.	HEALTHCAP AB	BIOLIPOX AB	TS	2001	2007
15.	INDUSTRIFONDEN AB	BIOMAIN AB	MBB	2008	2008
16.	SKANDINAVISKA ENSKILDA BANKEN AB	BIOMAIN AB	MBB	2008	2008
17.	ALMI INVEST AB	BIOVATOR AB	LIQ	2008	2012
18.	LINKMED AB	BIOVATOR AB	LIQ	2008	2012
19.	IT PROVIDER	BLUEFACTORY AB	TS	2000	2003
20.	CREANDUM ADVISOR AB	BYTEACTIVE AB	LIQ	2008	2014
21.	STOCKHOLM INNOVATION & GROWTH CAPITAL AB	BYTEACTIVE AB	LIQ	2008	2014
22.	KAROLINSKA DEVELOPMENT AB	CALABAR AB	LIQ	2008	2013
23.	LEDSTIERNAN AB	CARETEC AB	LIQ	2000	2003
24.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	CARMEN SYSTEMS AB	TS	2000	2006
25.	INDUSTRIFONDEN AB	CARTELA AB	TS	2003	2008
26.	VOLITO INNOVATION AB	CARTELA AB	TS	2003	2008
27.	BIOLIN MEDICAL AB	CAVIDI AB	LIQ	2000	2006
28.	INVESTOR GROWTH CAPITAL AB	CAVIDI AB	LIQ	2000	2006
29.	LEDSTIERNAN AB	CCNOX	LIQ	2000	2003
30.	BARNWIK AB	CELLARTIS AB	TS	2005	2011
31.	CATELLA AB	CELLARTIS AB	TS	2005	2011
32.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	CELLARTIS AB	TS	2005	2011
33.	TEXCEL INTERNATIONAL AB	CELLARTIS AB	TS	2005	2011
34.	ORESUND	CELLTRIBE AB	LIQ	2000	2001
35.	LEDSTIERNAN AB	COLUMBITECH AB	MBB	2000	2013
36.	PELAGO VENTURE PARTNERS AB	COLUMBITECH AB	SBO	2000	2008
37.	NOVESTRA AB	COMINTELL HOLDING AB	MBB	2000	2002
38.	MALMÖHUS INVEST AB	CONNECTBLUE AB	SBO*	2000	2006
39.	INDUSTRIFONDEN AB	CONVENEER AB	TS	2009	2010
40.	STOCKHOLM INNOVATION & GROWTH CAPITAL AB	CORTUS AB	TS	2009	2012
41.	INLANDSINNOVATION AB	CPD CENTER AB	LIQ*	2012	2014
42.	VITA NOVA VENTURES AB	DATAREAL KARLSTAD AB	MBB	2004	2005
43.	INDUSTRIFONDEN AB	DECUMA AB	TS	2003	2004
44.	VISIONALIS AB	DECUMA AB	TS	2001	2004
45.	VOLITO INNOVATION AB	DECUMA AB	TS	2001	2004
46.	ARGNOR WIRELESS VENTURES ADVISORS AB	DIGITAL ROUTE AB	SBO	2002	2008
47.	IT PROVIDER	DRUTT CORPORATION	TS	2004	2007
48.	LITORINA KAPITAL MANAGEMENT AB	DYNAMED AB	LIQ	2000	2005
49.	INDUSTRIFONDEN AB	EFFPOWER AB	LIQ*	2003	2012
50.	VOLVO GROUP VENTURE CAPITAL AB	EFFPOWER AB	LIQ*	2003	2012
51.	LEDSTIERNAN AB	EKONOMI24 AB	SBO	2000	2005
52.	IT PROVIDER	ENVOX GROUP AB	TS	2002	2008
53.	NORTHZONE VENTURES AB	ENVOX GROUP AB	TS	2002	2008
54.	SERVISEN INVESTMENT MANAGEMENT AB	ENVOX GROUP AB	TS	2002	2008
55.	KAROLINSKA DEVELOPMENT AB	ERIBIS PHARMACEUTICALS AB	LIQ	2010	2011
56.	NOVESTRA AB	ERICSSON MULTILET AB	MBB	2000	2002
57.	INNOVATIONSBRON AB	FLATWALLET AB	TS	2012	2013
58.	LEDSTIERNAN AB	FM FONDMARKNADEN AB	MBB	2001	2003
59.	B-BUSINESS PARTNERS	FRONTVILLE AB	TS	2000	2003
60.	INVESTOR GROWTH CAPITAL AB	FRONTVILLE AB	TS	2000	2003
61.	SKANDINAVISKA ENSKILDA BANKEN AB	FRONTVILLE AB	TS	2000	2003
62.	FORSKARPATENT I SYD AB	GALECTO BIOTECH AB	TS	2012	2014
63.	ARGNOR WIRELESS VENTURES ADVISORS AB	GENERAL WIRELESS SCANDINAVIA AB	TS	2001	2008
64.	FÖRETAGSBYGGARNA AB	GENERAL WIRELESS SCANDINAVIA AB	TS	2003	2008
65.	HEALTHCAP AB	GLOBAL GENOMICS AB	TS	2000	2005

66.	KAROLINSKA INVESTMENT MANAGEMENT AB	GLOBAL GENOMICS AB	LIQ	2002	2006
67.	MALMSTEN INVEST AB	GLOBAL GENOMICS AB	LIQ	2002	2006
68.	H&B CAPITAL	GYROS AB	SBO	2001	2009
69.	HEALTHCAP AB	GYROS AB	SBO	2001	2009
70.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	GYROS AB	SBO	2001	2009
71.	LITORINA KAPITAL MANAGEMENT AB	HAPAX INFORMATION SYSTEMS AB	LIQ	2000	2002
72.	ARGNOR WIRELESS VENTURES ADVISORS AB	HOTSIP AB	TS	2001	2006
73.	LEDSTIERNAN AB	HOTSIP AB	TS	2002	2006
74.	STOCKHOLM INNOVATION & GROWTH CAPITAL AB	HULU SWEDEN AB	TS	2008	2008
75.	SKANDINAVISKA ENSKILDA BANKEN AB	IBX GROUP AB	TS	2001	2010
76.	INDUSTRIFONDEN AB	ILLUMINATE LABS AB	TS	2005	2010
77.	VOLVO GROUP VENTURE CAPITAL AB	ILLUMINATE LABS AB	TS	2005	2010
78.	KAROLINSKA INVESTMENT MANAGEMENT AB	IMED AB	LIQ	2007	2011
79.	LINKMED AB	IMED AB	LIQ	2007	2011
80.	TRANSFERATOR AB	IMODULES AB	TS	2011	2014
81.	LEDSTIERNAN AB	INCOMIT AB	TS	2000	2004
82.	KAROLINSKA INVESTMENT MANAGEMENT AB	INDEPENDENT PHARMACEUTICA AB	LIQ	2004	2011
83.	CATELLA AB	INTERNET 5 AB	TS	2000	2004
84.	INDUSTRIVARDEN AB	INTERPEAK AB	SBO	2000	2004
85.	LEDSTIERNAN AB	INTERPEAK AB	TS	2004	2006
86.	SKANDINAVISKA ENSKILDA BANKEN AB	INTERPEAK AB	TS	2002	2006
87.	INDUSTRIFONDEN AB	IPUNPLUGGED AB	LIQ	2001	2008
88.	LEDSTIERNAN AB	IPUNPLUGGED AB	LIQ	2000	2008
89.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	ISCONOVA AB	TS	2008	2013
90.	INDUSTRIFONDEN AB	JENSEN DEVICES AB	TS	2007	2012
91.	MIDROC NEW TECHNOLOGY AB	JENSEN DEVICES AB	TS	2007	2012
92.	VOLVO GROUP VENTURE CAPITAL AB	JENSEN DEVICES AB	TS	2007	2012
93.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	JOLIFE AB	TS	2003	2011
94.	NEW SCIENCE SVENSKA AB	KAROCELL TISSUE ENGINEERING AB	LIQ*	2004	2010
95.	RITE INTERNET VENTURES AB	KLIKKI AB	TS	2008	2012
96.	SJATTE AP-FONDEN	KREATEL COMMUNICATIONS AB	TS	2000	2006
97.	BURE EQUITY AB	KREATEL COMMUNICATIONS AB	TS	2000	2006
98.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	KREATEL COMMUNICATIONS AB	TS	2000	2006
99.	SKANDINAVISKA ENSKILDA BANKEN AB	KREATEL COMMUNICATIONS AB	TS	2000	2006
100.	LEDSTIERNAN AB	LINKPOOL AB	LIQ	2000	2001
101.	CIMON MEDICAL AB	LIPID TECHNOLOGIES PROVIDER AB	TS	2003	2006
102.	FÖRETAGSBYGGARNA AB	LUDESI AB	LIQ	2004	2010
103.	SJATTE AP-FONDEN	LUDESI AB	LIQ	2004	2010
104.	INDUSTRIFONDEN AB	LYNGBOX MEDIA AB	LIQ*	2007	2012
105.	PRIVEQ PARTNERS AB	M2 ENGINEERING AB	LIQ*	2004	2010
106.	AFFÄRSSTRATEGERNA I SVERIGE AB	MAINBOX	LIQ	2000	2003
107.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	MEDEIKONOS AB	LIQ*	2000	2005
108.	SKANDINAVISKA ENSKILDA BANKEN AB	MEDEIKONOS AB	LIQ*	2000	2005
109.	IT PROVIDER	MEDINSITE AB	LIQ*	2000	2008
110.	HEALTHCAP AB	MELACURE THERAPEUTICS AB	LIQ*	2000	2004
111.	NOVARE KAPITAL AB	MELACURE THERAPEUTICS AB	LIQ*	2000	2004
112.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	MGAGE SYSTEMS AB	TS	2000	2001
113.	CIMON MEDICAL AB	MICROMUSCLE AB	LIQ	2002	2008
114.	INDUSTRIFONDEN AB	MICROMUSCLE AB	LIQ	2002	2008
115.	HEALTHCAP AB	MILLICORE AB	SBO*	2003	2009
116.	INDUSTRIFONDEN AB	MILLICORE AB	SBO*	2003	2009
117.	CREANDUM ADVISOR AB	MITRIONICS AB	TS	2005	2010
118.	TEKNOSEED AB	MITRIONICS AB	TS	2005	2010
119.	HOPPENSTEDT BONNIER INVEST AB	MOMAIL AB	LIQ	2008	2011
120.	SJATTE AP-FONDEN	MOMAIL AB	LIQ	2008	2011
121.	INLANDSINNOVATION AB	MOVINTO FUN AB	MBB	2013	2014
122.	AFFÄRSSTRATEGERNA I SVERIGE AB	MUSICBRIGADE AB	LIQ*	2000	2008
123.	ALFRED BERG HOLDING AB	MYSQL AB	TS	2001	2008
124.	SCOPE CAPITAL ADVISORY AB	MYSQL AB	TS	2001	2008
125.	TEXCEL INTERNATIONAL AB	MYSQL AB	TS	2001	2008
126.	INDUSTRIFONDEN AB	NANOFABRIK INSTRUMENTS AB	LIQ*	2007	2014
127.	NORTHZONE VENTURES AB	NANOFREEZE TECHNOLOGIES LUND AB	LIQ*	2007	2012
128.	TEKNOSEED AB	NANOFREEZE TECHNOLOGIES LUND AB	LIQ*	2007	2012
129.	CREANDUM ADVISOR AB	NANORADIO AB	TS	2009	2012
130.	INDUSTRIFONDEN AB	NANORADIO AB	TS	2005	2012
131.	AB CHALMERSINVEST	NANOXIS AB	LIQ*	2003	2011
132.	CREANDUM ADVISOR AB	NANOXIS AB	LIQ*	2003	2011
133.	GU HOLDING AB	NANOXIS AB	LIQ*	2003	2011
134.	AFFÄRSSTRATEGERNA I SVERIGE AB	NETBABY WORLD	MBB	2001	2002
135.	HEALTHCAP AB	NEURONOVA AB	TS	2000	2012

136.	INVESTOR GROWTH CAPITAL AB	NEURONOVA AB	TS	2003	2012
137.	PARTNERINVEST OVRE NORRLAND AB	NORDIC RIVER SOFTWARE AB	LIQ*	2010	2013
138.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	NORDNAV TECHNOLOGIES AB	TS	2005	2007
139.	INVESTOR GROWTH CAPITAL AB	OPTILLION AB	LIQ	2000	2005
140.	INNOVATIONSBRON AB	OREXPLORE AB	TS	2011	2013
141.	HEALTHCAP AB	PERSONAL CHEMISTRY AB	TS	2000	2003
142.	INVESTOR GROWTH CAPITAL AB	PERSONAL CHEMISTRY AB	TS	2000	2003
143.	SKANDINAVISKA ENSKILDA BANKEN AB	PERSONAL CHEMISTRY AB	TS	2000	2003
144.	STARTUPFACTORY AB	PICOFUN AB	TS	2000	2002
145.	ALMI INVEST AB	POCKET MEDIA GROUP AB	TS	2012	2013
146.	SJATTE AP-FONDEN	POLARICA AB	SBO	2006	2010
147.	INNOVATIONSBRON AB	POLYSCORP SYSTEM AB	LIQ*	2011	2012
148.	INVESTOR GROWTH CAPITAL AB	PROJECTPLACE INTERNATIONAL AB	TS	2001	2014
149.	INVESTMENT AB LATOUR	PROSTALUND AB	SBO	2001	2006
150.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	PROXIMION FIBRE OPTICS AB	LIQ	2001	2003
151.	NOVARE KAPITAL AB	QEYTON SYSTEMS AB	TS	2000	2000
152.	RATOS AB	Q-LABS	TS	2000	2004
153.	INNOVATIONSBRON AB	QUBULUS AB	LIQ*	2012	2014
154.	CAPMAN AB	QUICKCOOL AB	TS	2006	2012
155.	INDUSTRIFONDEN AB	QUIQOM SYSTEMS AB	LIQ	2009	2009
156.	INDUSTRIFONDEN AB	RADIANS INNOVA AB	LIQ*	2002	2004
157.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	RADIANS INNOVA AB	LIQ*	2002	2004
158.	INVESTOR GROWTH CAPITAL AB	RADIANS INNOVA AB	LIQ*	2002	2004
159.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	RED MESSAGE AB	LIQ	2000	2002
160.	DELPHI CAPITAL	REDCYBER AB	LIQ	2001	2002
161.	NORDIC WIRELESS AB	REDCYBER AB	LIQ	2000	2002
162.	LEDSTIERNAN AB	REPEATIT AB	TS	2001	2009
163.	FÖRETAGSBYGGARNA AB	REPLISAURUS TECHNOLOGIES AB	LIQ*	2004	2013
164.	SJATTE AP-FONDEN	REPLISAURUS TECHNOLOGIES AB	LIQ*	2004	2013
165.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	SAFELOGIC AB	TS	2003	2004
166.	MALMSTEN INVEST AB	SAFELOGIC AB	TS	2003	2004
167.	NORTHZONE VENTURES AB	SAFELOGIC AB	TS	2003	2004
168.	CATELLA AB	SATSAFE MLS AB	LIQ	2000	2002
169.	DELPHI CAPITAL	SATSAFE MLS AB	LIQ	2001	2002
170.	H&Q TECHNOLOGY	SATSAFE MLS AB	LIQ	2000	2002
171.	INDUSTRIFONDEN AB	SCALADO AB	TS	2004	2012
172.	TEKNOSEED AB	SCALADO AB	TS	2004	2012
173.	SLOTTSBACKEN VENTURE CAPITAL AB	SECODE AB	TS*	2000	2010
174.	LITORINA KAPITAL MANAGEMENT AB	SENSISTOR AB	TS	2000	2006
175.	POD HOLDING AB	SERVICEFACTORY SF AB	TS	2004	2007
176.	CREANDUM ADVISOR AB	SILICON CONSTRUCTION SWEDEN AB	LIQ*	2004	2009
177.	INDUSTRIFONDEN AB	SILICON CONSTRUCTION SWEDEN AB	LIQ*	2004	2009
178.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	SILICON CONSTRUCTION SWEDEN AB	LIQ*	2004	2009
179.	SCOPE CAPITAL ADVISORY AB	SILICON CONSTRUCTION SWEDEN AB	LIQ*	2004	2009
180.	ALMI INVEST AB	SIMATIC AB	TS	2009	2013
181.	COACH & CAPITAL NORDIC 1 AB	SIMATIC AB	TS	2009	2013
182.	CELL NETWORK INNOVATION AB	SNAPSEND	LIQ	2000	2002
183.	WIKOW INVEST AB	SNAPSEND	LIQ	2000	2002
184.	EKSTRANDA AB	SOFT CAPITAL INVESTMENT AB	SBO	2006	2009
185.	LEDSTIERNAN AB	SOFT CAPITAL INVESTMENT AB	SBO	2006	2009
186.	CAPMAN AB	SPINTOP NETSOLUTION AB	TS	2006	2008
187.	ZODIAK VENTURE CAPITAL AB	SPIREA AB	LIQ	2000	2004
188.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	SPOTFIRE HOLDINGS INC	TS	2000	2007
189.	LITORINA KAPITAL MANAGEMENT AB	SWE DISH WAHLBERG & SELIN AB	TS	2000	2007
190.	NORDIC WIRELESS AB	SWE DISH WAHLBERG & SELIN AB	TS	2000	2007
191.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	SYNTENSIA AB	TS	2008	2010
192.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	SYNTUNE AB	TS	2004	2009
193.	SKANDINAVISKA ENSKILDA BANKEN AB	TAIL-F SYSTEMS AB	TS	2005	2014
194.	SKANDINAVISKA ENSKILDA BANKEN AB	TELELOGIC AB	TS	2005	2007
195.	ERICSSON BUSINESS INNOVATION AB	TERRAPLAY SYSTEMS AB	TS	2001	2007
196.	IT PROVIDER	TERRAPLAY SYSTEMS AB	TS	2001	2007
197.	LEDSTIERNAN AB	TICKETANYWHERE	LIQ	2001	2002
198.	ACR CAPITAL AB	TIFIC AB	TS	2002	2011
199.	SLOTTSBACKEN VENTURE CAPITAL AB	TIFIC AB	TS	2001	2011
200.	TELIA BUSINESS INNOVATION AB	TIFIC AB	TS	2002	2011
201.	SJATTE AP-FONDEN	TODOS DATA SYSTEMS AB	TS	2000	2010
202.	INDUSTRIFONDEN AB	TONIUM AB	LIQ	2008	2010
203.	INDUSTRIFONDEN AB	TRANSIC AB	TS	2008	2011
204.	MIDROC NEW TECHNOLOGY AB	TRANSIC AB	TS	2008	2011
205.	VOLVO GROUP VENTURE CAPITAL AB	TRANSIC AB	TS	2008	2011

206.	POD HOLDING AB	TRANSMODE SYSTEMS AB	IPO	2003	2011
207.	EKONORD INVEST AB	UMBIO AB	LIQ*	2012	2014
208.	NORRLANDSFONDEN	UMBIO AB	LIQ*	2011	2014
209.	PARTNERINVEST OVRE NORRLAND AB	UMBIO AB	LIQ*	2011	2014
210.	SPARBANKSSTIFTELSEN NORRLANDS RISKKAPITALSTIFTELSE	UMBIO AB	LIQ*	2011	2014
211.	LEDSTIERNAN AB	WAZOO HOLDING AB (KATSHING AB)	SBO	2007	2012
212.	AFFÄRSSTRATEGERNA I SVERIGE AB	WEB UPDATE	SBO	2000	2007
213.	ALMI INVEST AB	VICI INDUSTRI AB	TS	2007	2014
214.	INDUSTRIFONDEN AB	VICI INDUSTRI AB	TS	2007	2014
215.	CREANDUM ADVISOR AB	VIDEOPLAZA AB	TS	2008	2014
216.	NORTHZONE VENTURES AB	VIDEOPLAZA AB	TS	2010	2014
217.	AFFÄRSSTRATEGERNA I SVERIGE AB	WIDERMIND AB	LIQ	2000	2005
218.	BRAINHEART CAPITAL AB	WIRELESS MAINGATE AB	TS	2001	2014
219.	CATELLA AB	WIRELESS MAINGATE AB	TS	2002	2014
220.	MVI EQUITY AB	WIRELESS MAINGATE AB	TS	2002	2014
221.	BRAINHEART CAPITAL AB	WIRELESSCAR	TS	2001	2008
222.	LEDSTIERNAN AB	VOICE PROVIDER SWEDEN AB	TS	2001	2006
223.	HEALTHCAP AB	XCOUNTER AB	IPO	2002	2007
224.	INDUSTRIFONDEN AB	XCOUNTER AB	IPO	2002	2007
225.	STARTUPFACTORY AB	XELERATED PACKET DEVICES AB	TS	2001	2012
226.	BRAINHEART CAPITAL AB	XPEDIO AB	LIQ	2000	2002
227.	PEDAL VENTURES	XPEDIO AB	LIQ	2000	2002
228.	SEGULAH AB	XPEDIO AB	LIQ	2000	2002
229.	KTH SEED CAPITAL	ZEALCORE EMBEDDED SOLUTIONS AB	TS	2004	2008
230.	INDUSTRIFONDEN AB	ZIMPL AB	LIQ*	2011	2014
231.	MST VENTURE AB	ZIMPL AB	LIQ*	2011	2014
232.	INNOVATIONSKAPITAL MANAGEMENT I GÖTEBORG	ÅMIC AB	TS	2002	2008
233.	INVESTOR GROWTH CAPITAL AB	ÅMIC AB	TS	2002	2008

* = Conclusive information is missing but there is strong support to assume the given exit

Appendix 2: Governmental VCs

Source: Riskrevisionen (2014), Figure 4, pp. 30

Operating under the Department of Finance:

Fourtiertrasform AB

Sjätte AP-Fonden

- Krigskassa Blekinge
- Jönköping Business Development
- Lannebo Microcap
- Lannebo Småbolag
- SEB Micro Cap

Operating under the Department of Education:

KTH Chalmers Capital (together with Industrifonden)

KTH Seed Capital (together with Industrifonden)

Ca 15 University holding companies

Luminova AB

Uminova AB

Operating under the Department of Industry

Industrifonden

- Malmöhus Invest AB
- Investa Företagskapital AB

Norrlandsfonden

- Partnerinvest Övre Norrland AB (together with Almi Invest AB)
- Arctic Business Incubator AB
- Norrsådd Holding AB (together with Industrifonden)

Almi Företagspartner AB

- Almi Invest AB
 - o Regional offices
- Almi Innovationsbron
 - o Teknoseed I AB
 - o Forskarpatent I Syd AB
 - Innovationspatent Sverige AB
 - o Sydsvensk Entreprenörsfond AB
- 16 regional subsidiaries

Inlandsinnovation AB

- Mittkapital
- Startkapital i Norr
- Ekoväst
- Ekonord

Appendix 3: Model adequacy

Hoshmer-Lemeshow Goodness-of-fit test:

Goodness-of-Fit Evaluation for Binary Specification

Andrews and Hosmer-Lemeshow Tests

Equation: EQ1

Date: 05/12/15 Time: 13:30

Grouping based upon predicted risk (randomize ties)

	Quantile of Risk		Dep=0		Dep=1		Total Obs	H-L Value
	Low	High	Actual	Expect	Actual	Expect		
1	0.0970	0.5925	8	7.55700	4	4.44300	12	0.07014
2	0.6046	0.7576	3	3.56431	9	8.43569	12	0.12709
3	0.7619	0.8357	1	2.58339	12	10.4166	13	1.21116
4	0.8360	0.8886	4	1.60605	8	10.3940	12	4.11977
5	0.8917	0.9311	1	1.10474	12	11.8953	13	0.01085
6	0.9354	0.9552	1	0.64465	11	11.3554	12	0.20700
7	0.9601	0.9741	0	0.38071	12	11.6193	12	0.39319
8	0.9741	0.9799	0	0.29227	13	12.7077	13	0.29899
9	0.9806	0.9867	0	0.19191	12	11.8081	12	0.19503
10	0.9870	0.9987	0	0.07499	13	12.9250	13	0.07543
Total			18	18.0000	106	106.000	124	6.70864
H-L Statistic			6.7086		Prob. Chi-Sq(8)		0.5684	
Andrews Statistic			55.3159		Prob. Chi-Sq(10)		0.0000	

Expectation-Prediction Evaluation:

Goodness-of-Fit Evaluation for Binary Specification

Andrews and Hosmer-Lemeshow Tests

Equation: EQ1

Date: 05/12/15 Time: 13:30

Grouping based upon predicted risk (randomize ties)

	Quantile of Risk		Dep=0		Dep=1		Total Obs	H-L Value
	Low	High	Actual	Expect	Actual	Expect		
1	0.0970	0.5925	8	7.55700	4	4.44300	12	0.07014
2	0.6046	0.7576	3	3.56431	9	8.43569	12	0.12709
3	0.7619	0.8357	1	2.58339	12	10.4166	13	1.21116
4	0.8360	0.8886	4	1.60605	8	10.3940	12	4.11977
5	0.8917	0.9311	1	1.10474	12	11.8953	13	0.01085
6	0.9354	0.9552	1	0.64465	11	11.3554	12	0.20700
7	0.9601	0.9741	0	0.38071	12	11.6193	12	0.39319
8	0.9741	0.9799	0	0.29227	13	12.7077	13	0.29899
9	0.9806	0.9867	0	0.19191	12	11.8081	12	0.19503
10	0.9870	0.9987	0	0.07499	13	12.9250	13	0.07543
Total			18	18.0000	106	106.000	124	6.70864
H-L Statistic			6.7086		Prob. Chi-Sq(8)		0.5684	
Andrews Statistic			55.3159		Prob. Chi-Sq(10)		0.0000	

Appendix 4: Correlation matrix

	PRIVATEVC	CLUSTER	PROXIMITY	HIGHGWT	_2002EXIT	_2008EXIT	DURATION	SIZE	EBITMARGIN	ROE
PRIVATEVC	1.000000	0.251630	-0.096386	0.093101	0.105409	0.029424	0.176794	0.094485	0.012893	0.075225
CLUSTER	0.251630	1.000000	0.301626	0.073120	0.094040	-0.254431	-0.003250	-0.174926	-0.115733	-0.033779
PROXIMITY	-0.096386	0.301626	1.000000	0.074780	0.045720	0.062962	-0.014424	-0.147008	-0.055665	-0.064684
HIGHGWT	0.093101	0.073120	0.074780	1.000000	0.013085	0.167106	0.075244	0.013345	-0.103566	-0.162939
_2002EXIT	0.105409	0.094040	0.045720	0.013085	1.000000	-0.065134	-0.222631	-0.024726	-0.265366	0.018351
_2008EXIT	0.029424	-0.254431	0.062962	0.167106	-0.065134	1.000000	-0.020344	-0.029866	0.105627	-0.050791
DURATION	0.176794	-0.003250	-0.014424	0.075244	-0.222631	-0.020344	1.000000	0.421901	0.140137	0.176954
SIZE	0.094485	-0.174926	-0.147008	0.013345	-0.024726	-0.029866	0.421901	1.000000	0.106419	0.254316
EBITMARGIN	0.012893	-0.115733	-0.055665	-0.103566	-0.265366	0.105627	0.140137	0.106419	1.000000	0.121011
ROE	0.075225	-0.033779	-0.064684	-0.162939	0.018351	-0.050791	0.176954	0.254316	0.121011	1.000000