

Public Venture Capital for Swedish Innovation

Theory and Practise

Abstract

In this study we tested prevailing theory relating to efficient government intervention in the shape of public venture capital. The rationale for such intervention rests upon the theoretical notion of a market failure in financing of innovative companies in early stages. We conducted interviews with practitioners in the Swedish public venture capital market in order to test the applicability of the theories. This resulted in the finding that the theoretical framework accurately emphasises the importance for government-owned funds to provide competence in addition to capital and that theory also accounts for proper scope in investment activity, where sectorial and regional limits should be avoided. Still, theory needs to be revised in order to incorporate historical aspects and dynamics between different financing stages. The theoretical framework should be extended by taking sector-specific time horizons into account and distinguishing between cases where it is in fact feasible to introduce formal requirements of co-investments with private actors. In addition, exit markets are found to play an important role in these market dynamics. Specifically, a perceived scarcity of potential buyers in later stages could pose an obstacle to functioning early stage-financing.

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Introduction

Background

At the time of writing, Swedish innovation strategy is among the topics most heatedly debated and as it has become a popular topic for politicians it is making headlines in most major newspapers (Globe Forum 2012). The financial tabloid Dagens Industri states in an editorial that “Swedes must realise the worth of private equity and venture capital” and that entrepreneurial venture capitalists have had a significant positive impact on Swedish growth in past years (Dagens Industri 2012). Mats Odell, current Chair of Committee on Industry and Trade in the Swedish Parliament, sees the lack of venture capital as “the single most important factor that keeps small businesses back” (Svenska Dagbladet 2012a). According to Marie Reinius, CEO of the Swedish Private Equity and Venture Capital Association (SVCA), there is now a scarcity in capital for growth companies in Sweden.(Reinius 2010).

The Swedish government is currently in the process of developing and implementing an innovation strategy, led by the Ministry of Enterprise, Energy and Communications. It strives towards a vision for the year 2020, with the goal of strengthening Sweden’s innovation capacity, and thereby increasing jobs and promoting social security and economic growth (Government Offices of Sweden 2012). At the same time, the new chairman of the Social Democratic Party of Sweden and leader of the red-green opposition block Stefan Löfven calls for a better stimulation of innovation through venture capital, and says that the government “plays a very important role”, as it “should make sure that there is venture capital available for innovation and research” (Svenska Dagbladet 2012b). At the same time, actors in the private sector such as the interest organisations Confederation of Swedish Enterprise and SVCA actively participate in the debate. They call for action on the part of the government to intervene in order to stimulate innovation and make risky investments more attractive (Confederation of Swedish Enterprise 2010, SVCA 2011a).

The reasoning behind the innovation strategy is reflected in earlier theoretical research - creation and development of innovative companies are of critical importance for a country’s growth (Abramovitz 1956, Solow 1957). In addition, according to empirical research by Acs and Audretsch (1988), new companies are more innovative than already established ones and contributed to approximately 50% of the important innovations during the 20-th century. In this context, Mason (2009) puts forward that small technology firms are particularly seen as key drivers of innovation, job creation and productivity growth.

The role of venture capital funds in this context lies with providing capital to companies that are in early phases when other actors at the capital market perceive the investments to be too risky. In theoretical research, venture capital funds are argued to create jobs, intellectual property, contribute to increased exports and to stimulate regional development (Christofidis, Debande 2001). Furthermore, the venture capital funds provide non-financial support like advice and monitoring which result in better performance of companies funded by venture capital compared to companies that have not obtained venture capital support (Harding 2002).

It can thus be argued that these innovative companies fill an important role in society. In addition, we see that venture capital funds are important actors in funding these companies in early stages. However, there are indications that there is a market failure for funding of innovative companies and that government intervention might be justified (Svensson 2011). This thesis explores the implications for public policy when the capital market is unable to provide capital in start-up innovation companies. One way the government can intervene is by taking the role of a venture capitalist and support companies in early stages with public capital, hereby referred to as public venture capital. However, the optimal implementation of this intervention is debated, and there are differing views on when, where and how the public venture capital funds should act. Thus, the question remains of what the optimal government response is to the market experiencing difficulties in financing innovation on its own.

Purpose and Methodology

As evident in current discourse, there is not only a need to form favourable public policies due to funding shortages, but also efficient implementation of these in order to promote innovation as an instrument for economic growth. The biggest funding shortage appears to be in early, uncertain stages of innovation projects (Mason 2009), which is apparent in the Swedish debate where active public intervention is a prominent topic. This study specifically concerns government intervention in capital markets by investments in innovative companies in early stages. Thus, its purpose on the one hand is to examine contemporary theory and thereby, ultimately, produce practical implications for Swedish public policy.

This twofold objective of the study more precisely implies a testing of empirics as well as an application of the results. We see a virtue in both aspects, namely scrutinizing current theory by contrasting it with real-world observational data and also gaining a practical dimension by applying the results through analysis of their policy implications. The purpose that is constituted by these objectives is illustrated by Figure 1. Hereby, we also point to the iterative nature of the process, where the application of theory and the shaping of policy ultimately feeds back to and becomes part of the theoretical framework. Concretely, we thus aim to contribute to this process by providing additional data, analysis and applications with regard to the discussed subject.

Analytical Framework

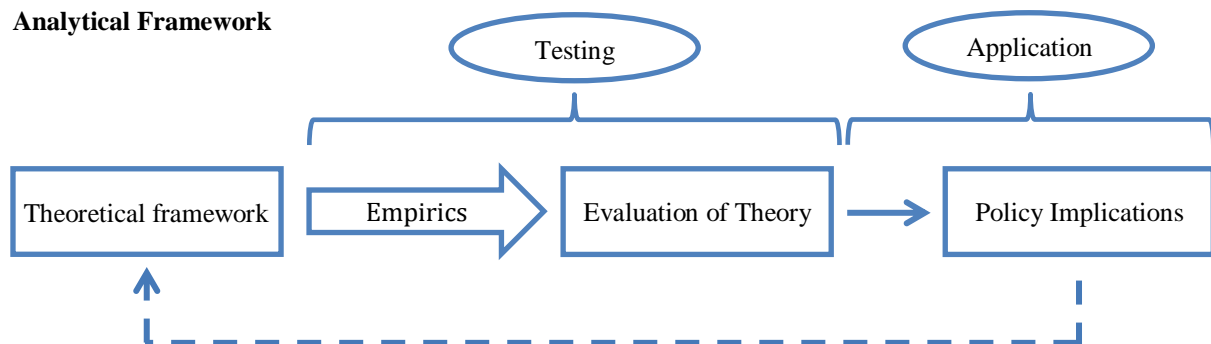


Figure 1 - Analytical Framework

In order to pursue this purpose, we initially make use of methodology for qualitative research as described by Miles and Huberman (1994). With an interpretivist approach, observations are analysed with qualitative rather

than natural scientific means, where a “deep understanding” is pursued through an understanding of human interface. Interview transcripts are a common tool for this approach, and in using this framework, we will make use of contextualisation to more effectively pursue a profound understanding in our analysis.

In line with Miles and Hubermans (1994) reasoning, we first build a conceptual framework by mapping currently prevailing theory with regard to the subject at hand, namely efficient promotion of innovation through public venture capital. Thereafter, we formulate the research questions, which we call “propositions”. These questions postulate a number of fundamental relationships that illustrate the objective of this study. After a delimitation of our study that sets the bounded context of our propositions, we consequently test the theory by contrasting it with our empirical findings.

The qualitative analysis largely follows the concept presented by Miles and Huberman (1994), which divides the process into three steps; namely “data reduction”, “data display“ and “conclusion drawing and verification”. Data reduction denotes the selection, simplification and transformation of the empirical data that is produced, often in the shape of interview transcripts. Data display often implies a compression and organization of the findings in order to make them manageable in the analysis. The reason why both these process flows are a part of the analytical process itself, rather than the data collection, is that the researcher’s presuppositions and conceptions influence the choices that are made in terms of omissions, emphasis and other aspects. Lastly, the conclusion drawing implies identifying regularities, patterns and causal flows, which are then verified by review and discussions of plausibility. We will elaborate on our practical implementation of this procedural framework in the Method section.

After applying the theory with Swedish data, this will allow us to conclude whether current theory is well founded, specifically with regard to the Swedish market. By creating this link between the theories of government intervention and the corresponding observed reality in our analysis, we aim to give a more nuanced and empirically founded view on the theory for these kinds of policies.

We use this evaluation of current theory and apply it by providing its implications for shaping and implementing public policy. This testing and application goes beyond earlier work in this field of study and can ultimately make a contribution to research in this area by not only providing empirical evidence for the theories applicability in real markets, but also be used in public policy formation and hereafter be incorporated in the theoretical framework for research purposes. In extension, our ambition is that the results will possibly provide suggestions for better public policy aimed at increasing societal welfare and strengthening economic growth.

Delimitation of Scope

In the context of a market failure in allocation of capital to companies in early phases, there are various ways the government can intervene. It can be done indirectly by regulation such as tax incentives or directly by offer loans, grants and convertibles or by offering capital in exchange for ownership shares. In our research we limit ourselves to direct involvement through capital provision by public venture capital funds. We see this as a

necessary delimitation in our study since our focus is on active intervention by the government, where it through its ownership typically appoints board members that actively develop the companies. More passive measures such as regulatory reforms and loans are relevant in this context but beyond the scope of this study.

Furthermore, we will primarily be mapping and analysing the Swedish venture capital market. Because of empirical research takes place in Sweden, we will draw our conclusions on a domestic level and apply them to Swedish public policy and only then attempt to generalise the findings where they deemed applicable in a wider theoretical perspective. We will explain this aspect of external validity more thoroughly in the Method section.

In Sweden there is a large amount of national, regional and local venture capital funds to take into consideration. Due to the scope of this study we have chosen to focus on the most influential public venture capital funds in terms of capital base and geographic spread. Accordingly, they are the large national funds that are often brought up when discussing Swedish public venture capital. We have also chosen to add one regional fund, namely Inlandsinnovation due to its size of 2 billion SEK, which makes it to one of the largest public venture capital funds in Sweden.

The discussion of a market failure in this context is heavily linked to investments in R&D. Theory concludes that the problems of funding are the largest for companies with high levels of innovation and R&D. In this setting, it would be optimal to limit our discussion to investments in innovative companies and only look at public venture capital funds investing in these companies. However, this is not viable due to limited possibility to distinguish these kinds of investments and to provide a definition of what constitutes an innovative company. Nevertheless, we try to highlight the cases when investments are done in more innovative and R&D-intensive companies.

Terminology

At first, venture capital operations were merely investments made by individuals with excess capital in projects where the originator lacked own funding and banks perceived the risk to be too high. Eventually, funds were formed in the shape of partnerships that strived for high returns by managing pools of projects. This is referred to as “private equity”, while “venture capital” is often seen as a subset of private equity, where equity is co-invested with entrepreneurs in early project stages; often alongside active management and guidance. There are slightly different definitions of these two terms and Swedish parlance does not always make a distinction between them and simply referring to them both as “riskkapital”. We choose to adhere to the definitions as given by the European Private Equity and Venture Capital Association (EVCA): Venture capital is “professional equity co-invested with the entrepreneur to fund an early-stage (seed and start-up) or expansion venture. Offsetting the high risk the investor takes is the expectation of higher than average return on the investment” (Christofidis, Debande 2001, EVCA 2012a).



Figure 2 - Financing Stages

It is important to make a clear distinction between the different phases where a firm can obtain financing. Resting on definitions obtained in the interviews¹ and the definitions by EVCA (EVCA 2012a) we have chosen to classify the various stages in following manner: In the initial seed phase the business is still at a conceptual stage where an idea is formed and researched. It is followed by the start-up stage where the company is set up and commercialisation and marketing of the idea is initiated. In the growth stage the company has an infrastructure and the products are commercialised, but no profits are yet obtained. Here, additional capital is needed for growth and increased capacity. In the expansion stage there is a known demand for the products and additional capital is needed for expansion to new markets. Finally, the company reaches the mature stage for its operations.

Overview of Following Sections

We will now present and discuss some theoretical concepts regarding market failures in the venture capital market and theories for government intervention. We then present the method of this study, followed by a background presentation of the current structures of the Swedish venture capital market. A description of our empirical findings follows next, together with an analysis with respect to our analytical framework presented in the theory section. Finally, we present our conclusions, discuss their implications for government intervention and elaborate on potential subjects for further research.

¹ Findings from interviews with Sven Ehn, former CEO of Innovationsbron Öst, 2012-03-28 and Per Nordberg, CEO Fouriertransform, 2012-03-28

Theories of Market Failures and Government Intervention

In this section, we aim to map the prevailing theories that form the foundations of our later analysis. We start by discussing the underlying reasons for the prevalent market failure in capital allocation and use the emerging framework to find the rationale for public intervention in capital markets, specifically with regard to venture capital funds. We then move on to the current state of knowledge of efficient government intervention in the shape of public venture capital and bring up some of the criticism of this form of intervention. Finally, we summarise theory by putting forward the underlying concepts of efficient government intervention that a majority of researchers promote.

Market Failure – Spill-Over Effects and Asymmetric Information

According to economic theory, there are two main reasons why there is a market failure in the private venture capital market for funding of innovative companies in early stages. It is claimed to be caused by the existence of spill-over effects on the one hand and asymmetric information on the other (Svensson 2011, Lerner 2002).

Spill-Over Effects

The economic incentives for companies to invest in R&D are lower than what is optimal for society as a whole. This is due to knowledge being a “public good”, with considerable spill-over effects from the point of its inception. Some or all of the new knowledge associated with an innovation will spread to other companies, with the company funding the research being unable to prevent them from using the knowledge due to its non-excludability (Arrow 1962, Jaffe 1986). The innovators cannot reap all the benefits and thus do not have sufficient incentive to engage in socially desirable innovation. This leads to what Brander et al refer to as an “under-provision of innovation” (Brander, Egan & Hellmann 2008). In this setting public venture capital programmes can encourage technological spill-overs by investing in projects that generate positive externalities and benefit society as a whole, with returns that private investors would not otherwise be able to reap (Lerner 2002).

In addition, the limited saleability of knowledge leads to problems for innovative companies when seeking funding. Entrepreneurs are faced with the dilemma of how to communicate the value of their idea to potential investors without revealing too much of the idea itself, so that investors will still want to invest. Thus, attractive ideas might not gain financing due to their limited saleability (Peneder 2008).

Asymmetric Information

The capital market for investments in companies in early phases is characterised by asymmetric information. One aspect of the problem is adverse selection, where the entrepreneur has better knowledge of the business idea’s profit potential than the potential investors do. The issue applies for all companies but is more severe in the case of high levels of innovation since, as mentioned above, the entrepreneurs are more reluctant to reveal confidential information about the business idea (Peneder 2008). Mason (2009) points to another difficulty with adverse selection among innovative companies; namely the difficulties to value an innovative company’s

knowledge. In addition, he argues, it is common for the management of innovative companies to lack commercial skills. Furthermore, the uncertainty of the return of the investment is greatest when the company is in an early phase. Thus, according to Mason, the problem of adverse selection is the most severe for companies searching funding in early phases and for companies with high levels of innovation. According to Hubbard (1998) the adverse selection consequently leads to a shortage of funding in the capital market for innovative companies in early phases.

Another aspect of asymmetric information is moral hazard, which leads to an incentive problem where the entrepreneur might alter their behaviour and undertake undesirable actions, specifically from the investor's point of view, after receiving financing. Therefore, the investor needs to monitor the actions of the entrepreneur. When the cost of monitoring gets too high the investor might choose to bypass investments in attractive start-ups (Peneder 2008). Hence, the asymmetric information problem both relates both to difficulty in communicating the attractiveness of an idea as well as incentives that hamper investments after the investor has found an otherwise attractive investment opportunity.

Related to the issue of asymmetric information is the tendency for private venture capital funds to not make use of investment opportunities in small companies, i.e. investments that fall short of approximately a couple of million Swedish kronor. This is due to the high fixed costs that relate to the gathering and analysis of information about the start-ups and their ideas as well as the fixed costs of monitoring and support (Svensson 2011).

To conclude, current economic theory supports the existence of a market failure for funding of companies in early phases. The funding shortage is claimed to be more severe for innovative companies due to the limited possibility to reap the positive externalities of innovation and limited saleability of innovative ideas.

Government Intervention – Public Venture Capital

Rationale for Intervention

In the financial market, organisations face coordination problems when it comes to allocating capital due to the factors discussed in the previous section. The market produces suboptimal outcomes and thus, a rationale for public intervention arises (Jensen, Meckling 1976). The challenge for government intervention thereby lies in bridging the financing gap, or facilitating a “deal flow”, between the stages of invention/development and marketing of innovations, at which the first stage differs from the later stages in terms of the incentive structure that companies are faced with. Accordingly, in the later stages the actors face lower levels of uncertainty leading to a more efficient allocation of capital where public intervention is not as motivated (Peneder 2008).

The nature of public intervention in cases of under-investment in early stage companies can take the shape of direct funding of firms, fiscal incentives that investors are faced with, e.g. tax legislation and similar measures, as well as stimulation of capital markets through regulation or public equity funds. In the case of capital market stimulation, government can promote the venture capital industry in order to bridge the aforementioned equity

gap. The venture capital form of financing is particularly important in this case, as innovation companies are faced with constraints in obtaining debt due to high risk and uncertainty levels. Thus, R&D-intensive firms tend to use venture capital as the most significant external equity source, making it “one of the important technology financing mechanisms” for R&D (Peneder 2008, Wonglimpiyarat 2011).

Empirical studies show that seemingly successful public venture capital programmes in Australia and the US have aided investment in innovative companies and also led to higher growth rates for companies that received public financing. This success has been attributed to the powerful signalling effect regarding the firms’ quality as well as the additional monitoring and business advising aspects that the venture capital financing form brings with it (Lerner 1999, Cumming 2007), which can possibly counteract the aforementioned agency problems.

However, Chesbrough (1999) argues that there is not a single “best practice” when it comes to public innovation policy – the usefulness of particular organisational structures partly hinges on the firm’s institutional surroundings. For public policy, this implies that institutional complementarities, specifically those of “the technical labour market, the venture formation capital market and the structure of buyer–supplier ties”, need to be taken into account when forming innovation.

Efficient Government Intervention and Best Practise

Although there is evidence that suggests that venture capital is crucial for innovative high-growth companies, their financing remains a challenge for the markets they operate in. The lack of venture capital at these firms’ disposal is described as the biggest obstacle to their success and consequently to well-functioning markets (Harding 2002). This apparent under-utilisation of financing of small businesses in private venture capital markets has led to public initiatives that provide social value and merit to this form of financing. This way, government can signal its support for early venture financing. By taking on an active role in this area, it acts to certify a “public value”, legitimacy and desirability of such financing activity. Through this signalling effect, there is evidence that public venture capital involvement leads to more investments in the industry as a whole (Leleux, Surlemont 2003).

According to Lerner (2009), not only capital is needed for the early stage companies. The entrepreneurs are dependent on their partners and need competent lawyers, engineers and marketing people in their teams to make success likely. He continues that a common mistake by governments is to hand out money without thinking about other barriers in the entrepreneurial environment.

Building on successes in US practice, the development of measures to stimulate venture capital in the EU is said to need to be complemented by informal measures to support business angel activity and at the same time to not remove focus from overall policy measures that aim to support market growth (McGlue 2002). In addition, public officials need to consider business issues when evaluating companies, e.g. make use of relationship building as well as take consumer feedback into consideration in order to establish the long-term profit potential of new technologies and the respective companies that seek financing. A crucial point is that a ‘business think’ along with flexibility is necessary to make the policy work (Lerner 2002).

The problem of incomplete capital markets and asymmetric information could be solved with joint investments from the state and private venture capital funds. These investments will also provide a solution to the problematic situation of the public investors not investing their own money and therefore having weaker incentives to be thorough when distributing the funds. The joint endeavours will lead to investments at the margin, specifically in firms with profit potential even though they cannot obtain all the recurrent capital on their own (Svensson 2011). Lerner (2009) makes a similar point, where he proposes that the market should be used for providing direction regarding the allocation of public funding through venture capital. He brings up examples of successful programme implementations in Israel and New Zealand that have shown the use of matching private co-investments alongside public funding of projects in order to effectively allocate government resources.

The problem of moral hazard after obtaining public capital can be addressed in two different ways. One way is that the entrepreneur also provides capital, which will lead to a convergence of the investors' and entrepreneurs' goals towards maximising the value of the company. The other way is to pay out the capital in steps and create targets that the entrepreneur has to reach before obtaining additional capital. This is how private venture capital funds design their incentives for entrepreneurs to participate in value-creating activities (Svensson 2011).

A problem with public venture capital is that it might create application experts, namely organisations that have previously obtained public funding and are more knowledgeable about the process and thereby more likely to be successful in obtaining capital again, regardless of the historical results of the projects (Gompers, Lerner 2001). One way to solve the problem is to require matching investments by the entrepreneur. The public venture capital fund should furthermore make a thorough assessment of the potential investment and the entrepreneurs behind it to see if it has obtained public funds in the past with unsatisfactory results (Svensson 2011).

According to Lerner (2009) a common mistake is that the public venture capital programmes are created top down, with politicians locking funding into certain regions and sectors. He further claims that programmes based on political rather than economic considerations are likely to be unsuccessful. Mason and Pierrakis (2009) also criticise regional-based venture capital programmes for being ineffective due to the size of the funds and existence of insufficient levels of investment opportunities at regional level. Studying the British venture capital market, the regional structure has not proven to be effective in stimulating entrepreneurship. They instead propose that the public venture capital programmes should put more emphasis on the demand side, i.e. the market itself. Lerner (2009) also argues that the public venture capital is more effective when matching funding from private actors is required, whereby the market helps to select attractive investments opportunities.

Further, Lerner (2009) argues that it is important for the government to recognise the long time frames associated with public venture capital programmes. It takes a long time to build an entrepreneurial sector and far too many promising programmes have historically been closed down due to impatience. According to him, impatience or forcing public venture capital funds to focus on short run returns is heavily linked to failure.

It is not only important to evaluate the ongoing public venture capital investments, but also to investigate if the operations of particular public venture capital funds are still warranted. The funds themselves do not have incentives to undertake such investigations and thus, many funds operate longer than what is economically efficient (Svensson 2011). Lerner (2009) argues that the countries that have been most successful with their public venture capital funds are the ones that have been able to retire the funds that are not doing well. Furthermore, they have been able to retire the funds that are doing too well and thus are no longer needed for bridging the equity gap.

The Risk of Crowding-Out

There is a risk that the public venture capital crowds out private investments when attractive projects are being financed by the state (Svensson 2011). One example is when the European Investment bank 2001 established a venture capital fund comprising 2 billion Euros to support small firms. Compared to the 4 billion Euros that the private venture capital invested every year, the fund was large. Da Rin et al show that the fund did not have the positive effect that was intended. For every Euro that was invested by the public fund in a given sector, the private venture capital investments decreased with one Euro, effectively crowding out private venture capital investments (da Rin, Nicodano & Sembenelli 2006).

As seen above, there is a substantial risk that public venture capital crowds out private investments if the existing venture capital structure is not taken into account when formulating policies. To avoid this, public funds should focus on investments in early phases where the equity gap is the largest. Furthermore, to prevent a gradual shift of the public investments towards segments with sufficient private venture capital, clear investment policies and frequent evaluation of compliance is necessary (Peneder 2008).

Criticism of Public Venture Capital

However, public policy is hard to implement and several caveats limit its applicability. Besides the issue of crowding-out, government involvement can cause detrimental market distortions where parties with vested interests, such as politicians, may alter or exploit the allocation of funding (Lerner 2002).

Furthermore, there are optimal levels of public venture capital funding in single firms. Brander et al study the impact of public venture capital on the success of their investments. By using international company-level data, they study successful exits defined as IPOs or third party acquisitions of the invested enterprises. The study showed that enterprises supported by both private and public venture capital funds outperformed benchmarked enterprises exclusively funded by private venture funds. However, the high performance was only associated with moderate levels of government funding. A high amount of government funding or the government as sole investor was associated with weaker performance (Brander, Du & Hellmann 2010).

In addition, they point to issues with the government crowding out the private venture capital industry, as discussed in the European Investment Bank example above. This criticism is also put forward by other scholars,

who instead point to other measures as being more cost-effective. Florida and Smith (1993) argue that the government is ill-suited to assume the role of a venture capitalist, as evidenced by the, in their view, “disastrous” performance of several earlier public initiatives. Instead, this task should be left up to the market and government measures aimed at providing adequate incentive structures are preferable and less wasteful in resources. Examples of such measures are tax reformation and judicial reforms.

Along the same line of reasoning, Keuschnigg and Nielsen (2001) argue that only cost-effective policies for venture capital can lead to desirable outcomes and thus increase a country’s welfare through increased entrepreneurship and innovation rates. Apart from the issue of information asymmetry, they attribute most failed businesses to poor management practises, and thus recommend government support to the private sector in the shape of entrepreneurial training, technological and informational services, as well as specialised business infrastructure.

Summary of Previous Research

Theory and previous research show that there is a market failure in allocation of capital to companies in early stages. One proposed way to alleviate the market failure is through government involvement in the shape of public venture capital. Researchers have not reached a consensus in all aspects of the matter, but there are some underlying concepts of efficient intervention through public venture capital that most scholars promote.

Positive externalities and the limited saleability of innovation make the funding shortage larger for innovative companies seeking financing. The problem of adverse selection is most severe in the idea stages when the profit potential is hard to estimate, which makes the equity gap most severe in seed and start-up stages. Public venture capital funds should thereby invest in these stages and focus on companies that have innovative products and ideas. Here, the risk of crowding out private investors is also the lowest due to the high perceived risk.

Theoretical reasoning and applied research assert that the public venture capital funds should not act as the sole investor or acquire an exceedingly high stake of ownership when investing. Instead, joint investments between the public and private venture capital funds are optimal. Furthermore, requirements of joint investments from the entrepreneur will counteract the problem of moral hazard and “application experts”.

The investments are in need of competence as well as of capital. Therefore, the public venture capital funds should not only provide capital but also offer competence and business advice to the companies that receive funding. Furthermore, monitoring is important to avoid problems related to moral hazard after the investment.

The public venture capital funds should not be locked into certain regions or sectors. To be successful, the funds should be created on economic rather than political grounds. This implies taking market conditions into consideration by identifying the sectors with the largest growth potential, instead of limiting the potential scope of investments because of local political interests or impacts from lobbying.

Our review of the research landscape leads us to the following five propositions:

1. Funding shortages are most severe for projects and companies in seed and start-up phases
2. Funding shortages are most severe for innovative projects and companies
3. Public venture capital funds should make joint investments with private actors
4. Competence and guidance is needed to make the investments succeed
5. The public investments should be national and general in scope, rather than limited to specific regions and/or industries

In the Method section we will now proceed to outline how these propositions will be tested and consequently applied to the Swedish market using empirical evidence.

Method

Principal Method

As explained in the Purpose and Methodology section, the fundamental approach used in this paper is testing the prevailing theory by using empirical findings and applying the evaluation to public policy in Sweden. This implies that a theoretical framework is formed in order to establish what the current state of knowledge is. Thus, we gain an understanding of the subject, avoid merely replicating earlier studies and produce a testable basis for our analysis.

Consequently, this theoretical framework is compared to the empirical findings that we make in the area that the theory relates to. This deductive method relates to the purpose at hand, to compare theory and practise and in the analysis seek out potential dissonance between the two, which in turn can be applied and incorporated in contemporary theories and further research.

The Analytical Process

This is done firstly by gathering and comparing secondary data to generate an academically founded theoretical overview of the subject at hand, namely public venture capital and its implementation. Drawing on theory, we seek out the rationale for such publicly managed programmes. The thesis has a qualitative approach as interviews are conducted with the purpose to make up our primary data. The underlying interview guide is provided in Appendix A – Interview Guide. Even though the interviews were semi-structured and somewhat adapted according to the specific interviewees, it provides a good reference for the questions that were discussed in the empirical process.

As Seidman (1997) states, a conventional way of presenting and analysing qualitative data is to organise the findings into categories. This process of argument classification is central to our later analysis, and the tabulation itself is provided in the Appendix B – Tabulation of Interview Responses section in order to allow for tracing of the argumentation in the analysis. Applying Seidman's framework, we look towards fundamental findings and commonalities in theories for optimal policy as well as areas of urgency with regard to a need for government intervention, rather than going into specific strands of research. This “dialectical” process leads to a synthesis of empirical data and our evaluation thereof, i.e. our conclusion. It is precisely this process that constitutes the testing of the presented theoretical framework. In other words, the interviews are used as a measurement by which theory tested for plausibility and consequently evaluated.

Reasons for highlighting particular responses in our analysis may occasionally be other than that they merely support each other mutually and constitute a connective thread of reasoning. Further, he put forward that certain arguments carry particular importance for the subject at hand and through their deviation from other responses pose an informed criticism. Accordingly, we raise several points that fall outside the given theoretical framework, yet inside our delimitation – in other words, we present areas relevant for our purpose that justify further research. We present them in the section Findings Beyond Current Theory.

Thus, we aim to test the core of prevailing theory; both its rationale and implications. In order to conduct this analysis, we gather empirical findings by conducting interviews with representatives from the bulk of the influential actors in the field of Swedish public venture capital.

Data Collection

Primary/Empirical Data

Rather than conducting database research and gathering quantitative data on public venture capital-investments, we choose to make qualitative, in-depth interviews with practitioners in the field. The reason lies in part with the rationale for government intervention; namely the pursuit of socially beneficial technologies and innovation and the fact that these aspects are hard to quantify and thereby to evaluate by using statistical measures.

A statistical evaluation of the public venture capital funds' performances may have been possible, but this would not have made a contribution to our purpose. A data analysis could show which public funds have realised high returns and which ones that are experiencing losses, but the purpose of the funds is not to generate high profits, but to make a contribution to societal welfare. A potential problem is also the difficulty in establishing how much the public funds crowd out private ones and what the net social benefit is in those cases. Furthermore, the lack of time series data due to most of the funds being relatively new would have been problematic.

A meaningful analysis is instead enabled by the use of qualitative data gathered in interviews. Even though they are used as a method of gathering data, they are not used in an explorative sense as expert interviews, since our mapping of the subject already took place in the preceding section. Instead, the interviews make up our empirical foundation. As they are semi-structured, we pose both formalised and open questions that are of descriptive and explanatory nature. The interviews are also adjusted slightly to the individual respondents. Overall, the chosen structure enables us to gain an understanding of how the interviewees perceive the issue of public involvement and how they evaluate current policy in Sweden with regard to their role and past experiences.

The interview objects are chosen in a manner that can best be described as a mix between what Miles and Huberman (1994) call "theory based" and "stratified purposeful". The choices are theory based, as theoretical rationale for public intervention in the market is used to identify meaningful respondents, but also stratified purposeful because distinct perspectives from different actors are sought after – specifically five different perspectives of the Swedish venture capital market. The CEOs for the different public venture capital funds have insights in and understandings of the operations of the Swedish venture capital market. Representatives from the Ministry of Enterprise, Energy and Communications have a broader view on the Swedish public venture capital and the intentions with its policy formation and operations. The chairmen of the funds represent the link between the owners and the operations, and should have a more strategic approach to the funds operations. Representatives from SVCA and the Confederation of Swedish Enterprise represent the private venture capital actors' interests and views on the public venture capital. Finally, Swedish scholars have a more academic view on the Swedish venture capital market.

The findings in the interviews are presented in four categories in the Empirical Findings in the Swedish Venture Capital Market section. The first three categories link into the theoretical conclusions that are the object of this study. The heading Perceptions of Funding Shortages in Sweden relates to propositions 1 and 2, while the heading Interactions with Investments and with Private Markets corresponds to propositions 3 and 4. Lastly, Views on Allocation of Investments links to proposition 5 and Findings Beyond Current Theory presents aspects that are found to be significant for the subject at hand but are not as recurring in current theory.

Limitations of our Method

There are certain limitations associated with our chosen method, which we elaborate on in this section. Important to note is that we make no claim in generating a complete mapping of the theoretical framework with regard to public venture capital. Although we made an attempt to create an informed and academically sound theoretical basis for our study, there is inevitably a limitation in the sheer amount of previous research that was feasible to process and include in the study. Hence, we limited the theoretical research primarily along our delimitation of scope. Additionally, we strived towards identifying recurring notions that were mutually supported by the majority of scholars and thereby warranted particular attention. These notions were summarised and presented in our propositions.

The choice of conducting 18 interviews in total was the result of a trade-off between breadth and depth. Miles and Huberman (1994) point out that a tight design for field research is appropriate when taking on a well-delineated, as they can be used in a “confirmatory” way, i.e. to test and/or extend current theory, and also bring clarity and focus in order to avoid digressions with regard to the subject at hand. We found that fewer interviews would not have enabled us to find significant commonalities or mutually supportive arguments in the responses, while more interviews would inevitably have been at the expense of depth in terms of focus in the analysis of the arguments presented to us. In order to ensure the external validity of our thesis, we will not draw too far-reaching conclusions from our analysis (Material from SSE course 659 2012). However, these 18 interviews did bring a degree of “saturation” in terms of recurring arguments being presented to us, along with interviewees referring to one another in their reasoning and referrals.

As explained in the Purpose and Methodology section, we made the choice to use a qualitative approach, but this also poses a challenge when testing our initial propositions. According to Miles and Huberman (1994), quantitative methods such as econometric regressions have rules for accepting or rejecting hypotheses at their disposal, yet qualitative approaches such as ours inevitably have to rely on evaluations of arguments which cannot be quantified.

In addition, we have internal validity in mind when conducting the interviews themselves (Material from SSE course 659 2012). Care has been taken not to influence the responses by posing leading questions and the interviewees were only sent a summary of the purpose of the thesis in beforehand. Open questions were used in the beginning of the interviews in order to allow for free and spontaneous associations and evaluations on the part of the interviewees. Later, more targeted questions are used to narrow down the discussed themes, and

gradually move towards the main theories discussed in the preceding section. The reason is, as previously mentioned, to enable an analysis that compares theory and praxis. In addition, the notes from the interviews were sent to the respondents afterwards. This was done in order to verify that we understood them correctly and also to give them the opportunity to make additions and clarifications to the interview. Several interviewees made use of this opportunity.

Important to note is that the interviewees are not anonymous. Again, this is a result of a trade-off; in this case between openness and honesty on the part of the interviewees on the one hand and traceability of the analysis on the part of the reader. Some interviewees explicitly asked us not to quote them on certain views they presented to us, which of course hampers the completeness of our empirics and resulting analysis. At the same time, the ability on behalf of the reader to trace the arguments is deemed to contribute to the validity of our findings and thus the conclusions we make.

Miles and Huberman (1994) also point out the importance of contextualisation when analysing interviews. The respondent's history, present situation and conceptions of reality may or may not get woven into their answers. Thus, the results are analysed with respect to the roles and experiences of the interviewees for the purpose of validity in the data and consequent analysis. For instance, CEOs of public venture capital funds are assumed to view and present their existence and operations favourably even though this might not be the case. Public officials in general might not always be prone to evaluate their own performances objectively; at least not until after their employments have ended.

In summary, the choice of method was characterised by trade-offs. Faced with these challenges, the decisions we have been made with internal and external validity in mind in order for our conclusions to carry theoretical significance. Since quantitative decision methods are not available to us when evaluating the propositions, it is all the more essential to have a transparent method that is traceable for the reader of this thesis.

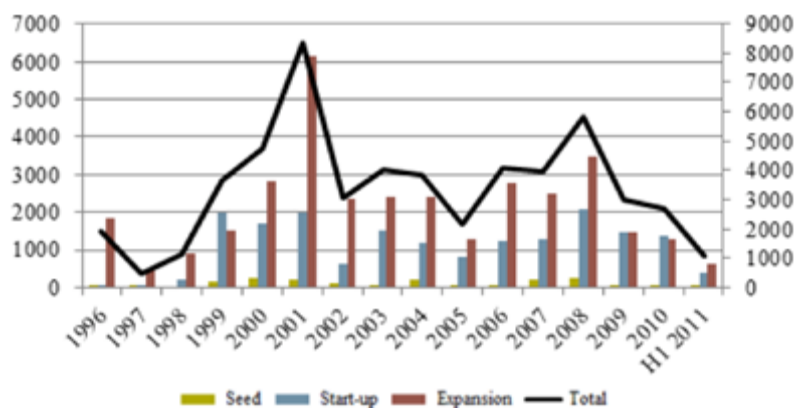
Outline of the Swedish Public Venture Capital Market

Development of the Swedish Venture Capital Market

The Swedish venture capital market emerged in the 1970s and had its first large shakeout at the end of the 1980s, drastically decreasing the number of actors. By government intervention the market rose again in the beginning of the 1990s and in the end of the decade many venture capital funds were created in Sweden as a result of an international venture capital boom.

From 1998 to 2002 the number of venture capital firms tripled, from 50 actors to 150 actors (Isaksson et al. 2004). For most of the funds it went very well, but then the IT-crash came which burnt the venture capital industry. The industry has not recovered yet and today there are only a few private venture capital funds left investing in these earlier stages.²

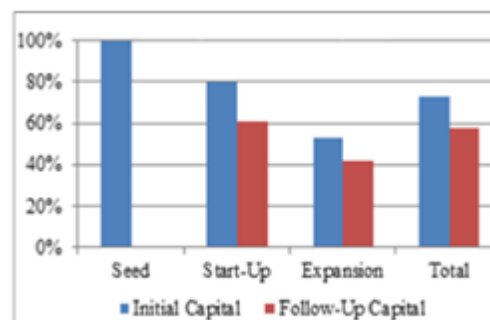
Figure 3 - Venture Capital Investments in Growth Companies



SVCA H1 2011

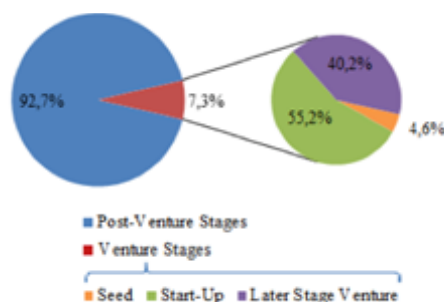
Therefore, the public venture capital today makes up a large share of the investments in early phases in Sweden. SVCA shows data that for the first half of 2011, 73 % of the initial capital and 55 % of the follow-up capital, which was invested in seed, start-up and expansion phases came from public venture capital funds. The public venture capital funds where the only venture capital investors in the seed phase, with a declining share the later the stages. Nevertheless, it is important to pay attention to the fact that the figures only show venture capital investors. Thus it does not take into account other private investors, like business angels, that usually invest in these stages (SVCA 2011b, SVCA 2011c).

Figure 4 - Share of Public Capital in Financing Stages of Growth Companies



SVCA H1 2011

Figure 5 - Fund Stage Focus in Investments



EVCA Yearbook 2011

However, venture capital is only a small part of the Swedish private equity market, where the buyout activities in 2010 made up 74.2 % of the invested capital. Of the venture capital invested, the start-up and later stages makes up the main part and only 4.6% of the venture capital is invested in the seed phases (EVCA 2012b).

² Finding from interview with Per Strömberg, Centennial Professor of Finance and Private Equity, 2012-04-12

Swedish Public Venture Capital Funds

Today there are mainly five large state-owned funds that provide venture capital: Industrifonden, Fouriertransform, Innovationsbron, ALMI Invest and Inlandsinnovation. There also exist a lot of small regional venture capital funds and some national organisations specialising in grants although offering some venture capital. One example is The Swedish Energy Agency, which mainly provides grants to energy projects but also to some extent invests in seed phases.

A historically important player to address in this context is the Sixth AP Fund. The fund is part of the national public pension system and it is the only one of the pension funds that is allowed to invest directly in unlisted companies. With a capital base of 19.9 billion SEK, it has historically been an important investor by partial investing in small and medium sized Swedish growth companies. On the other hand, the aim of the fund has not been to solve the market failure but to create high, long-term returns to the pension savers. As a new strategy are being implemented where the fund from now on will concentrate more on investments in mature companies, the fund has lost its importance in the context of solving the prevalent market failure and will thus not be part of further analysis (Sjätte AP-fonden Annual Report 2010, Sjätte AP-fonden Homepage 2012). We therefore turn to a description of the key features of the most important Swedish public venture capital funds in Sweden.

Industrifonden

Industrifonden is a foundation created in 1979 by the Swedish government and is Sweden's largest investor in small growth companies. The fund offers technical- and business competence, capital as well as access to their network to small and medium sized Swedish companies with international growth potential. The companies can have no more than 250 employees and maximum revenue of 400 million SEK. They look for companies with strong management, a unique business idea and prospects of international growth.

Investments are carried out nationally through their own investment offices and partly owned venture capital firms. The assessment of potential investment objects is done in cooperation with other investors and occasionally, outside experts is brought in for additional expertise. Almost all investments are done together with entrepreneurs and co-investors, although in some cases the fund can go in as the sole investor. Industrifonden acts as an active minority investor and strives for an ownership interest of 15-50%. The active ownership is exercised by having investments managers on the board that contribute with their expertise and network.

The fund provides capital for two different phases; the development phase and the expansion phase. The firms in the development phase are technology companies in the late start-up phase that need funding for product developments. The investments in the expansion phase are made in companies that already have developed products and sales, but need additional funding to be able to grow.

Industrifonden aims to yield a return on own capital in excess of the five-year government bond yield over an investment cycle. The fund receives no further funding from the government and thus operates on a commercial basis. All the returns are reinvested in new projects and it should at least hold its capital intact in real terms.

The fund has access to 3.8 billion SEK of which 1.4 billion SEK is invested in over 90 companies. The fund mainly invests through equity, although it also provides loans and guarantees. The investments in each company ranges from 5-100 million SEK, even though no single investment are allowed to exceed 5% of the total managed assets. The investments are usually provided in steps, which means that the initial investment may be less than 5 million SEK. All investments are time-limited and the exits are decided form case to case, although it often occurs 5 to 10 years after the initial investment (Industrifonden Annual Report 2010/2011, Industrifonden Homepage 2012).

Fouriertransform

Fouriertransform was founded in 2009 by the state and the purpose of the fund is to invest in commercialisable R&D projects in the automotive cluster, with the aim of strengthening the competitiveness of the Swedish automobile industry. The fund is allowed to invest in companies ranging from early phases to mature phases. It also sees an important future role in supporting restructurings and spin-offs of companies in growth and mature phases.

Investments are made in innovative products or services that have high growth potential - both domestically and internationally. The investments are restricted to the automotive sector and aim to be linked to Sweden through production or research. In addition to capital, the fund also provides competence by having representatives on the boards, as well as through its existing network in the automotive sector.

The fund currently manages 3 billion SEK and had by the end of December 2011 made investments of 491 million SEK in 13 companies, with each individual investment ranging from 7 to 103 million. Further, Fouriertransform acts as a minority investor and has a maximum ownership interest of 49%. In addition, the investments should not exceed 5% of the fund's total capital, hence 150 million SEK.

The goal of the fund is to become a long-term partner and operate on a commercial basis with an annual return of 10-15%. The investments have a long-term horizon without any fixed time limits. However, the fund focuses on investments with a time frame of 3 to 8 years (Fouriertransform Annual Report 2011, Fouriertransform Operations Report 2011, Fouriertransform Homepage 2012).

Innovationsbron

Innovationsbron started 2005 with the mission of increasing the commercialisation and utilisation of the resources that Sweden invests in R&D and knowledge creation. The fund is owned to 83.7% by the state and 16.3% by Industrifonden. The government's aim of the fund is to strengthen the Swedish business sector's competitiveness, strive for sustainable growth and to offer competence and capital for development and commercialisation of knowledge-intensive ideas. There is no required return as the Articles of Association explicitly say that Innovationsbron's activities should not create profits to the owners. Furthermore, the fund should concentrate on projects in very early development stages.

The investments have high growth potential but the time to the market is long and risky. There is a requirement of innovation, the fund only supports companies that during one of the last three years have had R&D expenditures with a share of at least 15% of the total costs. At the end of 2010, the fund had holdings in 125 companies and a capital stock of 300-400 million SEK. The initial investment can amount to a maximum of 2.5 million SEK with total investment of maximum 1 million Euros and the ownership share range between 10-49%. For the period of 2011-2014, Innovationsbron will obtain 60 million SEK of state funding per year.

A regional investment committee takes the decision of investment. Close work together with national and regional partners is considered a sufficient condition for Innovationsbron's operations. Usually, the investment is shared with co-investors, although occasionally Innovationsbron goes in as the sole investor. In addition to capital, the fund develops and complements the existing teams and boards in the companies. An analysis from 2010 shows that for every SEK Innovationsbron invested in new companies, it resulted in an additional 1.5 SEK from external investors and for every additional SEK invested in existing portfolio companies it resulted in an additional 7 SEK from external investors.

The fund also provides loans for early stage technology developments and supports incubations; entrepreneurial environments where start-up companies get help with development of their business as financing is complemented with business competence (Innovationsbron Ownership Directions 2011, Innovationsbron Annual Report 2010, Innovationsbron Homepage 2012).

ALMI Invest

ALMI Invest was founded 2009 by ALMI Företagspartner together with regional investors and was founded as a response to the European Regional Development Fund (ERDF). Half of the capital comes from the ERDF and the rest is provided by the parent company ALMI Företagspartner and regional investors. The capital that not has been invested by the end of 2014 need to be sent back to ERDF.³

The aim is to invest in small companies that have gone through the early establishment phase and are now in the expansion phase. Thus, the aim is not to invest in start-up companies. However, 90% of the investment objects have been in the early expansion phase and 12% of those have actually been in the start-up phase. Thus, even if it is not the preliminary aim, a substantial amount of the investments are provided to start-up companies.

ALMI Invest consists of seven regionally based venture capital funds and currently manages 1 billion SEK. In 2010, the fund invested totally 136 million SEK in 49 companies. For every 1 SEK invested, an additional 1.5 SEK was invested by external investors yielding total investments of approximately 340 million SEK. The fund not only provides financing but also competence and access to their network. ALMI Invest prefers to find competent people in their network to represent them on the board, rather than to have their own investment managers on the board.

³ Finding from interview with Jan Bengtson, CEO ALMI Invest, 2012-04-17

The fund can invest in most industries as long as the investment object has the opportunity of long-term growth. The initial investment usually range between 2-4 million SEK, although after following up investments, a maximum of 10 million SEK can be invested in each portfolio company. ALMI Invest requires that private investors, venture capital funds or business angels invest at least as much as they in both initial investment and in additional rounds of investments (ALMI Företagspartner Annual Report 2010, ALMI Invest Homepage 2012).

Inlandsinnovation

In December 2010 the government decided to create Inlandsinnovation with the aim to increase the supply of risk willing financing in the north of Sweden's inland and to generate growth and development in the region. The fund will have a relatively small own administration that works together with existing public and private actors. The investments should vary in size and range from early stages to more mature stages. The fund plans to invest in all industries as long as it is in the geographically restricted area.

The fund manages 2 billion SEK and should be able to invest in projects with longer horizons and commitments where other investors cannot take on the whole arrangements themselves. The operations started under the second half of 2011 and the fund is still in a start-up phase. The fund recently did its first three investments with a total value of 8 million SEK (2-3 million SEK per investment). All of the investments had an innovative profile and they range from the early phase to the expansion phase. The fund intends to use multistage investments and not to take an ownership share over 30%.⁴

The fund works on commercial grounds with direct and indirect investments in companies and innovation projects, thus Inlandsinnovation also offers loans. The required return should according to the parliamentary letter be flexible as the return is expected to follow the inflation and interest rate fluctuations (Inlandsinnovation Homepage 2012, Inlandsinnovation Annual Report 2011).

⁴ Finding from interview with Jan Nylander, vice CEO, 2012-04-10

Table 1 - Summary of the Key Facts of the Swedish Public Venture Capital Funds

	Industrifonden	Fouriertransform	Innovationsbron	ALMI Invest	Inlandsinnovation
Year of inception	1979	2009	2005	2009	2010
Ownership structure	Foundation	Owned by the state	83.7 % owned by state, 16,3% by Industrifonden	Owned by the state through ALMI Företagspartner	Owned by the state
Capital stock (million)	3800	3000	300-400	1000	2000
Investment size (million)	5-100	7-103	2.5 with follow-up max 1M€	2-4 with follow-up 10	-
Investment phases	Late start-up to expansion	Start-up to mature	Seed and start-up	Late start-up to early expansion	Start-up to expansion
Ownership share	15-50 %	Max 49 %	10-49 %	Max 50 %	Max 30 %
Requires private co-investments	Preferable	No	No	Yes, at least 1:1	No
Required return	5 year government bond yield	10-15 %	No	Yes, 2 %, corresponding to inflation	Yes, flexible
Requirement of innovation	No	No	Yes	No	No

Empirical Findings in the Swedish Venture Capital Market

Interviewees

Table 2 - Interview Objects and Their Roles

Name	Employer	Role	Specialities and Selected Experience
Bengtsson, Jan	ALMI Invest	CEO	<ul style="list-style-type: none"> Former CFO at AU-System
Brogren, Charlotte	Vinnova Industrifonden	General Director Chairman	<ul style="list-style-type: none"> Rod Manager at ABB
Ehn, Sven	Kvadrat AB	Management consultant	<ul style="list-style-type: none"> Former CEO at Innovationsbron Öst Former Chairman at Västervik Invest Former Board member at Iteksa
de Neergaard, Claes	Industrifonden	CEO	<ul style="list-style-type: none"> Board member of SVCA Board member of Innovationsbron Chairman of Connect Sweden Former Executive Director at the European Investment Bank
Görnerup, Emil	Svenskt Näringsliv	Senior advisor	<ul style="list-style-type: none"> Responsible for research and innovation policy
Holm, Sven-Thore	LundaVision AB	CEO	<ul style="list-style-type: none"> Former Chairman at Venture Cup Syd Former CEO at Innovationsbron Syd
Hultstrand, Stefan	Ernst & Young	Partner	<ul style="list-style-type: none"> Accountant for Innovationsbron Specialised in entrepreneurial companies
Löf, Annie	Government of Sweden	Minister for Enterprise and Regional Affairs	<ul style="list-style-type: none"> Member of the Swedish Parliament Chairman of the Swedish Centre Party
Nordberg, Per	Fouriertransform	CEO	<ul style="list-style-type: none"> Former CFO at Sandvik Former Vice President of Finance at Atlas Copco
Nylander, Jan	Inlandsinnovation	Vice CEO	<ul style="list-style-type: none"> CEO of Innovationsbron during the start-up and later responsible for the strategic development Responsible for the incubator programme at Vinnova CEO of the incubator services at SSE
Rodny, Jonas	Swedish Venture Capital Association (SVCA)	Head of Communication	<ul style="list-style-type: none"> Former Communications Manager at IK Investment Partners Former Head of European Communications at NASDAQ OMX
Seddigh, Akbar	Innovationsbron	Chairman	<ul style="list-style-type: none"> Chairman of Elekta Chairman of SwedenBIO Chairman of Blekinge Institute of Technology

Skoogberg, Ylva	Swedish Ministry of Enterprise, Energy and Communications	Political Advisor in Entrepreneurship and Market Regulations for the Minister for Enterprise	<ul style="list-style-type: none"> ▪ Political Advisor at Centerpartiet (Swedish Centre Party) ▪ Specialist at AS3Companies
Strömberg, Per	Stockholm School of Economics	Centennial Professor of Finance and Private Equity	<ul style="list-style-type: none"> ▪ Director at the Swedish House of Finance ▪ Vice-Chairman at the Sixth AP Fund ▪ Former Member of the Scientific Advisory Board of Finansinspektionen (Swedish Financial Supervisory Authority)
Strömbäck, Peter	Innovationsbron	CEO	<ul style="list-style-type: none"> ▪ Former Deputy Director-General at the Swedish Ministry for Enterprise, Energy and Employment
Svensson, Roger	Institutet för Näringslivsforskning	Docent	<ul style="list-style-type: none"> ▪ Specialised in innovation technology
Talborn, Henrik	Swedish Venture Capital Association (SVCA)	Chief Economist	<ul style="list-style-type: none"> ▪ Proprietary Trader and Strategist at Erik Penser Bankaktiebolag ▪ Proprietary Trader and Strategist at Handelsbanken Capital Markets
Zetterberg, Leif	Inlandsinnovation	Chairman	<ul style="list-style-type: none"> ▪ Former Secretary of State ▪ Former Political Advisor to the Prime Minister's Office ▪ Former CEO of Federation of Swedish Farmers

Perceptions of Funding Shortages in Sweden

Reasons for Capital Shortages in the Swedish Market

Nylander points to lack of capital for companies in early stages, as few private actors have own money to invest in these stages and the venture capital funds invest in later stages where the risk is lower. For the private venture capital funds it is as costly, or even sometimes more costly, with regard to time, research cost, management etc. to do a small investment in early stages as to do a large one in later stages leading to preferences for large investments and late stages. Furthermore, the management cost per invested SEK is high for small investments, thus the return would need to be higher for the investment to be profitable. High return is hard in early stages with small amounts of investments. The combination of high costs, large risk and long time horizons shift focus from early to late stages for the private venture capital funds.

Strömberg also argues that there is a gap in financing in early stages and further adds that the state should fill it. There are many reasons for the funding shortage: In Sweden we have a small wealth accumulation, which makes it hard for the entrepreneurs to do self-investments. The Swedish venture capital market has during the last years also significantly decreased. During the nineties the venture capital market bloomed, there were hundreds of private venture capital firms in Sweden, although when the IT bubble broke most funds left the market. There is also a problem with the investments having a long time horizon, for example Life science it can take ten years before the product reach the market. Since most private venture capital funds have a life of ten years it do not work to invest in these sectors. Furthermore, the investments in early stage are usually too small to be profitable

for the private venture capital funds to have efficient impact; an investment manager cannot be active in too many companies. The institutional investors have also become larger and for them it is not cost efficient to invest in the venture capital funds since the sums needed usually are relatively small.

Rodny follows the same line and argues that there are historical reasons behind the equity gap. The private venture capital funds in Sweden have decreased from 150-200 actors in 2000 to 5-10 actors today. The remaining actors invest in later stages, as they are concerned about the risk. There is a gap between angel investors and private venture capital actors, called "The Valley of Death", where the financing does not work well. Therefore public entities act to bridge this gap. He further argues that even if public funds experience financial losses, the intervention can be seen as economically beneficial because of the jobs and tax revenues that are realised.

Seddigh also sees a historical reason for the lack of capital: the first venture capital companies, which were founded in the 80s by financial actors without industrial skills, led to major failures in the 90s and the funds that survived chose to go to later stages where the risk is lower. In the last 15 years, the number of active venture capital firms has declined, and the remaining ones have shifted their focus to later phases. This in part explains why there is a vacuum in capital accumulation for early phases in Sweden today.

Challenges in Early Stage Financing

Löf claims that the private venture capital in Sweden is relatively risk averse, which makes the public venture capital an important complement in early phases and seed financing where the risk is difficult to assess and the time horizon to positive returns are long. There are socioeconomically values in this activity since support to innovation and development gives returns outside the individual investment or company. The public venture capital should complement the market and only act where the private financing is missing or insufficient. There are also other reasons for why the private financing market needs to be complemented; for example that the supply of capital varies between regions and with business cycles. The ambition of the government today is to move away from grants to more venture capital, since companies that succeed pay back the public capital.

Seddigh confirms that there is a shortage of capital for companies in early stages today, but claims that the availability also differs with different types of businesses. For Life science, there is a large capital shortage. However, there is more capital available for ICT, since the investment horizon is shorter. The government should be in early stages where it today is not and the funding shortage is the largest until the product is ready for market introduction. However, it is important to create a full chain of financing for the companies, since it otherwise is not worth to invest in the earliest phases. Talborn follows the same reasoning and says that it is necessary for all financing stages to work, so public intervention is needed where private short-sightedness leads to funding gaps. Structures are needed to stimulate the provision of capital, where a chain of financing is created.

Skoogberg claims that the Swedish venture capital market is not perfect, as the venture capital is risk averse. There is a lack of capital for companies in early stages, i.e. seed and start-up. This funding gap is partly due to

the financial crisis in the late nineties. The venture capital market was hit hard by the IT bubble and has not recovered yet. The government's role here is to complement the private market. Additionally, Brogren claims that the public venture capital funds are needed to complement the market. She further claims that there exists capital today, but there is lack of risk willing capital. There is high risk in the early phases and there is also there the scarcity of capital is the largest.

Svensson, on his part, sees a clear shortage of capital in early stages, especially for innovative projects. The reason is that there is a principally higher risk the earlier the investment phase. Government intervention should be seen as financing, rather than long-term business activity. The reason for this need for intervention is asymmetric information in the market regarding the potential of the ideas and innovations, and high fixed costs that require large investments for realising any profitability that these ideas may bring with them. Görnerup follows the same line of reasoning and sees a lack of capital for companies in early stages in Sweden today. The government should be where there are no private actors that satisfy the need for capital.

Ehn argues that there is a funding shortage in the seed and start-up phases and that even more capital than what is offered today by the public venture capital funds are needed in these phases. He also sees an issue with the transition in later stages from public to private venture capital investments. Private risk perceptions, and thus demands for returns, are much higher than those of public funds, which pose an obstacle to commercialisation of ideas and innovations.

Zetterberg claims that companies are often failing between the start and the expansion due to funding shortage. Therefore deductions and other incentives are needed to promote growth. There are regional differences in the shortage of capital and the problem of insufficient investments in certain regions is largely psychological. For example, the business potential in Norrland is not exploited by the private market. There are significant resources, but most actors focus on other parts of Sweden out of tradition. The public fund Inlandsinnovation, however, allows these business opportunities to be realised.

Expansion Phases, Competence and Time Horizons

Bengtsson, on the other hand, argues that in the absolute earliest stages there is no capital shortage and here venture capital is not optimal but rather loans are. Private venture capitalist has left the early stages and there is a funding shortage, especially in the expansion phase but also in the phases before and after. However, he argues that it is important not only to analyse the Swedish market in stages, but also in regions. Some regions have excess of capital but too few entrepreneurs, like the north of Sweden.

De Neergaard claims that the public system has sufficient resources for meaningful intervention but that there is no clear indication of insufficient capital in early stages for Swedish companies. Rather, the issue is finding competent management for later stages in investment projects. However, there is general shortage of capital for Life science, energy and media technology due to the long investment horizons and large fixed costs.

Similarly, Nordberg does not agree with what he sees as the current predominant view – namely that there is a shortage of capital in companies' early stages. There are plenty of actors ready to provide financing and the problem is instead that projects lack focus and adequate management in early stages. If there is not proper leadership and project focus, new ideas cannot be made attractive to investors. Yet he also sees a rationale for public venture capital as it today are a great risk aversion among the private venture capital funds, making them invest in later stages. Public capital is needed for restructuring processes and investments with long horizons, which are not taken care of by the private investors.

Along the same lines of reasoning, Strömbäck describes early project stages to be in much more need of competence than capital. Government intervention should not be needed in principal, and should only act as a complement to the private market with its funds. He sees the discussion of capital shortage for early stages as exaggerated, and an increase of Innovationsbron's total yearly capital from 200 million to 350-400 million would be enough. Rather, there seems to be a need for increased investments in companies' expansion phases, since private actors have gradually been leaving this area.

Hultstrand sees that the long time horizon from an idea to positive cash flows makes the private venture capital funds invest in later stages, which gives the government the given role of supporting the companies in the early stages. He also sees transitioning as a central challenge and that the problem lies in connecting researchers and innovators with venture capitalists. This matchmaking, rather than capital, is the main shortcoming in the Swedish market. The innovators often claims that there are lack of capital, but there are rather lack of competence and the capability of presenting the idea in a good way.

Holm also points out the high risk as a source for capital shortage in early stages. In general, it is hard to attract financing for inexperienced innovation companies. The reason is that private investors are looking to maximise profits and thus shun early, high-risk investments. There is, however, also lack of industrial competence when it comes to analysing potential investments. Therefore the risk is perceived as higher and attractive investments are bypassed. Rodney follows the same line of reasoning and claims that it is extra hard for complex ideas to gain financing.

Ehn also argues that the funding situation looks somewhat different for innovative companies since new technology is hard and costly to secure in the seed phase but it is absolutely necessary. However, when receiving a patent the product is better protected than the non-innovative products. There is also a risk of getting stuck in early phases and work with product development rather than taking the product to the market, however it is more due to actors than the idea itself.

Interactions with Investments and with Private Markets

Opinions on Joint Investments

Brogren claims that the public venture capital should be used to attract private capital to investments. Therefore it is important to move over a scale and to adjust the investments with consideration to the situation. Public venture capital funds can lower the risk for the private actors and also act as a quality indicator of the investment.

Svensson promotes that joint investments with private actors should be a requirement for the public venture capital funds. A lower requirement can be justified in the earliest stages. With co-investments the private actors will also contribute with their knowledge, this is good since he advises against having the government as an advisor.

Skoogberg claims that private co-investments are always desirable and that the government never should be the only investor. Bengtsson points to that by demanding co-investments the risk of crowding out is effectively prevented. However, he brings up that it can be hard to find co-investors especially as other public actors usually not are counted as legitimate co-investors.

According to de Neergaard, Industrifonden tries to do joint investments with private actors, although it has become harder to find co-investors, especially other private venture capital funds. Today 46 % of the co-investors are not private venture capital funds.

Strömbäck, on the other hand, claims that requirements of joint investments are typically not needed, for every SEK Innovationsbron invests, private actors usually spontaneously invest 3.5 SEK. The requirements can also be problematic, when Innovationsbron tries to pass over on an investment to another public venture capital fund with requirements of co-investments the regulations often require that 50 % comes from new private actors, which discriminates the private investors that have been investing from the beginning.

The Importance of Competence

Strömbäck claims that in the earliest phases the availability of competence and not capital is the most critical. Hultstrand follows the same reasoning by arguing that not only capital but also competence are needed for the investments and that these to a great extent are linked. This as the innovators often has limited management competence. He further claims that the greatest challenge for the public venture capital funds is to make sure that they offer the right competences. There need to be people in the funds that understands the different markets and also understands the researchers. Today the public venture capital funds are not always structured effectively and there is a risk that capital rather than competence is offered.

Zetterberg also points to the importance of building a network with competent people with academic or business backgrounds that can support and develop the investments. The network should also include private investors like business angels. Brogren brings up the problematic situation of the investments great need of competence

and coaching, although they usually cannot afford to offer high compensations to the board members. More industry leaders would need to be active in the boards of these growth companies.

Furthermore, it is, according to Seddigh, important to notice that the capital only is a small part of the success for an investment; a company's success depends to 20 % on funding and to 80 % on competence. In this setting the incubators have an important role. Nylander follows the same line of reasoning and claims that the companies that perform poorly are often the ones with management problems. In these situations it is often hard but necessary for the entrepreneur to leave the position as CEO to someone better suited for the role.

Ehn claims that the problem lies in that the entrepreneur is not an ideal businessman. When the product is in the start-up phase and is going to be introduced to the market competence is of great importance. Here it is important that the venture capital funds put in competent people in leading positions. With better businessmen in the company the development will be better and the return higher.

Holm points to that exit strategies for the entrepreneurs are needed, as they often are not suitable to lead the operations in later stages. He sees that the biggest challenge in making the companies successful is lack of good management rather than capital. The success of a company is often mirrored by the composition of the board; a problem is that the entrepreneurs and its relatives remain at the board due to majority ownership.

Svensson also claims that the entrepreneur often does not have the right competences and that it therefore is good to pass over the decision power to a new management. Although the incentive structure in the contracts need to be designed so that the entrepreneur will still work hard after the pass over.

Views on Allocation of Investments

Regarding the total amount of disposable funds in the public venture capital system, Strömbäck claims that the 17 billion SEK presently available for investments are enough. However, these resources are not allocated correctly. They are often bound to certain regions or sectors, which is suboptimal. Instead, industrial competence is needed in combination with a wide investment scope, geographically and industry-wise.

Likewise, de Neergaard argues that the government should not tie capital to specific areas or industries, although it is important not to discriminate, so that capital is free to finance the best projects, independent of region. In addition, sector competence is needed together with the investments. Bengtsson follows the same line of reasoning and says that the demand for financing should determine the allocation of capital; it should not be tied to certain regions or sectors for political reasons like it is today, to a certain extent.

Strömberg acknowledges that there is a tendency of public venture capital funds to be limited in their investment scope, like Fouriertransform and Inlandsinnovation, but points out that the funds should instead have a broader investment scope. Ehn also claims that it is not good when funds are created as responses to unemployment or other crises; the government should instead focus on successful sectors and regions. Nylander also points out

capital that is locked into certain regions or sectors as problematic. Brogren maintains that it is better in the long run with free capital than capital that is bound to certain regions or sectors in this context.

Similarly, Seddigh argues that the capital should not be tied to a specific region or industry, although it is preferable that investment managers possess industrial competence. Fouriertransform is already in a mature and crowded industry and Inlandsinnovation is politically motivated decision - before it was created, officials should have analysed the real demand for capital in the region. He states that you cannot direct innovation. Innovationsbron has become more successful since they went from being regionally driven to being structured with a focus on four industrial clusters.

Svensson sees regionally limited funds as suboptimal since the capital is not used where it makes the largest difference. The capital should instead be invested in regions with high growth potential, which will also attract private investors. Inlandsinnovation should be discontinued since it invests in an unattractive area with low growth potential. Furthermore, sector-specific capital like Fouriertransform is not good since such funds tend to crowd out private investors.

Rodny argues that regional and industry-specific funds are not optimal, and politically rather than theoretically motivated. However, it may be socially beneficial when job creation and tax revenues are taken into account. Along the same line of reasoning, Hultstrand says that when structuring the public venture capital funds, national rather than regional and local interests should be in focus. However, with regionally restricted funds local and regional engagement can be created which can have other positive consequences that can be hard to measure.

Nordberg, on the other hand, says he supports sector-specialised investments since it leads to better selection due to better understanding of the investment opportunity and thus a lower risk of rejecting good investments. Zetterberg challenges SVCAs view that it is not meaningful to have regional limitations on the funds and instead claims that it is just as meaningful as having a sector focus; it is just another way to develop an understanding for potential investment opportunities.

Löf claims that the government should be active and strive to solve market failures, which the Department of Enterprise, Energy and Communication perceives exists in the venture capital market. The regional and sector limited funds Inlandsinnovation and Fouriertransform were created so that companies in the north of Sweden and companies in the automotive cluster could get a supply of public financing, instead of grants. Skoogberg follows the same line of reasoning and says that although the public actors have been criticised for being political in their structure, there is a political task of filling voids left by the private market, such as the case of Norrland and Inlandsinnovation. The reason is that there is not perfect information on the Swedish market, which makes it flawed in its functioning.

Findings Beyond Current Theory

In this section we raise arguments found in our empirical studies, which have not been thoroughly discussed in previous research but are still deemed relevant with regard to the subject of this thesis.

Exit Market

Bengtsson claims that it is hard today for investors to terminate their investments, since Sweden does not have a well-functioning exit market. Therefore, companies need to grow mainly on their own. One of the main reasons for the funding shortage is thereby the lack of a working exit market. The Swedish market does not, like the American market for example, have a tradition of larger enterprises buying small firms that they see potential in.

Rodny also points out the lack of a well-functioning exit market in Sweden as an obstacle for complex or non-traditional innovations to attract financing. In the US, there are more potential recipients in later stages, which enables present investors to withdraw. This uncertainty in terms of disposal of investments causes a reluctance to invest in otherwise attractive projects out of a fear of “getting stuck” as the owner.

Cultural and Environmental Aspects

Görnerup claims that public venture capital funds tend to invest smaller sums in more companies, which leads to a less active ownership and weaker governing. Today, there is a large focus on increasing the recourses for research. However, there are already sufficient resources and instead, it is important to focus on incentives and to create driving forces. At present, it is not viewed as prestigious for a researcher to work together with a company; instead, the number of citations and publications is what counts.

Rodny proposes that the lack of capital could possibly be attributed to cultural aspects - in Sweden, inventions are often refined at the cost of commercialisation, while the U.S. has a more commercial focus. In addition, self-employment is seen more favourably in the U.S. than in Sweden.

Lööf states that there is lack of knowledge within banks regarding the possibility of public venture capital funds complementing their loans. The problem exists at a local level, and increased knowledge about public venture capital at bank offices could improve the efficiency of the money lent out. More collaboration between the banks and the public funds would be desirable, and it is mainly information that poses an issue for the Department of Enterprise, Energy and Communication to work with.

Skoogberg mirrors this thought and points to a need for increasing public awareness of the availability of government funding and investment. For example, not all banks know that loans can be combined with public capital, which means that the loans become more favourable.

Administration and Structuring of the Public Funds

Zetterberg points out that the government needs to structure the public venture programmes into fewer actors in order to make the financing chain function better. The Ministry of Enterprise, Energy and Communications need to work as a leader for all the public venture capital funds, but today the staff mostly consists of lawyers and economists that do not have sufficient technological knowledge. Strömbäck also points to the structure of the Swedish public venture capital landscape as fragmented and in need of simplification, since there are too many actors that make it hard to coordinate. Holm says that venture capital funds should not be too small since the effect on the market will be questionable and most of the capital will be used to pay management fees.

As a government representative, Skoogberg accordingly points out that the aim is to coordinate as much of the public venture capital as possible. ALMI and Innovationsbron will be merged, which will enable the resulting fund to take advantage of ALMI's nationwide structure and Innovationsbron's incubator operations and industry-specific knowledge.

Ehn points out that the government should make strive for a full chain throughout the financing stages without gaps or overlaps. As long as there are gaps more capital in early phases will not help. One should start with increasing capital in the seed phases and then move on to later stages with the investments. Clear owner directives are of great importance, and they should be in line with the aim of the fund, so that a drift in operations is minimised.

Analysis

As explained in the Purpose and Methodology section, our analysis aims to evaluate the fundamentals of prevailing theory presented in our propositions by using our empirical findings. As they are qualitative in their nature, we look for common traits in the arguments that have been presented to us, rather than raise every aspect discussed by the interviewees. Inevitably, we make assessments of the arguments and their relevance, but this is done with respect to our purpose at hand, and the theoretical framework presented earlier.

An illustrative overview of the empirical findings, presented according to the sections in this analysis, can be found in Appendix B – Tabulation of Interview Responses. There, the central viewpoints of the interviewees are tabulated so that the reasoning in the following analysis can be easily traced to the empirics and thus better understood by the reader.

Funding Shortages in Seed and Start-Up Phases

Theory puts forward that the funding shortages are most severe for projects and companies in seed and start-up phases. This is supported by most of our empirical findings and seems to be the case also in the Swedish market. The reason for the funding shortage is by theory attributed to the existence of asymmetric information that is said to be most severe in early stages. The concept or project has not proven itself on the market in terms of growth or profitability potential and thus, possible financiers perceive a high risk and they either demand exceedingly high return or pass on the investment opportunity entirely (Peneder 2008, Hubbard 1998).

The interviewed actors on the Swedish venture capital market agree that high-perceived risk levels play an important part of the capital shortage. They also put forward historical reasons for the capital shortage - the bursting of the IT bubble radically decreased the number of private venture capital funds in the Swedish market and increased the risk aversion among the few venture capital investors that survived. Current theory does not fully provide guidance in understanding this aspect of the imperfect functioning of the Swedish market. The historical reasons make, according to some actors, the funding shortage extend all the way up to the expansion phase, which also goes beyond the scope of the theoretical elaboration of this issue.

Thus, although theory is applicable to some extent, it fails to acknowledge the important issue of the current market structure and the underpinnings of this structure. Even as the underlying reason of the funding shortage is the issue of asymmetric information and high risk, other factors play an important part in the market. Peneder, one of the most frequently cited scholars in the subject of promotion of innovation, does not take this into account in his theory. As historical factors to a large extent affect the dynamic evolution of the financing market, theory should include them in order to increase applicability in specific contexts.

Furthermore, besides the historical aspects, the actors perceive there to be gaps between the stages themselves, which poses an obstacle to efficient transitioning of ownership and a functioning chain of financing. According to the respondents, the aim should not only be to stimulate capital flows in certain stages, but also to make sure

that the transition between these stages functions properly. Theory does not adequately address the urgency for adequate matching of projects and financiers throughout the system. This focus on infrastructure and partner matching seems to be needed beyond a mere influx of capital to early stages, which is however what theory mainly promotes in the area of early stage financing issues. As gaps in financing chains appear to hamper a functioning deal flow, an extension of current theory is necessary in order to understand how this shortcoming can be mitigated so that investment possibilities can progress to further stages. Without a proper framework for analysing financing chains and the occurrence of gaps, research will not be able to provide adequate guidance in solving these adversities.

Along with the idea of financing chains, several interviewees highlight the need for competence to accompany the investments. Without technical expertise among the public funds, investment projects cannot be accurately evaluated, and the issue of asymmetric information is not alleviated by the government intervention. Consequently, an efficient allocation of the funds cannot be achieved. We return to the specific point effective allocation of capital later.

Thus, although some of our empirical findings lend support to the proposition, the problem is not as clear-cut when the Swedish actors are asked about their perception of funding shortages. Specifically, results in part identify other problematic phases, such as expansion phases. Similarly, there seems to be a need for public funds to support financing chains with adequate transition between investment phases and owners in order for public intervention to have the intended effect. As shown above, theory provides limited guidance in addressing these issues and needs to be extended in light of these findings.

The Funding of Innovative Companies

Prevailing theory promotes the existence of a market failure in the venture capital market, whereby the funding shortage is said to be more severe for innovative companies as the positive externalities generated cannot be fully reaped by the investor (Lerner 2002, Arrow 1962, Brander, Egan & Hellmann 2008). When describing their perceptions of the funding shortage in the Swedish venture capital market, few actors directly raise an innovative nature of companies as a problem in itself. Furthermore, positive externalities, limited saleability of ideas and adverse selection are not brought up as impediments to successful policy implementation. Only Lööf and Rodny touch on the subject of positive externalities when they argue that a socioeconomic value of public support to innovative companies could be generated because of possible returns outside the individual investments. Indeed, this is not surprising, as practitioners rarely have a clear-cut theoretical approach to their work. Still, the issues presented in this paragraph are not reflected in our empirical findings as much as would be expected given their focal role in economic theory.

Peneder (2008) holds the issue of limited saleability and adverse selection as particularly severe for innovative companies, as it increases their funding shortage. Holm brings up an aspect of this argument, namely the importance of industrial competence when evaluating the investment opportunities. He argues that the lack of competence and understanding of innovative products can increase the perceived risk and thus lead to a bypassing of these investments. Hence, lacking competence at venture capital funds can lead to a more severe

financing gap for innovative companies, and an increased understanding could alleviate the theoretical issues of limited saleability and adverse selection.

On the other hand, theory falls short in explaining the, by our respondents, often raised issue of time horizons. Many actors emphasise the fact that investments with long time horizons, and thus longer time spans until possible positive returns, face more difficulties in obtaining financing. Time is an important factor in financial valuation methods, yet is not proportionally reflected in current theory relating to venture capital stimulation. The theoretical framework presented in this thesis does not allow us to address time as a factor adding to capital shortages. This lacking perspective in the current theory can be due to several factors. One possible explanation is that most of the empirical studies take on a more general scope when looking at venture capital markets, thus not limiting the analysis to certain sectors. In this setting, the difference and impact of differing time horizons will not be noticed.

An illustrative point relating to long time horizons is the commonly raised discussion of Life science. Many actors claimed that this sector has particular difficulties in gaining financing, mainly because the long investment horizons. Life science exemplifies the issue well, as it is generally viewed as an “innovative sector” with high R&D expenses and product developments that are characterized by long time spans. Hence, the actors seem to indirectly perceive the need of funding to be larger for more innovative companies. Yet, the underlying reasons for these findings tend to be the long time horizons of these investments and not the spill-over effects. The duration until positive cash flows induces a higher risk and thus deters the risk-averse private venture capitalists.

To summarise, our empirical findings implicitly point to a more severe funding issue for innovative companies. Emphasis lies on the long time horizons and not the by theory promoted spill-over effects. The time horizons of the investments are not integrated into the theoretical framework and hence, its applicability may be limited. In addition, theory does not seem to distinguish between sectors and their attributes, which may be the result of an excessive generalisation. This leads us to the possible conclusion that a directed application of theory necessitates a distinction between sectors in order to achieve a more empirically founded theoretical approach to the construction of the programs.

Implementation of Co-Investment Requirements

Current theory contends that joint investments by both public and private venture capitalists are optimal. Most interviewed actors in the Swedish venture capital market seem to agree with this notion, although for somewhat different reasons than the ones proposed by theory. Additionally, there are some caveats to its applicability.

From a theoretical standpoint, enterprises supported by joint investments from the public and private venture capital funds tend to outperform others in terms of several quality measures (Brander, Du & Hellmann 2010). By making use of joint investments, many interviewed actors argue that the risk of the private venture capital funds' operations decreases. Furthermore, the actors maintain that the risk of crowding out private investors is lowered significantly, which further points to joint investments increasing the efficiency of financing markets in early stages.

Earlier research also shows that joint investments are said to counteract the problem of asymmetric information and send a credible signal regarding the profit potential of the project to the public investors (Svensson 2011, Lerner 2009). However, our empirical findings indicate that even if joint investments are desirable, it is not always straightforward to implement them as formal requirements on public venture capital investments. The reason lays in the radically decreased number of active private venture capital funds on the Swedish market in the last ten years, which is largely attributed to the Swedish financial crisis in the late 1990s.

This scarcity of private venture capital funds thus makes it harder to find co-investors, according to the majority of the interviewees. Therefore, several actors see formal requirements on co-investment as problematic. Furthermore, our empirical findings in the case of Innovationsbron illustrate that joint investments can occur even without formal requirements; in the fund's case a ratio of 3,5 to 1 with regard to total spontaneous private co-financing versus own financing. This casts further doubt on the practical soundness of the suggested formal requirements.

This leads to the conclusion that theory regarding formal requirements on private co-investments may need to take the shape of the private market into account. A limited private venture capital market provides a weak basis for identifying private co-investors, which in turn puts a cap on the investment opportunities available to the public funds. Drawn to its extreme, the theoretical concept for joint investments becomes paradoxical. Even though private activity is supposed to guide capital allocation, public funds are at the same supposed to counteract low private sector activity. An absence of private actors creates an exceedingly adverse setting in the financial market, where no public investments can be undertaken to begin with because of a lack of opportunities for joint investments. Thus, a catch 22 situation is created, where no private investments can be stimulated through public intervention. The very foundation of current theory is thus questioned by this line of reasoning, where a categorical requirement may not be warranted unless there are a sufficient number of private investors presently active in the early or adjacent phases.

The Role of Competence

Although theory discusses the underlying reasons for a market failure and hence a financing gap that should be bridged, most scholars put forward that not only capital but also competence is of great importance. The entrepreneurs are dependent on competent people in their teams (Lerner 2009) and the empirically proven success of public venture capital programmes in Australia and the US are said to some extent be attributed to additional monitoring and business advising (Lerner 1999, Cumming 2007).

The theoretical notions are largely supported by our empirical findings. Most interviewed actors in the Swedish venture capital market agree that competence is of great importance for the success of the investment object. The actors are of the same opinion as the scholars, namely that competence is needed in the operations of the companies. As guidance and active management are a part of the very concept of venture capital, as shown in the Terminology section, this conformity between theory and empirical findings is not very surprising. It is to be

expected that the interviewed actors advocate the active management by the appointment of competent chairpersons, as this is held to be not only an advantage but an integral part of the financing form.

Moreover, Mason (2009) maintains that it is common for the management of innovative companies to lack commercial skills. This is also brought up in the interviews, as emphasis is put on the limitations of the entrepreneurs as businessmen, many actors argues that the entrepreneurs are good at developing products and new ideas, but less suitable to lead the operations. Therefore, exit strategies are needed for replacement of the entrepreneur as CEO. This in order for the funds to more effectively provide the competence and active guidance for the investment objects by contributing with a knowledgeable and experienced executive management.

To conclude, theory seems to be quite applicable in relation to the importance of competence in investments in early stages. The notion that entrepreneurs are not always ideally suited to run businesses is reflected in our findings, which implies that theory constitutes a useful tool when approaching the issue of competence as a necessary and sufficient component in public venture capital investments. This framework can be used to further analyse management issues that arise in venture capital investments and may link into the fields of management as well as corporate governance in additional research.

Regional and Industrial Scope of Fund Allocation

Theory points to potential problems of political nature, whereby allocation of funding is characterised by sectorial or regional limitation due to political goals that are not optimally aligned with national growth stimulation (Lerner 2009). Our empirical results generally conform to this line of reasoning and indicate a general scepticism towards limiting venture capital in terms of regional or industrial scope. A majority of the interviewees reason in a way that at least in part confirms the theoretical notion of optimal capital allocation; namely to the areas in the economy that have the largest potential with regard to innovation and future growth, wherever they may arise.

It is in part to this end that private co-investments are sought after, as previously discussed; namely as an indicator for where demand for financing is the largest. Funds such as Inlandsinnovation and Fouriertransform, however, are unable to see to the Swedish market as a whole, and may consequently face incentives to engage in suboptimal, if not wasteful investment projects.

This point is further illustrated by an account of ALMI Invest's financing from the EU structural fund. Whatever funds are left at the end of a given programme period are automatically retracted. By extension, this opens up for investments being made for their own sake, rather than being reallocated to more efficient areas.

Mason and Pierrakis (2009) put forward that locking capital into certain regions is inefficient both considering the insufficient levels of investment opportunities at regional level and the size of the funds, which often has limited resources at their disposal. There is evidence that, as some actors indicate, certain regions in Sweden have limited investment opportunities. They interviewees typically refer to the north of Sweden, where the regionally limited fund Inlandsinnovation operates. However, the notion that the funds are too small to function

properly is contradicted by several respondents arguing that Inlandsinnovation is excessively funded, which leaves it with a surplus of funds in relation to the few investment opportunities. This discrepancy between Mason and Pierrakis work and our empirical findings is not unexpected, as their findings are based on the British market where several small scale regional based public venture capital funds have been implemented.

However, there are interjections that public limited funds simply have a different way of analysing the market and that the narrow scope can serve to lend focus and understanding to the investments. The contention is that the market leaves gaps that can only be filled by focused government intervention. Important to note is that the actors that put these arguments forward are directly involved in these funds, either by the position of CEO, chairman or representative from the government. Therefore, their views in this subject are expected to be coloured by their positions.

Additionally, there is the notion of positive externalities with politically motivated public venture capital measures. Even though restricted funds may direct funds sub-optimally from a financial or innovative perspective, they are by some actors claimed to generate positive aspects such as job creation and tax revenues from business stimulation. Theory relating to public venture capital does not extend to analyse the existence of such externalities exist or how they can be measured. To make such policy evaluations, perspectives from the field of political science would have to be included in the theoretical framework.

Given that the goal of government intervention is to effectively promote innovation through efficient capital allocation, however, the inclusion of an analysis of secondary effects grounded in political science within the existing economic framework may not be advisable. The reason is that political targets should not get mixed up with an overall strategy for innovation promotion - programmes aimed at job creation and furthering local businesses for instance are shown to partly conflict with the pursuit of innovation as a tool for national growth, and should be treated separately in order to use existing resources effectively. As prescribed both by theory and empirical results, this is rather done by national-wide funding policies without restrictions on industrial scope.

Findings Beyond Current Theory

Exit Market

Some of our empirical findings raise the issue of scarce exit markets as an obstacle to functioning financing in early stages. If potential investors perceive there to be a significant risk that they will be unable to withdraw from the projects at a later stage, this in turn raises the perceived risk. Sweden is hereby compared to the US, where the problem is not as inherent in financial markets.

This question has not been raised as a central issue in theory, yet there are indications that this has a negative effect on funding of otherwise attractive investment opportunities. According to our respondents, the problem emanates from a perceived lack of potential buyers in later stages, which makes earlier actors reluctant to enter projects to begin with. The lack of theoretical reasoning in this field could potentially be due to the geographical

focus of current research. Much of the literature today is based on the US markets that, as some of our interviewees have pointed out, has a quite different structure than the Swedish market.

This problem also links into the ambition to create a functioning chain of financing through all stages. Inactive expansion stages with low funding activity could have a negative effect on seed and start-up stages. If theory fails to accurately account for this interaction between financing stages, its application may promote additional capital in early stages, although it in reality may not have the fully intended effect due to adverse environmental settings.

Thus, we find exit markets to potentially play an important role in financing chains that relate to the purpose, yet to have received limited attention in earlier research. This causes current theory to disregard environmental settings that seem to have a significant effect on financing activity. It would thus be desirable to extend the current analytical approach by taking exit markets and their determinants into account. The way this could be done is by accurately mapping the interactions between the financings stages in order to anticipate how capital flows will influence the exit opportunities in later stages. The effect of a contribution of public venture capital in early stages is today hard to determine, but capital market theory could provide additional guidance in further research relating to this area.

Cultural and Environmental Aspects

Our empirical findings put forward some cultural aspects that affect the structure of the venture capital market and the innovation potential. In academic culture, it is supposedly not prestigious for researchers to work together with the industry, which is claimed to hamper innovation. Sweden is said to have a focus on technological refinement at the cost of commercialisation, and that self-employment is seen less favourably than in other countries such as the US. All these cultural aspects affect the climate for starting and running innovative companies. Furthermore, the fact that banks lack awareness of private venture capital options hampers the effectiveness of the public venture capital programmes according to some actors.

When applying the theory presented here, it does not provide us with a sufficient basis for analysing the cultural aspects that have been presented to us during the course of this study. Chesbrough (1999) provides certain guidance by pointing out that there is no single “best practice” for innovation policy with regard to public venture capital, and that institutional surroundings should be taken into account. Although, his theory does not provide us with guidance when it comes to analysing our empirical findings.

Considering the importance of contextualisation, importing successful policies from abroad seems to be problematic. Since they are developed in different institutional settings, the theories relating to optimal policy have a deviating cultural constitution, as illustrated by the example of commercialisation practice in Sweden vis-à-vis the US. This implies that their implementation may not achieve the desired effects when applied in another national institutional setting. Nevertheless, an exhaustive consideration of cultural settings would necessitate an incorporation of socio-cultural theory to complement the economic aspects used in this study.

Administration and Structuring of the Public Funds

Many actors would like to see a simplification of the Swedish public venture capital market today. The argument put forward is that there is a redundancy in the number of public venture capital funds, making the activities hard to coordinate. Structures where the funds are fewer, and hence larger, are seen as optimal. This manner of organisation could facilitate the provision of a full chain of financing without gaps or overlaps between the funds administered by the government.

Theory presents us with the notion that there are fixed costs associated with the management of the funds, indicating economies of scale in operation (Svensson 2011). However, the current literature does not explicitly discuss the structure of the public venture capital programmes in terms of number of actors, interactions between the funds, etc. A theoretically founded evaluation of fund administration is desirable in order to enable an efficient utilization of available government resources, yet is not feasible with current theoretical foundations.

The reason a majority of the respondents promote a simplification of current government structures is an ambition to achieve more effective public intervention in the financial market. We thus have indications that the organisation of public funds is likely to affect the efficiency of the programmes. A more centralised approach seems to be preferable, as a consolidated programme structure enables a more focused and efficient utilisation of available resources. A consolidated structure decreases the risk of gaps in financing chains and overlaps in investment activities between public actors. If this were to be integrated into current theory, more guidance would be available to policy makers that are faced with problems of organisational nature.

A more in-depth analysis of the efficiency of different structures of the programmes could yield insights on optimal coordination of the public actors. Such an analysis could make use of organisational theory, which would then be applied to theory in order to identify favourable strategies and structures for innovation incentivisation by public funds. Thus, these organisational aspects are potential subjects for further research within public venture capital.

Conclusion

We have in our analysis tested and nuanced the prevailing theory of efficient government intervention by public venture capital. In addition, we now aim to further elaborate on the applicability of the current state of knowledge and when it is justified present subject for further research. Furthermore, we will try to provide some guidance for efficient government intervention, by concretising important factors that affect the creation and implementation public venture capital programmes.

The theoretical notion that competence in addition to capital is of great importance for the investments is largely confirmed by our empirical data. This finding was found to be in line with the very concept of venture capital, whereby appropriate management and guidance are seen as fundamental merits of this form of financing. For public policy, this implies that the public venture capital funds should make sure that competent people are available for support and guidance for the investment objects. As the entrepreneur is often not an ideal businessman, exit strategies for them should be created.

On the issue of allocation of public venture capital, empirical findings again comply with the theoretical standpoints – sectorial and regional limitations on the scope of investments can lead to suboptimal promotion of innovation. When applying theory, we thus have indications that a political dimension of policy implementation may distort the workings of government programmes. Instead, a strict adherence to economical soundness of investment scope is advisable. Important to note is that the ultimate goal of the particular programme is decisive in the valuation of secondary effects. Given that the purpose is an efficient stimulation of innovation, the importance of strictly economic considerations remains, but other targets such as job creation and generation of tax revenues may warrant an inclusion of political aspects in the analysis. Hence, given that the ambition to promote innovation, the government should not create public venture capital funds that are limited to specific regions or sectors.

Empirical findings lend support to the theoretical proposition that public funds should co-invest with private actors. The virtue of this notion lies in the guidance that the private market can provide in identifying investment opportunities with growth and profit potential. However, there are problematic aspects in the very foundation of this theoretical standpoint. A paradoxical investment model is created when private co-investors are sought where there is in fact a lack of private actors to begin with. This fallacy limits the applicability of the theory, which leads us to the conclusion that the theory is only pertinent under particular circumstances. We hereby refer to cases where a sufficient number of co-investors in the relevant or adjacent phases can be identified and induced to undertake co-investments. A necessary nuancing of theory would be to distinguish between cases where it is feasible to introduce formal requirements on private co-investments with the purpose of accurately directing public capital allocation.

Following the same line of reasoning, governments should thus be careful to implement such formal requirements on co-investments as they may do more harm than good. Before deciding on implementation, a mapping of private investment activity in the same and adjacent stages needs to be conducted.

Theory points to the innovative nature of ideas as being a factor that deepens financing problems in private markets. The reason is said to be the potential spill-over effects that are associated with the technologies they can yield. Empirical findings rather identify long time horizons as the main factor that intensifies the funding adversity, as the long horizons raise the perceived risk levels of the investments. Hereby, many respondents make a distinction between sectors, which is illustrated by Life science as facing particular financing difficulties due to long time spans in the commercialisation process. This leads us to the conclusion that theory does not accommodate differences between sectors and does not always provide adequate guidance in analysing different settings.

A feasible explanation could be an excessive generalisation of the current conceptual framework, where the sector-specific trait of time horizons has been abstracted away for the sake of simplicity, yet at the expense of applicability. Theory would stand to gain from a more concrete perspective that accounts for how sector-specific time horizons affect the perceived risk levels of the investments.

Hence, a subject for further research is the way time horizons affect how risk is perceived by potential investors and what this relationship implies for funding shortages. Our tentative conclusion is that industry sectors are characterised by systematically differing time horizons within investments. The varying time spans consequently lead to diverging risk levels, which are believed to determine the availability of capital in the specific sectors. Whether this model provides explanatory power to funding structures needs to be determined by using further empirical data. Its merit also hinges on determining the individual relationships between sectors, time horizons and risk levels. Research that draws on a mapping of capital flows and financial valuation with risk measures could provide such insights in order to verify or develop the reasoning presented here.

The time horizons also have implications for government intervention as the extent of funding shortage differs between sectors with different investment horizons. This implies that to be able to solve the market failure, the public funds may need to be given more liberal time constraints for their investments compared to the private sector, as this could aid investments in for attractive opportunities associated with long time horizons.

Where theory suggests that funding shortages are most severe in early financing stages, empirical findings also indicate difficulties in later stages that emanate from historical aspects where financial distress has adversely affected private sector activity. While theory is partly applicable in this respect, it does not adequately address market structures by differing between financing stages to locate the difficulties and determine their extent. Along this line of reasoning, public support aimed at bridging gaps in financing chains and backing transitioning of ownership is seen as necessary.

There is room for extending theory in a more dynamic way by moving away from single-stage analysis towards incorporating historical aspects and dynamics between different stages. An inclusion of historical determinants of financial structure development as well as inter-stage dependencies could enable theory to apply to more diverse settings and make it more generally applicable. This will enable policy-makers to analyse relevant market conditions more accurately and thereby improve programme structures aimed at the effective provision of venture capital.

Thus, prevailing theory does not seem to take current market situations sufficiently into account in order to produce fully applicable guidance in policy formation. For this reason, we do not find it advisable that policy makers simply apply prevailing theory when implementing public venture capital in seed and start-up phases. Along the lines of our analysis, there is instead an apparent need to take market conditions into account in order to explore where funding gaps are actually present, as factors outside the existing theoretical framework play an important role in determining the capital shortage.

Similarly to the idea of creating functioning financing chains, it is brought to our attention that exit markets play an important role. A lack of potential buyers in later stages negatively affects the willingness of providing financing in earlier stages due to a fear of not being able to divest. Theoretical reasoning does not sufficiently address how exit markets affect early stage investments. Exit markets are likely to be an important part of market dynamics, and neglecting circumstances in adjacent stages will lead to an incomplete analysis of shortcomings in specific market sectors.

Therefore, a subject for further research is the role of exit markets. The relationship between the willingness to invest in early stages and a functioning exit market needs to be determined. We have indications that a lack of potential buyers in later stages hampers earlier investments. With this linkage in mind, the effect of a contribution of public venture capital in early stages is hard to determine. While it could fall short in stimulating activity because of a systematic reluctance among private investors due to limited possibilities to divest, the contrary could be true if the influx of capital has positive effects by stimulating exit markets where buyers in fact enter the market due to the increased investment opportunities. The specific nature of this relationship needs to be determined by further empirical research.

A way to minimise the risk of gaps and overlaps between public venture capital funds is, according many of the interviewees, to increase the organisational efficiency. This leads us to believe that the organisational structure of the public programmes at least in part determines their functionality. Theory does not elaborate on optimal structures for realising the aims of the government intervention in financial markets, yet our evidence suggests that this is a necessary aspect to take into consideration. We find a need to include elements of organisational theory in order to avoid wasteful practises and set an administrative foundation that allows resources to be directed where they most increase market efficiency.

The implications for government policies are not clear, as the subject of organisational structures of the programmes is in need of further research. Yet, our empirical findings indicate that fewer public funds are

optimal for administrative purposes and prevent the risk of overlaps. Furthermore, structures for coordination between the public funds should be established to further prevent gaps and overlaps in financing activities.

We also found evidence that there is a need for a contextualisation with respect to cultural settings that have a significant effect on programme implementation. This institutional aspect is not sufficiently provided to us by theory, which is why an application of the current framework runs the risk of advocating implementations of foreign programme structures that are in fact ill-suited for domestic use. Theory seems to generalise the applicability of government intervention, where cultural aspects are not made part of the critical considerations in programme implementation. An understanding of country-specific environments and their effect on financing structures would stand to gain from socio-cultural perspectives.

Hence, our findings indicate that it is important for policy makers to take into consideration how the cultural environment will affect the implementation and results of policies. It follows that the government should be cautious before importing successful policies from abroad, as they might not give the expected and desired results in another cultural setting.

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Interviews

Table 3 - Interview Details

Interviewee	Date and Time	Location
Bengtsson, Jan	Tuesday, April 17 th 9.00 - 10.00	ALMI Invest, World Trade Center, Klarabergsviadukten 70, Stockholm
Brogren, Charlotte	Tuesday April 10 th 15:00 - 16:00	Vinnova, Mäster Samuelsgatan 56, Stockholm
Ehn, Sven	Wednesday March 28 th 14:30 - 15:30	Conducted over the telephone
de Neergaard, Claes	Wednesday April 4 th 10.00 - 11.00	Industrifonden, Vasagatan 11, Stockholm
Görnerup, Emil	Monday April 2 nd 14.30 - 15.40	Svenskt Näringsliv, Storgatan 19, Stockholm
Holm, Sven-Thore	Tuesday April 3 rd 10.00 - 11:00	Conducted over the telephone
Hultstrand, Stefan	Tuesday April 3 rd 13.30 - 14:30	Ernst & Young, Jakobsbergsgatan 24, Stockholm
Lööf, Annie	E-mail received April 19 th , 16:52	Written interview conducted over e-mail
Nordberg, Per	Wednesday March 28 th 10:00 - 11:00	Fouriertransform, Sveavägen 17, Stockholm
Nylander, Jan	Tuesday April 10 th 10.00 - 11.00	Stockholm School of Economics, Sveavägen 65, Stockholm
Rodny, Jonas	Wednesday April 11 th 10.00 - 11.00	SVCA, Grev Turegatan 18, Stockholm (conducted simultaneously with Talborn, Henrik)
Seddigh, Akbar	Wednesday April 11 th 14:30 - 15:30	SwedenBIO, Wallingatan 24, Stockholm
Skoogberg, Ylva	Monday April 16 th 10.00 - 11:00	Swedish Ministry of Enterprise, Energy and Communications, Mäster Samulesgatan 70, Stockholm
Strömberg, Per	Thursday April 12 th 11.30 - 12:00	Swedish Institute for Financial Research (SIFR), Drottninggatan 89, Stockholm
Strömbäck, Peter	Monday April 2 nd 09:30 - 10:30	Innovationsbron, Vasagatan 11, Stockholm
Svensson, Roger	Wednesday March 28 th 13.00 - 14:00	Institutet för Näringslivsforskning (IFN), Grevgatan 34, Stockholm
Talborn, Henrik	Wednesday April 11 th 10.00 - 11.00	SVCA, Grev Turegatan 18, Stockholm (conducted simultaneously with Rodny, Jonas)
Zetterberg, Leif	Wednesday April 11 th 15.30 - 16:30	Case Asset Management, Linnégatan 18, Stockholm

Appendices

Appendix A – Interview Guide

Introductions and Background

(Short presentation of the subject of the thesis, without getting into details)

- What is your background within venture capital?
- What is your professional role in this context?

Rationale and Purpose

- What do you think is the purpose of public venture capital funds?
- Have their purpose and focus shifted since their inception?
- What directives do they receive from the government?
- Are there any additional guidelines they have to follow?
- (If so, what are they?)

The Swedish Venture Capital Market

- What is your view on the Swedish venture capital market?
- Which are its main players?
- Do you perceive there to be a shortage of capital for companies in early stages?
- (If yes, why is this the case and why don't private actors fill the gap?
- (If not, why are there public venture capital funds?)

Do you see a particular issue in the case of innovative companies with novel technologies?

What role do public venture capital funds play in this context?

Do you feel that there are other actors than the state that could invest in the same stage?

- (If so, which are they?)

What is your view on co-investments between private and public venture capital funds?

Operations and Administration of Public Venture Capital Funds

Which are the challenges that the funds face in their operations?

Do you think that current funds are successful in achieving their purpose?

- (If yes, what makes them successful?)
- (If no, why not?)

What additional resources do you think are necessary in the current system of public venture financing?

What could be done to ensure that operations are more successful with regard to stimulation of innovation?

How would you characterise the interaction between the public venture capital funds?

Additional Thoughts

Is there anything else you would like to add in this context?

Appendix B – Tabulation of Interview Responses

Table 4 - Responses Relating to Funding Shortages in Seed and Start-Up Phases

Funding Shortages in Seed and Start-Up Phases	
Bengtsson, Jan	<ul style="list-style-type: none"> • There is no significant capital shortage in the very earliest (seed) phases seed and there, loans rather than venture capital is optimal • Private financial actors have largely left consequent early stages, especially the expansion phase but also before and after • There is also high region variation in funding availability
Brogren, Charlotte	<ul style="list-style-type: none"> • The public venture capital funds are needed to complement the market • There is capital available today, but a lack of risk willing capital • There is high risk in the early phases, where the scarcity of capital is the largest
Ehn, Sven	<ul style="list-style-type: none"> • There is a funding shortage in the seed and start-up phases • These phases need more capital than what is offered today by the private and public venture capital funds • Achieving a functional transition in later stages from public to private venture capital investments is also an important issue • Private risk perceptions, and thus demands for returns, are much higher than those of public funds
de Neergaard, Claes	<ul style="list-style-type: none"> • The public system has sufficient resources for meaningful intervention • There is no clear indication of insufficient capital in early stages • The issue is finding competent management for later stages in investment projects
Görnerup, Emil	<ul style="list-style-type: none"> • There is a lack of capital for companies in early stages in Sweden today
Holm, Sven-Thore	<ul style="list-style-type: none"> • High risk is a source of capital shortage in early stages • Private investors are looking to maximise profits and thus shun early, high-risk investments
Hultstrand, Stefan	<ul style="list-style-type: none"> • Transitioning is a central challenge and that the problem lies in connecting researchers and innovators with venture capitalists • Match-making, rather than capital, is the main shortcoming in the Swedish market • Innovators often claim that there is lack of capital, but there is rather a lack of competence and the capability of presenting the idea in a good way
Löf, Annie	<ul style="list-style-type: none"> • The private venture capital in Sweden is relatively risk avert • The risk in early stages is difficult to assess
Nordberg, Per	<ul style="list-style-type: none"> • There are plenty of actors ready to provide financing in early stages • The problem is instead that projects lack focus and adequate management in early stages • There is a great risk aversion among the private venture capital funds, which makes them invest in later stages
Nylander, Jan	<ul style="list-style-type: none"> • There is a lack of capital for companies in early stages • High return is hard in early stages with small amounts of investments • The venture capital funds invest in later stages where the risk is lower
Rodny, Jonas	<ul style="list-style-type: none"> • There are historical reasons behind the equity gap (IT bubble bursting) • Private venture capital funds in Sweden have decreased • Remaining actors invest in later stages, as they are concerned about the risk • Cultural aspects are also present (Swedish refinement vs. U.S. commercialisation)

Seddigh, Akbar	<ul style="list-style-type: none"> • There is a shortage of capital for companies in early stages today • There is a historical aspect that contributes to the lack of capital: <ul style="list-style-type: none"> ▪ The first venture capital companies founded in the 80s were led by financial actors without industrial skills, which led to major failures in the 90s ▪ The bursting of the IT bubble also contributed to the turmoil and risk aversion • The number of active venture capital firms has declined, and the remaining ones have shifted their focus to later phases • The availability varies with different types of businesses (e.g. a large capital shortage for Life science) • Public intervention should engage in early stages where there is a shortage today • The shortage is the largest until the product is ready for market introduction • It is important to create a full chain of financing for the companies – otherwise, early-phase investments will make little sense
Skoogberg, Ylva	<ul style="list-style-type: none"> • The Swedish venture capital market is not perfect, as the private venture capital sector is risk averse • There is a lack of capital for companies in early stages, i.e. seed and start-up • This funding gap is partly due to the Swedish financial crisis in the late nineties, which was caused by the IT bubble and has not recovered since
Strömberg, Per	<ul style="list-style-type: none"> • There is a gap in financing in early stages • There is a small venture capital market due to the bursting of the IT bubble
Strömbäck, Peter	<ul style="list-style-type: none"> • Early project stages are in much more need of competence than capital • Capital shortage for early stages is exaggerated • There seems to be a need for increased investments in companies' expansion phases, since private actors have gradually been leaving this area
Svensson, Roger	<ul style="list-style-type: none"> • There is a clear shortage of capital in early stages • The reason is that there is a principally higher risk the earlier the investment phase • High fixed costs require large investments for realising any profitability that these ideas may bring with them, which poses an obstacle to investors
Talborn, Henrik	<ul style="list-style-type: none"> • It is necessary for all financing stages to work • Public intervention is needed where private short-sightedness leads to funding gaps • Structures are needed to stimulate the provision of capital, where a chain of financing is created
Zetterberg, Leif	<ul style="list-style-type: none"> • Companies often fail between start and expansion phases due to funding shortages • Deductions and other incentives are needed to promote growth

Table 5 - Responses Relating to Funding Shortages in Innovative Companies

Funding Shortages in Innovative Companies	
Ehn, Sven	<ul style="list-style-type: none"> • The funding situation looks somewhat different for innovative companies since new technology is hard and costly to secure in the seed phase • When receiving a patent, the product is better protected than the non-innovative products
de Neergaard, Claes	<ul style="list-style-type: none"> • There is a general shortage of capital for the Life science, energy and media technology due to the long investment horizons and large fixed costs
Holm, Sven-Thore	<ul style="list-style-type: none"> • It is hard for inexperienced innovation companies to attract financing • There is lack of industrial competence when it comes to analysing potential investments, the risk is perceived as higher and attractive investments are bypassed
Hultstrand, Stefan	<ul style="list-style-type: none"> • The long time horizon from an idea to positive cash flows makes the private venture capital funds invest in later stages
Lööf, Annie	<ul style="list-style-type: none"> • The time horizon to positive returns in innovative projects is long, which makes public venture capital an important complement to private actors • There are socioeconomically values in this activity since support to innovation and development gives returns outside the individual investment or company
Rodny, Jonas	<ul style="list-style-type: none"> • It is especially hard for complex ideas to gain financing • Even if public funds experience financial losses, the intervention can be seen as economically beneficial because of the jobs and tax revenues that are realised
Strömberg, Per	<ul style="list-style-type: none"> • The long time horizon of the investments poses a problem, as illustrated by the Life science industry
Svensson, Roger	<ul style="list-style-type: none"> • The shortage of capital is especially severe for innovative projects • The reason for this shortage is asymmetric information in the market regarding the potential of the ideas and innovations

Table 6 - Responses Relating to Implementation of Co-Investment Requirements

Implementation of Co-Investment Requirements	
Bengtsson, Jan	<ul style="list-style-type: none"> • By demanding co-investments, the risk of crowding out is effectively prevented • It can be hard to find co-investors, especially as other public actors usually do not count as legitimate co-investors
Brogren, Charlotte	<ul style="list-style-type: none"> • Public venture capital should be used to attract private capital to investments • Investments should be scalable adjusted with consideration to the situation • Public venture capital funds can lower the risk for the private actors and also act as a quality indicator of the investment
de Neergaard, Claes	<ul style="list-style-type: none"> • Industrifonden tries to do joint investments with private actors, although it has become harder to find co-investors - especially other private venture capital funds
Skoogberg, Ylva	<ul style="list-style-type: none"> • Private co-investments are always desirable • The government should never be the sole investor
Strömbäck, Peter	<ul style="list-style-type: none"> • Requirements of joint investments are typically not needed • Evidence for this is that for every SEK Innovationsbron invests, private actors usually spontaneously invest 3.5 SEK • Regulatory requirements can also be problematic when Innovationsbron passing on investments to other public venture capital funds
Svensson, Roger	<ul style="list-style-type: none"> • Joint investments with private actors should be a requirement for the public venture capital funds • A lower requirement can be justified in the earliest stages • With co-investments, the private actors will also contribute with their knowledge

Table 7 - Responses Relating to Regional and Industrial Scope of Fund Allocation

Responses Relating to Regional and Industrial Scope of Fund Allocation	
Bengtsson, Jan	<ul style="list-style-type: none"> • The demand for financing should determine the allocation of capital • Public capital should not be tied to certain regions or sectors for political reasons like it is today, to a certain extent
Brogren, Charlotte	<ul style="list-style-type: none"> • It is better in the long run with free capital than capital that is bound to certain regions or sectors in this context
Ehn, Sven	<ul style="list-style-type: none"> • It is not good when funds are created as responses to unemployment or other crises • The government should instead focus on successful sectors and regions
de Neergaard, Claes	<ul style="list-style-type: none"> • The government should not tie capital to specific areas or industries • Here, it is important not to discriminate, so that capital is free to finance the best projects, independent of region • Sector competence is needed together with the investments
Hultstrand, Stefan	<ul style="list-style-type: none"> • When structuring the public venture capital funds, national rather than regional and local interests should be in focus • However, with regionally restricted funds local and regional engagement can be created which can have other positive consequences that can be hard to measure
Löf, Annie	<ul style="list-style-type: none"> • The regional and sectorial limited funds Inlandsinnovation and Fouriertransform were created so that companies in the north of Sweden and companies in the automotive cluster could get a supply of public financing, instead of grants
Nordberg, Per	<ul style="list-style-type: none"> • Sector-specialised investments can lead to better selection due to better understanding of the investment opportunity and thus a lower risk of rejecting good investments
Nylander, Jan	<ul style="list-style-type: none"> • Capital that is locked into certain regions or sectors is problematic
Rodny, Jonas	<ul style="list-style-type: none"> • Regional and industry-specific funds are not optimal, and politically rather than theoretically motivated • However, there may be socially beneficial when job creation and tax revenues are taken into account
Seddigh, Akbar	<ul style="list-style-type: none"> • Capital should not be tied to a specific region or industry, although it is preferable that investment managers possess industrial competence • Fouriertransform is already in a mature and crowded industry and Inlandsinnovation is a politically motivated decision • You cannot direct innovation
Skoogberg, Ylva	<ul style="list-style-type: none"> • Although the public actors have been criticised for being political in their structure, there is a political task of filling voids left by the private market • The reason is that there is not perfect information on the Swedish market, which makes it flawed in its functioning
Strömberg, Per	<ul style="list-style-type: none"> • There is a tendency of public venture capital funds to be limited in their investment scope, like Fouriertransform and Inlandsinnovation • The funds should instead have a broader investment scope
Strömbäck, Peter	<ul style="list-style-type: none"> • Public funds available for investments are sufficient but incorrectly allocated • They are often bound to certain regions or sectors, which is suboptimal • Instead, industrial competence is needed, in combination with a wide investment scope, geographically and industry-wise
Svensson, Roger	<ul style="list-style-type: none"> • Regionally limited funds are suboptimal since the capital is not used where it makes the largest difference • Capital should instead be invested in regions with high growth potential, which will also attract private investors • Inlandsinnovation should be discontinued since it invests in an unattractive area with low growth potential • Fouriertransform is not good since such funds tend to crowd out private investors
Zetterberg, Leif	<ul style="list-style-type: none"> • Regional limitations on funds is just as meaningful as a sector focus

Table 8 - Responses Relating to the Role of Competence

Responses Relating to the Role of Competence	
Brogren, Charlotte	<ul style="list-style-type: none"> • The investments need competence and coaching, although they usually cannot afford to offer high compensations to the board members • More industry leaders would need to be active in the boards of these growth companies
Ehn, Sven	<ul style="list-style-type: none"> • The problem lies in that the entrepreneur is not an ideal businessman • In the start-up phase, competence is of great importance • It is important that the venture capital funds put in competent people in leading positions • With better businessmen in the company the development will be better and the return higher
Holm, Sven-Thore	<ul style="list-style-type: none"> • Exit strategies for the entrepreneurs are needed, as they often are not suitable to lead the operations in later stages • The biggest challenge in making the companies successful is lack of good management rather than capital • A problem is that the entrepreneurs and its relatives remain at the board due to majority ownership
Hultstrand, Stefan	<ul style="list-style-type: none"> • Not only capital but also competence are needed for the investments and that these to a great extent are linked • The greatest challenge for the public venture capital funds is to make sure that they offer the right competences • The innovators often has limited management competence • The people in the funds need to understand the different markets and understand the researchers • Today, the public venture capital funds are not always structured effectively and there is a risk that capital rather than competence is offered
Nylander, Jan	<ul style="list-style-type: none"> • The companies that perform poorly are often the ones with management problems • In these situations is often hard but necessary for the entrepreneur to leave the position as CEO to someone better suited for the role
Seddigh, Akbar	<ul style="list-style-type: none"> • It is important to realise that the capital is only a small part of the success for an investment • A company's success depends to 20 % on funding and to 80 % on competence
Strömbäck, Peter	<ul style="list-style-type: none"> • In the earliest phases, the availability of competence rather than capital is most critical
Svensson, Roger	<ul style="list-style-type: none"> • The entrepreneur often does not have the right competences and it is therefore good to pass over the decision power to a new management
Zetterberg, Leif	<ul style="list-style-type: none"> • It is important to build a network with competent people with academic or business backgrounds that can support and develop the investments • The network should also include private investors like business angels

Table 9 - Responses Relating to Findings Beyond Current Theory

Findings Beyond Current Theory	
Bengtsson, Jan	<ul style="list-style-type: none"> • It is hard today for investors to terminate their investments, since Sweden does not have a well-functioning exit market • Therefore, companies need to grow mainly on their own • One of the main reasons for the funding shortage is thereby the lack of a working exit market
Ehn, Sven	<ul style="list-style-type: none"> • The government should make strive for a full chain throughout the financing stages without gaps or overlaps • As long as there are gaps more capital in early phases will not help • One should start with increasing capital in the seed phases and then move on to later stages with the investments • Clear owner directives are of great importance
Görnerup, Emil	<ul style="list-style-type: none"> • For research, there are already sufficient resources and instead, it is important to focus on incentives and to create driving forces • At present, it is not viewed as prestigious for a researcher to work together with a company; instead, the number of citations and publications is what counts
Holm, Sven-Thore	<ul style="list-style-type: none"> • Venture capital funds should not be too small since the effect on the market will be questionable and most of the capital will be used to pay management fees
Lööf, Annie	<ul style="list-style-type: none"> • There is lack of knowledge within banks regarding the possibility of public venture capital funds complementing their loans • Increased knowledge about public venture capital at bank offices could improve the efficiency of the money lent out
Rodny, Jonas	<ul style="list-style-type: none"> • There is a lack of a well-functioning exit market in Sweden, which poses an obstacle for complex or non-traditional innovations to attract financing • In the US, there are more potential recipients in later stages, which enables present investors to withdraw • This uncertainty in terms of disposal of investments causes a reluctance to invest in otherwise attractive projects out of a fear of “getting stuck” as the owner • The lack of capital could possibly be attributed to cultural aspects. In Sweden, inventions are often refined at the cost of commercialisation, while the U.S. has a more commercial focus
Skoogberg, Ylva	<ul style="list-style-type: none"> • One aim of the current government innovation strategy is to coordinate as much of the public venture capital as possible • There is a need for increasing public awareness of the availability of government funding and investment
Strömbäck, Peter	<ul style="list-style-type: none"> • The structure of the Swedish public venture capital landscape is fragmented and in need of simplification, since there are too many actors that make it hard to coordinate
Zetterberg, Leif	<ul style="list-style-type: none"> • The government needs to structure the public venture programmes into fewer actors in order to make the financing chain function better