

I dare you: Trust, Networks and the Financing of Innovation

– The Case of Venture Capital –



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Yet to be decided

This thesis is first and foremost dedicated to my loving parents and sister, who always supported and encouraged me when i was following my intuition did what I thought was right.

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“I find that a great part of the information I have, was acquired by looking up something and finding something else on the way.”

– Franklin Pierce Adams

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Abstract

Venture capital investments in innovative and knowledge based entrepreneurship have due to well known arguments such as the need of face-to-face contact to exchange tacit informations always been seen as a form of investment that requires spatial proximity. During the last decade this industrial paradigm changed in favor of a more globally distributed investment pattern. The cross border expansion of venture capital firms presents an interesting case of internationalization to study, because manifests not mainly through the establishment of foreign subsidiaries and branches but rather through the formation of international investment networks and alliances. Given the specific nature of venture capital investing, a new theoretical perspective is needed to understand the mechanisms of this new industrial paradigm of global investments. This thesis contributes to international business, finance and innovation system research by providing a novel theoretical framework to explain and analyze international investment activities and alliance formations in uncertain settings. By unifying theories of the resource-based view with trust, social capital and interaction theories, a comprehensive multidimensional analytical model is offered. Activities between two heterogeneous entities are explained on the one hand by social, organizational, institutional, and geographical proximity, on the other hand by differences in the resource-base, which mobilize opportunities through the combination of complementary assets.

To provide first empirical evidence, this study examines venture capital investment activities of 18 selected OECD countries during the 2000 – 2010 period. I observe the influence of social interaction,

network formation, generalized trust, and similarities as well as differences in the institutional environment and sectoral specialization. This is done on domestic, bilateral and firm level. Major findings are the following. On country level, the demand for venture capital in terms of economic growth and activities associated with innovation as well as a high generalized trust facilitates the development of the domestic venture capital industry. On the bilateral level, venture capital shows a propensity to flow between countries with high geographic, social and institutional proximity but different configurations of the innovation system. Bilateral trust negatively influences investment activities between country pairs, indicating the mechanisms driving venture capital investments to substantially differs between domestic and international investments. This finding opens the discussion, if a domestic *trust overload* may lead to the exclusion of foreign investors. On firm level most important findings are that venture capitalists with a strong sectoral specialization show a higher propensity to invest abroad.

Overall, this thesis contributes to a better understanding of the complex macro- and socioeconomic dimensions influencing international investment activities and augment the existing analytical toolbox with a novel theoretical framework. From a broader perspective, this framework can, *mutatis mutandis*, also be used to explain cross-border economic exchange in general, if uncertainty, tacit knowledge and though the need for the formation of persistent relationships is involved.

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Chapter 1

Introduction

“There are countries in Europe [...] where the most serious impediment to conducting business concerns on a large scale, is the rarity of persons who are supposed fit to be trusted with the receipt and expenditure of large sums of money.”

– John Stuart Mill, [1848](#)

1.1 Background

During the last four decades, the venture capital industry has experienced a tremendous growth over long term. In the United States, the origin of modern venture capital financing concepts, annual fundraising increased from about \$ 0.1 billion during the 1970^s to over \$11 billion in 2003 [[NVCA, 2011b](#)].

Although the amount of venture capital investments still appears as relatively low, its economic impact cannot be neglected. In 2008 (circa 0.2 percent of the U.S. GDP), venture capital-backed companies in the USA generated nearly \$ 3 trillion in revenue (21 percent of the U.S. GDP) and accounted for more than 12 million employees (11 percent of U.S. private sector employment), what illustrates the enormous impact of venture capital can have on the national economy [[NVCA, 2011a](#)]. Indeed, many companies known for innovation and high growth such as Microsoft, Oracle, Intel, Google, Facebook, Apple, Starbucks, Medtronic and Genentech where formerly venture capital backed [[Maula et al., 2005](#)]. Fur-

thermore, it is argued that the maturity and sophistication of the U.S. venture capital industry is a major reason for its economy's extraordinary ability to turn innovative ideas (from universities, R&D labs etc.) into high growth businesses [Landström, 2007] and to serve as a *catalysts to commercialization* [Samila and Sorenson, 2010].

Not surprisingly, there exists a general consensus among scholars and professionals about the important macroeconomic role of venture capital in contemporary economy [Megginson, 2004]. From an evolutionary point of view, financial intermediaries are a dominant source of capitalistic selection, which shape the environment within which new entrepreneurial ventures evolve. Since venture capitalists are specialized on the financial and managerial support of new technology based firms – a setting where classical capitalistic instruments are likely to fail – they play a unique role in this selection process. They are of high importance in supporting innovative and uncertain economic activities [Kortum and Lerner, 2000] and bringing innovations to the market rapidly [Bygrave and Timmons, 1992].

Motivated by success stories such as the one of Silicon Valley, policymakers have shown increasing interest towards the venture capital industry since the early 1990^s. National as well as regional cluster policies nowadays consider venture capital as integral element, and governments all over the industrialized world heavily engage themselves in a creating flourishing domestic venture capital industry. The vast majority of these policies focuses on increasing the domestic supply of venture capital. To give examples, Canada, Germany and Chile recently started to increase the national venture capital supply through massive public investment in venture capital funds [Cumming and MacIntosh, 2007]. These policies act according to the underlying assumption that more venture capital generally leads to more entrepreneurial activity and innovation, *ceteris paribus*.

These attempts show success and failure stories as well. Especially punctual and isolated measures focusing exclusively on increasing the venture capital supply tend to lead to disappointing results [Da Rin et al., 2006]. Despite enormous public investments in venture capital, many European countries up to now failed in creating a strong domestic venture capital industry. In contrast, positive examples can be found for instance in Israelis Yozma program in the middle

1990^s. Israel's government massively invested in venture capital funds, but only under the condition that the investment was carried out together with a foreign investor. Primarily focused on interactive learning of the emerging domestic industry through cooperation with established international venture capitalists, this measure has proven as highly effective, and Israel succeeded in the development of a vibrant venture capital industry in only one decade. Nevertheless, it may be questionable if this measure would have had the same effect in a country without Israel's strong high-tech research community and the close ties to the United States [[Avnimelech et al., 2006](#)].

Overall, venture capital industries all around the globe appear to be very fragile and volatile. This volatility manifests in a number of ways. The value of capital venture capital firms are able to rise, the investments in portfolio companies, and the financial performance of portfolio companies and venture capital firms all show high cyclic fluctuations, external shocks and the internal creation of bubbles [[Gompers and Lerner, 2004](#)]. Small changes in the environment and policy can cause much harm, often unintended. In the late 1970^s, the government of the United States adopted the *prudent man* law as a reaction of the foregone financial crisis, which placed criminal liability on fund managers for *imprudent* investment in risky assets. Without intentionally targeting venture capital at all, it nevertheless has inadvertently shaken the United States industry to its core and almost caused its total collapse. Another example provides the burst of the dot com bubble around 2000, where the resulting collapse of the high technology stock market NASDAQ robbed the venture capital industry its favorite exit option and brought it once again to the edge of chaos. During the peak of the dotcom bubble, the fundraising of the United States increased by 95 percent from \$ 51.4 billion to \$ 100.1 billion between 1999 and 2000, just to decrease again by 62 percent during the subsequent year [[PricewaterhouseCoopers, 2011](#)].

These examples vividly illustrate the strong systematic character of interdependencies between the venture capital and its environment. Accepting this, it intuitively calls for differentiated, evolutionary and systematic policies instead of one-fits-all solutions based on best-practice. Furthermore, against the background of a steadily increasing share of cross-border venture capital flows, successful ven-

ture capital policy and research in this global context has to be designed open for external factors and therefore cannot stop at the national borders.

Here, systematic concepts such as the *National System of Innovation* approach [Freeman, 1987; Lundvall, 2010; Nelson and Rosenberg, 1993] offer powerful tools that meets these requirements. Since the late 1970^s it rapidly diffused between academics as well as policymakers and is now integral part of the toolbox of national and international organizations like the OECD and UNCTAD. However, even though the approach has steadily grown in its explanatory density, there are still many white spots to discover. One of this current research gaps is the role of venture capital finance as a component of the financial system, and its interdependencies with the various subsystems, and with exogenous factors.

1.2 Motivation

A vivid venture capital industry does – or at least is able to do – a major contribution in shaping the environment in which innovations occur. As financial intermediaries, specialized on managing new knowledge based firms, they represent the link between the classical financial market which provide the capital and the entrepreneur who engages in innovative activities.

This thesis is motivated by recently observed phenomena which indicate a changing industrial paradigm in the venture capital industry, namely the changing pattern from local to international investment activities. This movement seems to have the potential to fundamentally change some of the whole industry which where up to now just considered as given. Though, also a change in the predominant scientific paradigms can be expected. Furthermore, this changing paradigm appears as highly suitable to illustrate the systematic and evolutionary characteristics of venture capital and thus highlighting them contributes to the understanding of underlying mechanisms.

1.2.1 The *Naive* Theory

The process of innovation, from a first naive perspective, requires two input factors, knowledge and capital. Both of these goods seems to be highly fungible,

mobile and easy to transport and locate wherever they are needed; in other words, weightless [Leadbeater, 2000]. Insofar, matching both of them – the major tasks of venture capitalists – should not be a matter of space, though.

Consulting neoclassical theories regarding the input factor knowledge supports this impression. The process of knowledge creation and distribution is envisioned as one with zero or at least negligible marginal costs [Arrow, 1962]. Once the overhead is paid and the initial knowledge is created, it can be duplicated and transferred almost effortlessly. These public good features of knowledge lead to market failure, caused by missing incentives and externalities. Not surprisingly, neoclassical theory is more concerned about the *ex ante* incentives to create knowledge than about the *ex post* distribution of it. When an appropriately designed incentive system leads to the creation of knowledge, *ex post* it is commonly available and, if not protected by intellectual property rights, will be used where it is needed.

The second input factor, capital, appears to be even more more mobile. Modern financial markets are highly information efficient, instantly providing price signals, and tremendous amounts of capital can be transferred to every destination almost effort- and costless. Indeed, they can be seen as what comes closest to the archetype of the perfect market in neoclassic theory, a numerous sequence of arms-length exchanges between anonymous actors, only driven by price signals. Agents on these markets are assumed to apply strict situative determinism of substantial rationality, and modern information and communication technology instantly provides price signals and all other necessary information for the buying and selling decision. Insofar, there is no need for establishing persistent relationships or even know anything except of prices about the trade partners to use financial markets as an investment vehicle.

1.2.2 The *Old* Paradigm

However, naive theories lack in explanatory power to capture industrial paradigms observed in the real world. The distribution of capital and knowledge undeniably shows pattern of spacial concentration [Porteous, 1999]. In the following I shall highlight the most questionable neoclassical assumptions which led to the gap

between theory and practice, followed by a brief description of the nowadays predominant academic and industrial paradigm of spacial proximity in venture capital.

For the concentration of knowledge around certain locations and organizations, recent literature suggests two reasons. The tacit characteristics of knowledge and the importance of interaction during the process of knowledge creation. I briefly introduced the neoclassical understanding of knowledge, that can be reproduced and transferred to negligible marginal costs. This necessarily presupposes that the recipient understands the language or symbols the knowledge is communicated with and is capable of interpreting and using this knowledge. In reality this often is not the case, since some knowledge cannot be expressed properly in a standardized language. I could read a whole textbook about advanced ice skating, but I doubt that it would give me a major edge the first time I am really on ice. Polanyi [1966] classifies human knowledge as consisting of *explicit* and *tacit* elements. Where *explicit* (or *codified*, how also widely used) elements are easily transmittable through the use of a standardized formal and systematic language such as mathematics, *tacit* elements are context depended, and show a tendency to stick to individuals, organizations and locations [Nelson and Winter, 2000]. Furthermore, knowledge from the current scientific or professional frontier is – due to its very nature – complex and contains novel elements, which cannot be properly expressed with existing formal languages and symbols. To transmit tacit knowledge between individuals, personal contact, interaction and face-to-face communication are of high importance [Von Hippel, 1994].

As a consequence, the creation and distribution of knowledge cannot be envisioned as an isolated process, where individuals draw from an existing pool of freely available existing knowledge and then improve or augment it. It is an interactive process between individuals and organizations, such as producers, users, universities, research institutes *et cetera* [Lundvall, 2010]. The higher the novelty, the higher the tacitness and the need for interaction. Additionally, science is getting more and more complex and often the success of one discipline is highly dependent on the outcome of another discipline. These different scientific disciplines such as biotechnology and informatics do not share common systematics of expressing language, and as a result much what would intradisciplinary be consid-

ered as codified shows more tacit characteristics if transmitted interdisciplinary, since the recipients different knowledge base may not enable them to encode and interpret it [Cohen and Levinthal, 1990]. For firms and researchers operating at the scientific frontier, establishing relationships dedicated to the exchange of knowledge, such as research communities, strategic alliances, and maintain upstream (producer) and downstream (user) relationships is of high importance, though.¹ These relationships establish and intensify through through social interaction, and social interaction is commonly negatively affected by increasing geographical distance [e.g. Blau, 1964; Bossard, 1932].

However, even though there exist justified reasons that knowledge and its production concentrate around certain locations, organizations and individuals, the question still remains if and why its finance has to do so as well. The archetype of an agent on modern financial markets makes his decision based on purely profit maximizing rationales.² The information that enables her to do her assessment, such as a companies valuation, performance history, stock price developments *et cetera* are highly codified and through modern ICT almost instantly and exhaustively available. Insofar, in the financial sphere there should be no need for personal contact, interaction and the formation of persistent relationships; my main arguments that call for spatial proximity.

The described situation is to a certain degree true in financial investments in general, but loses much of its validity in the case of investments in new technology based firms. Investments in this kind of firms is, due to their very nature, subject to the uncertainty Knight [1921] describes, which makes most traditional investment instruments obsolete. The emergence of these firms usually goes hand in hand with a innovations, embedded in the firms unique intangible assets, based on up to now unproven organization concepts, technologies or markets. Hence, on the level of particular investments, a reliable *ex-ante* prediction of either the likelihood success or on its impact becomes an almost impossible task.

¹Even early work of Marshall [1920] takes the need for frequent and reciprocal inter-organizational and -personal exchange into consideration when explaining agglomeration economics

²Well, one could question the assumption of rational agents and claim that instead they are overconfidence and greedy, guided only by the expectations of short-run profit and herd behavior, as vividly illustrated by the last financial crisis [Bikhchandani and Sharma, 2000; Blanchard and Watson, 1983; De Long et al., 1989; Kirman, 1993].

However, at this point we have to distinguish between this archetype an agent on financial markets and venture capitalists – and keep in mind that the latter only exists because the former fails in providing finance to new knowledge based firms. Based on knowledge and not on tangible assets, the assessment of the firm can only be done by agents that understand this knowledge and are able to estimate the future value of it. This is, among others, the justification for the existence of venture capitalists, who are specialized financial intermediaries that combine financial, industry and technical knowledge, which is novel and complex, often from the scientific frontier; in other words, highly tacit.

Now we are exactly in the same argumentation I used before and see, that through the tacitness of the content, all arguments I stated in favor of spacial proximity are here valid too. Beside the value of knowledge, venture capitalists also have to assess the entrepreneurs capability to commercialize it. Facing a lack of historical codified data, the only way is to know the entrepreneur, an outcome of an established relationship. This process is time consuming and requires personal contact to transfer this tacit knowledge between the portfolio company and venture capitalist. Not surprisingly, the vast bulk of literature [e.g. [Powell et al., 2002](#); [Von Burg and Kenney, 2000](#)] characterizes venture capital investments as a local business.

1.2.3 The *New Paradigm*

Recently, a growing body of literature [e.g. [Aizenman and Kendall, 2008](#); [Baygan and Freudenberg, 2000](#); [Guler and Guillén, 2010](#); [Gurung and Lerner, 2010](#); [Schertler and Tykvová, 2009](#); [Wright et al., 2005](#)] provide evidence for this industrial paradigm to change towards more global investment pattern. [Hain and Willeke \[2011\]](#) illustrate with what they call the *Venture Capital Paradox* the unique position of the United States as global venture capital hub in this new paradigm. They show how the mature venture capital industry of the united States channels capital from international institutional investors and distribute them to promising targets all over the world.

A venture capitalist vividly states in [glo \[2004\]](#):

“VCs who once bragged about never driving more than half an hour to visit a portfolio company are jetting to Australia for optical engineers, Israel for security whizzes, India and Kazakhstan for brute software coding, South Korea for online gaming, and Japan for graphics chips. For growth across the board, China is the place to go.”

and later adds

“VCs in Silicon Valley used to pride themselves on being local [...] That was well and good when the U.S. was the mecca for technology.”

In line with this research and practical observations, I claim the contemporary industrial as well as scientific paradigm of spacial proximity between knowledge and finance as partially obsolete. Reasons therefore can be found in globally changing preconditions such as the sophistication of information and communication technology, diminishing transportation costs, regulatory harmonization, trade liberalization and cultural harmonization.

However, I suggest fruitful explanations to be found on industry level, where the knowledge bases, routines and codes of practice may have changed, resulting in new forms of organization. The accumulation of knowledge in mature venture capital industries – such as we find in the United States or the United Kingdom – may enable them to operate in new modes and with an increased division of labor. In fact I claim that this manifests in a specialization of mature venture capitalists towards international rather than local investments. The formerly as homogeneous considered venture capital industry in an evolutionary process becomes more and more heterogeneous. This growing internal variety mobilizes the potential for synergies through combining complementary resource and knowledge-bases; differently stated makes the establishment of intra-industry networks and strategic alliances lucrative. I suggest that the development of inter-industry networks between venture capitalists enables them to overcome the obstacles of cross-border investments and thus to be the major reason for the internationalization of venture capital.

1.3 Research Question and Design

1.3.1 Specifying the Research Question

Identifying the underlying mechanism which induce the phenomenon of venture capital internationalization appears to be an interesting and promising avenue of research, especially when applying a systematic and evolutionary framework. It describes the story of a industry with very distinctive features, highly volatile and fragile, and crucial for shaping a nations innovation system. An industry in between and connecting both spheres as different as one could imagine, the highly calculative financial one ruled by large calculative institutional investors and the dynamic entrepreneurial one, responsible for the real innovation output.

It is rather surprising that research on venture capital up to now neglects its interdependencies between supply and demand as well as with with other components of the innovation system and is often reduced to best practice case studies of a few regions with a vivid venture capital industry, such as literatures paragon, the Silicon Valley [e.g. [Hellmann and Puri, 2002](#); [Kenney and Florida, 2000](#); [Saxenian, 1996](#)].

Venture capital industries may react very sensible on changes in the economic preconditions and institutional setup. To give some examples, [Samila and Sorenson \[2010\]](#) observe the relationship between the availability of venture capital and entrepreneurial activities and come to the conclusion that this availability only has a significant impact if particular side-conditions such as the engagement of the government in R&D support, are fulfilled. [Avnimelech et al. \[2006\]](#) provide a comparative case study which illustrates the emergence of the venture capital industry in the United States and Israel from a highly evolutionary perspective and provides manifold vivid example of path dependencies and the accumulation of events which shaped the current national markets. [Mäkelä and Maula \[2008\]](#) provide an explanatory model for venture capital cross-border investments which includes firm parameters as well as economic and institutional ones, such as the venture capitalists home markets size and social capital. Nevertheless, beside these positive examples, the major share of former research applies static neo-

classical approaches, which bothers neither with the industries dynamics nor with its the systematic character.

To start filling this gap, this thesis shall be a first attempt to provide synthesis in an integrative model of international venture capital financing, which includes the supply as well as the formerly often neglected demand side of venture capital and emphasizes its (co-) evolutionary character. The case of venture capital is of particular interest since we are able to observe the internationalization of something that was always claimed to be local but now becomes international. Here, the internationalization manifests in the horizontal rather than the vertical dimension of the process, or stated differently, in intra-industry networks and organizational innovation.

In this thesis I shall demonstrate how venture capitalists are able to overcome cross-border investment obstacles through the formation of intra-industry networks, how this networks develop in and at the same time shape an innovation system. Instead of breaking investment allocation decisions down on a set of macroeconomic and political determinants – as fashionable in research regarding the international allocation of venture capital investments [e.g. [Bonini and Alkan, 2009](#); [Groh et al., 2007](#); [Romain and Van Pottelsberghe, 2004](#)] – I attempt to offer a more comprehensive approach, which contains indicators for the supply and demand of venture capital as well as the link between them, social capital and networks which distribute information regarding opportunities and foster the emergence of trust between the actors. Hereto I draw from three streams of literature and theories.

Prerequisite for every investment is the existence of a promising venture to invest in, though the demand for venture capital, determined by the outcome of the national innovation system. Consequentially, the flow of cross-border venture capital can be explained either with similarities or with differences between systems and the resulting supply and demand variation.

Prerequisite for every syndication is that it leads to higher benefits than a stand-alone investment. Resource-based theories [[Barney, 1991](#); [Dierickx and Cool, 1989](#); [Penrose, 1959](#); [Rumelt, 1991](#); [Wernerfelt, 1984](#)] offer exhaustive arguments how the combination of complementary resource bases can lead to beneficial synergy effects [[Teece et al., 1997](#)]. Furthermore, the very process of interaction

between heterogeneous actors may increase their absorptive capacity [Cohen and Levinthal, 1990].

To explain the emergence of distant networks between heterogeneous groups, I draw from the rich body of literature regarding *bridging and bonding* and *social capital* theories. In line with the chosen dimensions of my research, I shall consider as well theories which emphasize the community's or society's [Coleman, 1988; Fukuyama, 1996; Portes, 1998; Putnam, 1993, 2000; Woolcock, 1998], firm's or organization's [Dasgupta and Serageldin, 2001; Podolny, 1994, 2001; Podolny and Page, 1998; Uzzi, 1996] or network configuration [Burt, 2000; Granovetter, 1973] perspective. I also introduce the notion of *international social capital* [Autio, 2004; Autio et al., 2005] to distinguish between a nation's internal and external relationships.

In highly dynamic and uncertain environments such as venture capital investment, and in absence of perfect information and complete contracts, actors to some extent simply have to trust in each other. Accepting this, it is obvious that identifying the mechanisms how trust emerges and develops between venture capitalists, brings us one big step closer to the explanation under which circumstances venture capitalists decide to establish a relationship between each others. As analytical framework I consult the work of Rousseau et al. [1998], which distinguishes between institutional, calculative, and relational trust. An advantage of this taxonomy is that it can be easily projected to the different dimensions of my observation. Whereas the former one is associated with the institutional setup and thus the national dimension, the latter two refer to the characteristics of the industry and finally the particular firm. To summarize, the major research questions my thesis is dedicated to, are:

- I. To what extent can domestic venture capital investments be explained by macro- and socioeconomic factors?
- II. To what extent can cross-border venture capital flows be explained by geographical, social, institutional and cognitive proximity between countries?
- III. To what extent can cross-border venture capital flows be explained by the opportunities offered by differences in the knowledge base, production and financial system, and socioeconomic factors between countries?

- IV. How can syndicated investments be explained with opportunities created through the heterogeneity of venture capitalists?
- V. To what extent does social capital and (calculative, institutional and relational) trust between countries and actors explain cross-border venture capital flows?
- VI. What are the characteristics of venture capital firms that show a propensity to invest internationally.

1.3.2 Methodology

To reach my goal of providing a comprehensive model of international venture capital, I shall proceed as follows. Firstly, an exhaustive literature research regarding the academic discussion on venture capital in general will be carried out, followed by in-depth studies of the further theories to be applied, namely decision making under uncertainty, the resource-based view, and theories regarding trust, social interaction and social capital, and network theories. After a general discussion, these theories will be, *mutatis mutandis*, introduced to the specific context of venture capital financing and finally brought to a synthesis which provides a foundation for the framework to be developed. The research up to here is done theoretical, in a descriptive and deductive manner, by using mainly secondary sources. Findings will be augmented with and contradictions clarified through interviews with selected industry experts, academics as well as professionals. As a result, a comprehensive and synthesizing model of international venture capital investments will be developed, and testable hypotheses will be derived thereof. In the following, an econometric analysis, using primary data from a state-of-the-art M&A database, will be conducted. Later, the findings will also be used in an inductive approach to augment the developing framework with additional insights obtained during the observation.

1.3.3 Limitations

Even though or maybe especially because this study is designed to be as comprehensive as possible, it is subject to some limitations in context and method.

First, the range of countries under study is rather limited, since it only includes Europe's major economies plus the United States and Japan. Reasons therefore are mostly associated with the lack of important data, such as bilateral trust and information regarding the configuration of national innovation systems. However, if sufficient data would be made available, an inclusion of countries such as Canada, Israel, China, Brazil *et cetera* would without doubt lead to interesting insights and foster the understanding of the worldwide pattern of venture capital flows. Especially the increased heterogeneity between countries and a more even distribution of the distance between them.¹ Second, due to constraints in time, space and available data, the empirical analysis omits an important dimension, namely the one between syndication partners. To provide sufficient empirical evidence for the rationales of venture capitalists to cooperate with a certain syndication partner, this dimension has to be addressed in follow-up studies in the future.

1.3.4 Structure of the Thesis

This thesis is structured as follows: *Chapter two* shall provide a brief overview of the venture capital industry in general, its historical development, and a literature review including some criticism in former research. Furthermore, selected issues regarding venture capital of particular importance for the following theoretical framework will be discussed in detail and augmented with own interpretations and reflections. Major attempt here is to apply selected building blocks of the *National System of Innovation* approach, namely systematic and evolutionary theories, the process perspective, user – producer interaction and the importance of the institutional setup in the context of venture capital.

In chapter three to five shall be dedicated the major building blocks of my theoretical framework of the dimensions of international venture capital flow. *Chapter three* discusses the effects and problems which may arise if investment decisions have to be made under high uncertainty. I illustrate why this is the case when it comes to the financing of innovation in general and particularly in

¹Up to now we only have Europe, where everything is relatively close, and the United States, which are far away from all the rest.

venture capital investment. Focusing on the different actors in the investment process, their rationales and knowledge base, and the degree of tacitness of the knowledge content, it is shown how the dimensions and amplitude differ between the stages of the process. Finally I illustrate how the industry developed new forms of organization which enables them to cope with increasing uncertainty.

Chapter four introduces theories regarding the resource-based view to the context of venture capital financing, pronouncing the possibilities of utilizing synergies by combining the complementary resources of heterogeneous actors. Again, this is done with a process perspective, distinguishing between the involved actors on different stages, but emphasizing inter-industry relationships. It is demonstrated how the division of labor and the resulting differences in social, human and intellectual capital mobilize opportunities for international cooperation between venture capitalists.

Building on the former discussion, *chapter five* introduces the last major building block of my framework, the role of trust and social capital in financing innovation. In a theoretical discussion I criticize former economic interpretations and applications of the concept trust in economic research and discuss the importance of trust especially in uncertain setting, where a lot of tacit knowledge exchange and the formation of persistent relationships is necessary. Afterwards this is projected on the context of venture capital finance and it is claimed that trust represents a powerful mean to overcome uncertainties. Again, it is shown how the importance of trust in general and the weight of its dimensions differ between the stages and actors in the investment process.

Chapter six provides a synthesis, where all formerly discussed aspects are unified in a comprehensive theoretical model with the attempt to explain the rationales of international venture capital investments. Beside classical macroeconomic factors, an emphasis is put on the socioeconomic dimension. As explanatory dimensions are selected the awareness of investment opportunity, the opportunity created by them, the associated uncertainty, and trust between the actors. In a nutshell, it explains cross-border venture capital flows on the one hand by similarities and proximity, which facilitate interaction and communication, on the other hand by differences and distance, which create opportunities by

combining complementary resources. During the development of the framework, hypotheses to be tested in the econometric analysis are stated.

This analysis is done in *chapter seven* on three levels. First on country level, the effect of general macroeconomic and additionally socioeconomic determinants on domestic investments and the networking activities of the domestic venture capital industry are observed. Afterwards, a observation between country dyads is conducted. Here, especially the effects of geographical, social and cognitive proximity and distance and bilateral trust on venture capital investments are tested. At last, on firm level I observe the characteristics of venture capitalists that show a propensity for cross-border investments.

Finally, *chapter eight* summarizes the theoretical and empirical insights provides during the thesis and offers some concluding remarks. Afterwards, the contribution of the thesis, practical and theoretical implications are discussed, followed by pointers for further research.

Chapter 2

An Introduction to Venture Capital

Preface

Despite its undoubtedly positive effects in facilitating innovative and entrepreneurial activities, venture capital still represents especially in Europe a widely unknown investment practice. Therefore, this introduction shall provide a brief summary of the most important topics regarding venture capital. After giving a general description and definition, the historical development of the venture capital industry from its emergence in the United States to its worldwide diffusion will be provided. Furthermore, selected building blocks of the *National System of Innovation* approach, namely systematic and evolutionary theories, the process perspective, user – producer interaction and the importance of the institutional setup will be briefly discussed in the context of venture capital. Finally most influential academic work on this field will be summarized, followed by some own comments and critique.

2.1 Basics and Definition

Venture capital is not only an important source of capital for new knowledge based ventures, but also an investment tool that has become an highly interesting option among the wide variety of investment vehicles available. Nevertheless, in the European environment, dominated by traditional investments, such as stocks and bonds, venture capital is probably one of the least understood asset classes of financial markets. Since still different definitions and understandings of venture capital exist, I firstly shall clarify my position in the discussion.

In traditional portfolio and investment theory, venture capital is categorized as a subset of private equity, whereas private equity is a subset of so-called alternative investments, which include all investments that do not resemble the classical portfolio. Here venture capital is classified as highly risky investments. The route of capital to its final dedication can be broken down to two distinct stages. Firstly the collection of capital from sophisticated investors and its pooling in investment vehicles, usually called funds, where the process of gathering capital is the *fundraising* period, and secondly its investment in promising high growth ventures.

The understanding of the concept of venture capital finance applied in this thesis will be based on the extension of classical [Wright and Robbie \[1998\]](#) definition by [Mäkelä \[2004, 12\]](#), who characterizes venture capital investments as:

“... (1) [T]he investment by professional investors of long-term, unquoted, risk equity finance in new firms where the primary reward is an eventual capital gain, supplemented by dividend yield, and (2) the monitoring of the investments and adding value to investee firms.”

2.1.1 The Mission of Venture Capitalists

High-growth oriented entrepreneurial ventures represent important drivers of economic development. They create dynamics, foster innovation, generate wealth, and contribute to employment and sometimes shape whole economic cycles with introducing radical innovation into the economic organism [[Schumpeter, 1927](#)]. They are mostly active in rapidly growing, knowledge-based and technology driven sectors, and often own almost no assets beside a great idea and knowledge

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[Landström, 2007]. Typically these entrepreneurs are no educated and experienced manager but scientists or visionaries, superior in their special field but lacking in primary management skills. Without a specific amount of initial financial capital plus access to business competence and networks many of them would not be able to survive. This is the domain of venture capitalists, who can offer superior business guidance, access to networks and a sufficient amount of capital for firms, where they expect a high growth potential.

2.1.2 Organization

A key organizational innovation in venture capital financing was the *Limited Liability Partnership* model, which has become the dominant form of financing venture capital investments since the late 1980^s. Here capital is raised from several private, corporate and institutional investors and then bundled in a fund by the venture capitalist. Once the money is collected, the venture capitalist distributes it between promising young firms (called portfolio companies, abbreviated PC) with high growth potential.

The venture capitalist acts as *general partner*, who acquires equity (in most cases a minority stake) of the portfolio company and is afterwards actively involved in steering and monitoring its further development. In most cases venture capitalists place themselves in the company's management board. As compensation for this effort, they charge an annual management fee plus a share of the funds carried interest. In contrast, the financiers (called *limited partner*, abbreviated LP) are not involved in the funds and the portfolio company's management and only benefit from the development of the funds value. With investing in the fund, they obtain the right of their share of profits after the funds execution, but no property rights in the funds companies.

In the last two decades, another organizational form has grown in importance, namely fund-of-funds. This funds invests not directly in portfolio companies but in composition of different funds. Since this adds an additional management fee layer, they can be seen as a trade-off between investment risk and return, representing the investors shifting preferences in direction of globally and sectoral diversified portfolios.

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To summarize, the venture capital investment process consists of two stages with substantially differing characteristics, the *investor-to-fund* or *limited partner-to-general partner* (LP-to-GP) stage and the *fund-to-target* or *general partner-to-portfolio company* (GP-to-PC) stage. Owing respect to the ongoing tendency to carry out international investments in a syndicate of venture capitalists, the in-between stage *venture capital syndicate* can be added.

2.1.3 History and Background

The historical roots of venture capital as an economic phenomenon can be traced back several centuries. Wealthy individuals and institutions always had the tendency to want to accumulate even more wealth and hence to invest in highly profitable, yet also risky ventures. For instance Christopher Columbus' voyage to (what he believed to be) India was a highly risky and finally profitable investment financed by Queen Isabella of Spain. Throughout economic history, one can find manifold examples where risky private equity investments fostered the development of new high-growth industries, such as the construction of channels, steamships or railroads, which in the end shaped entire economic cycles and laid the basis for wholly new industries [for an exhaustive discussion about the role of finance in introducing new technological revolutions, c.f. [Perez, 2004](#)].

The modern venture capital industry can be seen as a professional and formal emergence of the historical private and informal venture capital markets. The first professional venture capital firm, American Research and Development (ARD), was founded 1946 in Boston by academics from the Harvard Business School and MIT in cooperation with professional financiers. Its major purpose was to finance high-potential university spin-offs, contribute to the commercialization of university research findings and fosters the economies knowledge transfer. Later, large scale venture capital financing strongly fostered the growth of high technology clusters, such as the Silicon Valley. In 1958, first limited partner concepts established as the major form of venture capital financing and helped to diffuse venture capital financing practice in the United States by separating investors from the fund managers. Here capital is raised from *Limited Partners* such as private, corporate and institutional investors who are – more or less – just providers of

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capital. In contrast, the venture capitalists act as *General Partner*, who acquires equity (in most cases a minority stake) of the portfolio company and is afterwards actively involved in steering and monitoring its further development.

The emergence of the first professional venture capital firms in Europe can be observed in the 1970^s in the United Kingdom. Until the late 1980^s, the European venture capital market was growing only modestly. This changed tremendously during the 1990^s in the wake of an euphoria that resulted in the dotcom bubble. Motivated by the successful example of the United States, European countries began to build up secondary stock markets for high-tech IPO's.¹ This offered venture capitalists comfortable and lucrative exit options, which they, driven by the surrounding euphoria, heavily used. During the peak of the bubble, the venture capital market swamped worldwide, but was heavily shaken by its final burst. Nowadays, venture capital financing represents a – more or less – established investment practice in all of the world's major economies. Nevertheless, most global venture capital activities are still funded by venture capitalists based in the United States, reflecting the maturity of the market and the sophistication and unique skill of the fund managers [Aizenman and Kendall, 2008]. Only Europe's most mature venture capital industry in the United Kingdom could up to now reach a comparable level of activity in terms of relative investment amounts, frequency and cross-border investments. For an exhaustive summary of the historical roots and development of venture capital, consider for Gompers [1994]; Landström [2007].

2.1.4 Venture Capital from a Systematic Perspective

In the following, selected building blocks of the *National System of Innovation* approach will be briefly discussed in the context of the venture capital industry. By doing so, a first understanding of the interdependencies between the development of the venture capital industry with environmental preconditions and historical events shall be provided.

¹As most important can be listed the *Neue Markt* in Germany, the *Alternative Investment Market* in the UK, the *Nouveau Marché* in France and later the *EASDAQ* a pan-European secondary stock market. Finally, with the burst of the dotcom bubble, these markets also failed.

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The environment the particular venture capital firm is embedded in substantially shapes its behavior and determines the resources it can draw from. First, the domestic demand for venture capital and possible supply of capital from institutional investors shapes its' initial set of opportunity. Very early, List [1841] illustrated how the characteristics of a firms *home market* may leverage their international competitive position. Though, one may assume that firms in countries with a high demand for venture capital, the outcome of the national innovation system, and the supply of capital, determined through the predominant financial system and public policy, substantially influence its success and likelihood of international investments.

Obviously, venture capitalists located in highly innovative environments have, regardless of their own skill and experience, *a priori* better chances to bring firms to successful exits. Venture capitalists located with a capitalistic system that promotes alternative investments¹ have, *ceteris paribus*, less trouble in collecting the necessary capital for their funds from institutional investors. Also, venture capitalists in countries with a vivid stock market have, *ceteris paribus*, *a priori* a higher probability to lead their portfolio companies to a favorable exit via IPO. Furthermore, a countries education system is also likely to influence the quality of venture capitalists, who have to combine technical with managerial knowledge.² Finally, the sectoral composition of the national production system and focus of the education system also matters. For instance, the United States are the home of a comparably strong ICT industry, whereas Germany is more known for its mechanical engineering and car industry, though the population of new knowledge based firms in this particular sectors which are suitable for obtaining venture capital finance, obviously can be assumed to be higher in countries with strong sectoral specialization and excellence.

¹To give an example. Capitalistic systems of the anglo-saxonian model are *inter alias* characterized by a lack of public retirement plans. Pensions are usually arranged by corporate or labor union pension funds. These funds often reach a tremendous size and are some of the main players of the global investment market. They in general do not have to bother to much with short term characteristics and are therefore more encouraged to take long term investments, such as private equity and venture capital, in their portfolio. Indeed, pension funds are the worldwide biggest investors in venture capital ?

²The *typical* venture capitalist holds a industry related technical master or PhD degree plus a MBA.

2.2 Literature Review

In the last two decades, venture capital has received increasing attention in the academic community, which nowadays provides a very rich and diverse body of literature. Major objective of this section therefore shall be to position the venture capital discourse in a larger domain and provide a brief summary the most relevant parts of the underlying literature in relevant strands of research. Even though it can be drawn from an enormous body of literature, there still exist research gaps of high importance, which I shall also highlight. Furthermore, I shall provide some epistemological caveats, wherever the currently dominant approaches appear as inappropriate, from my process-oriented, systematic and evolutionary point of view. For a general overview regarding the current state-of-the-art in venture capital research, the consideration of the work of [Landström \[2007\]](#) can be recommended.

2.2.1 The Pioneers of Venture Capital Research

Regarding the emergence of venture capital financing as an economically relevant phenomena, [Gompers and Lerner \[2004\]](#) provides a detailed overview of the historical development and its causes and consequences. During the 1990^s, venture capital started to receive growing attention from the academic society. Building on what venture capitalists exactly do [[Gorman and Sahlman, 1989](#)] and what characterizes venture capital financing in general [[Sahlman, 1990](#)], following research cascaded in various streams. Most contributions are accounted to the strand of management literature, where the major focus lays on the venture capitalist firms themselves. Here exists a voluminous amount of research how venture capitalists evaluate potential investments and choose portfolio firms [[Bruno and Tyebjee, 1986](#)], which kind of assistance they provide them [[Barney et al., 1996](#); [Barry et al., 1990](#)], how contracts and governance structures are or should be designed [[Cumming and Johan, 2009](#)] *et cetera*. Further streams of research of particular interest for this study will be reviewed separately in the following.

2.2.2 Value Added by Venture Capitalists

Scholars spend enormous effort on identifying the non-financial contribution of venture capitalists to their portfolio companies. Beside financial capital, a crucial aspect of venture capital is the provided additional support and guidance. Often venture capitalists occupy board positions in the new firms, actively engage in the administrative management duty and ensure a market compatible strategic perspective [Bygrave and Timmons, 1992]. They identify and correct unconscious and ill-considered behavior of inexperienced entrepreneurs [Berglund et al., 2007], contribute to the professionalization of start-ups [Hellmann and Puri, 2002] and pave the way to the introduction to the stock market [Barry et al., 1990; Maula and Murray, 2002] or other exists. Furthermore, they create missing links to other supporting actors such as lawyers, consultants, suppliers *et cetera* and introduce the entrepreneurs to professional networks [Hellmann and Puri, 2002]. The entrepreneurs in turn also seem to be aware of the superior value adding capabilities of high-reputation venture capitalists and aim for them, even if the offered financial conditions are inferior to what would be offered by venture capitalists with a lower reputation [Hsu, 2004].

2.2.3 Venture Capital Internationalization and Cross-Border Investments

During the last decade, scholars recognized the ongoing internationalization of venture capital and started to conduct research on this topic. To the best of my knowledge, the OECD report of Baygan and Freudenberg [2000] is the first study that in-depth investigated this phenomena. They came to the conclusion, that the increasing international investment activities of venture capitalists increase the efficiency of the global allocation of capital dedicated to innovative activities and reduce the importance of domestic supply factors in favor of domestic demand factors, such as creativity, innovation, risk-taking and entrepreneurship. In fact they show that in some markets foreign venture capital investment already outweighs domestic investment. Some influential papers that augmented this new stream of research are now briefly reviewed.

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Pruthi et al. [2003] studies differences in the behavior of foreign and domestic venture capitalists when investing in a portfolio company in the case of the United States and India. They observe that cross-border venture capitalists are more involved on the strategic level, while domestic ones tend to focus on the operational level.

Regarding the path of diffusion of venture capital investment practices, Kenney et al. [2002a,b, 2004] claim the driving force behind this movement to be the internationalization of U.S. venture capital firms, which were seeking for new investment opportunities abroad, first in Europe later in Asia. Besides determinants indicating excess supply and demand for venture capital in different countries, they are to the best of my knowledge the first who also discuss the role of cultural links, social and economic exchange, labor mobility *et cetera*, for instance if U.S. trained immigrants return to their home country to foreign venture capital firms.

Owing respect to the changing industrial paradigm, Megginson [2004] attempts to offer a global model of venture capital, where he comes to the conclusion that the biggest obstacles for the development of true global venture capital investment markets are differences in legal systems among countries. He illustrates how U.S. venture capital and European private equity are heavily dependent on legal regimes, which are nation-specific and not easily transferable. He also emphasizes the importance of vibrant national stock markets for the development of the venture capital industry.

Wright et al. [2005] review and synthesizes research on the internationalization of venture capital and provides contentual and methodological suggestions for further research. They criticize that most research up to now was designed as cross-country comparison and highlight the contemporary under-researched issues regarding the influence of institutional contexts especially the role of social networks and cultures. As promising avenues for research on cross-border investment activities, they suggest applying resource-based, capabilities, institutional and network theories.

More recent, Schertler and Tykvová [2009, 2010] investigate the determinants of cross-border venture capital flows in a country-pair setting. They report that venture capital tends to flow from countries with low to countries with high eco-

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conomic growth. For many surprisingly, they report that a higher stock market capitalization and a more favorable environment for venture capital intermediation lead to lower net cross-border inflows. These findings reveal the importance of country pair instead of cross country comparing observations. Results of the latter commonly suggested a high market capitalization and favorable regulatory environment investments in a country to be more lucrative and thus leading to higher venture capital inflows. In contrast, the findings of the here applied country pair setting suggest that venture capitalists located in more facilitating investment environments to exploit their advantages in foreign markets with less favorable conditions. In conclusion venture capital inflows from abroad may compensate a underdeveloped domestic investment landscape.

[Guler and Guillén \[2005, 2010\]](#) emphasize the role of institutional factors explaining cross-border venture capital flows and come to the conclusion that venture capital firms prefer to invest in countries with technological, legal, financial, and political institutions that create innovative opportunities, what they measure by the level of scientific knowledge and technology. Furthermore, they find strong evidence for network and learning effects and report that venture capital firms tend to replicate the past foreign entries of their syndicate partners and after accumulating international investment experience, they are more likely to overcome constraints related to institutional distance.

2.2.4 The Venture Capitalist – Entrepreneur Relationship

In venture capital theory, most economists accept principal agent models as most appropriate to conceptualize the relationship between the venture capitalist and the portfolio company. Hence focus in research agenda lay on designing contract mechanisms that secure the investor against moral hazard and opportunistic behavior and create incentives for the entrepreneur to overcome adverse selection and incomplete information problems [[Akerlof, 1970](#); [Stiglitz and Weiss, 1981](#)]. To be fair, seldom the literature offers different approaches which capture this relationship more interactive and evolutionary. [Arthurs and Busenitz \[2003\]](#) argue that in the uncertain venture capital industry, principal agent issues may be second order problems, [Cable and Shane \[1997\]](#) provide an alternative approach,

based on game theory. [Sapienza and Korsgaard \[1996\]](#) propose procedural justice theory as a fruitful approach. They describe the entrepreneur – venture capitalist relation as one in which trust and commitment are crucial for reducing the need for costly information, governance and management mechanisms.

2.2.5 Venture Capital Networks and Syndication

The phenomenon of syndications, the joint investment of at least two venture capitalists in one portfolio company, recently attracts considerable attention by scholars. Even though it is only a small part of the whole picture, scholars realized for one or another reason that it is one of major importance. I argue in the same line and hence put an emphasis on this stream of literature. Existing literature focuses on the rationales of syndication and resulting benefits [[Lerner, 1994](#); [Manigart et al., 2002, 2006](#)], their compared performance [[Ferrary, 2010](#); [Maula and Murray, 2002](#)], how syndicates are structured [[Wright and Lockett, 2003](#)] and the determinants for the emergence and development of syndication networks [[Bygrave, 1987](#); [Sorenson and Stuart, 2001, 2008](#)].

Rationales to syndicate presented by the literature can be classified as follows: (i.) portfolio diversification and risk sharing, (ii.) increased coaching and scouting capacity through the combination of complementary assets, (iii.) increased deal-flow, (iii.) reciprocity and social reasons pertaining to network position [[Lerner, 1994](#)]. Not surprisingly, the valuation of these rationales differs considerably across the academic disciplines. Furthermore, a change over time from emphasizing deterministic financial to nowadays more on intangible rationales can be observed.

Scholars with background in finance explain attribute syndication mainly with portfolio optimization through diversification, as one can find it all through classical financial theory. Through capital pooling, syndications are a mean to attain a widely spread portfolio and minimize the risk of individual investments by given returns [[Fiet, 1995](#)]. Through the spread of investments across different sectors and geographical regions, furthermore sources of systematic risk can be eliminated [[Manigart et al., 2006](#)]. However, even though this explanation obviously has practical relevance, it also has been criticized. Since venture capital is by def-

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inception a risky investment, some scholars argue that the systematic risk cannot be eliminated on fund level [Manigart et al., 2006], some rise even the question why venture capitalists should try to do so. Casamatta and Haritchabalet [2007] argues that there is no need for diversification at all, since the (mostly institutional) investors already use the vehicle venture capital, which only accounts for a small fraction of their portfolio, for the reason of asset diversification.

A second stream of literature offers a quite different perspective whit mobilizing resource-based theories. It is argued that through syndication, venture capitalists increase their scouting and coaching capabilities by combining complementary assets. Maula and Murray [2002] stress the importance of intangible assets, embedded in the firms' cumulated stock of knowledge. Through the division of labor, venture capitalists develop heterogeneous knowledge bases consisting of mostly tacit knowledge. Combining these complementary assets leads to a better *ex ante* selection and better *ex post* management support of the portfolio companies, which increases their firms survival rates and performance [Bygrave, 1987; Manigart et al., 2006]. To give an example how complementary assets can be combined in a fruitful way, Chemmanur et al. [2011] observe a specialization of venture capitalists for local or international investments. While the former attain superior expertise regarding their local market, its dynamics and regulatory features, the latter are experienced in assessing business plans from a *global* perspective, guiding international expansion and paving the way for the introduction to international capital markets. Bygrave [1987] also argues favor of the resource-dependence theory that especially in highly uncertain investments, the motivation for the firms to syndicate arises primarily from the need to share information.

Inspired by Nahapiet and Ghoshal [1998], Mäkelä and Maula [2008] augment this view by extending the resource based arguments with the additional resources that can be mobilized through the syndication partners networks, and stress the importance of the actors social capital for the syndication decision. Bygrave [1987] furthermore emphasizes the reciprocity of syndications, which results in further deal flows for the involved actor by broadening their investment possibilities. Podolny [2001] refers to relational and social reasons for syndication networks

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and argues that they reflect the venture capitalists need to elevate and maintain their social status in investment networks.

Tykvová and Schertler [2008] argue that syndications are a powerful mean to overcome transaction costs related to geographical and cultural distance. Tacit information, which require geographical as well as social and cognitive proximity to be transferred efficiently, are gathered by the local venture capitalist, which can is able to do so with minimal transaction costs. The local venture capitalist transforms them to a small set of important codified information, which can be transferred to international partners with minimal effort.

Complementary, the literature also provides empirical evidence for the positive performance related effects of syndicated investments and syndication networks. Brander et al. [2002] investigate the returns of venture capital investments in the USA between 1992 and 1997 and report higher average returns (measured in IPO and trade sales valuation) for syndicated investments. Recent research also takes the structure of syndicated investments into account. Hochberg et al. [2010] find evidence that the location in investment networks matters and observes significantly higher returns for venture capitalists in a central network position. Chemmanur et al. [2011] investigates how the setup of syndicates influence their performance and report that cooperations between local and foreign investors on average lead to a higher probability of firms survivor and higher post IPO performance.

2.3 Limitations, Research Gaps and Criticism

I criticize most existing literature regarding venture capital in at least five points and thereby point out current research gaps.

First, literature focuses either on the relationship of venture capitalists with the portfolio companies or the decision of institutional investors, in which venture capital fund to invest. Beside the exception of Groh [2011], the whole process of investment through the venture capitalists vertical network is not taken into account. A eclectic theory that convincingly connects the financial with the entrepreneurial sphere of venture capital financing is desperately missed.

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Second, most existing macroeconomic studies on venture capital are of highly descriptive nature. They meticulously observe investment-quantities and isolated allocation determinants, but fail in deriving meaningful political implications. To the best of my knowledge there exists no coherent approach that succeeds in connecting the micro- and macroeconomic level of venture capital investments. The interdependencies between a country's institutional setup and the behavior and possibilities of the venture capitalist are commonly neglected.

Third, theory also lacks in a connection between national and international venture capital studies. The former observe the causes and consequences of venture capital domestically, the latter the determinants which trigger cross-border venture capital flows and describe their characteristics. The influence of foreign sources of capital, knowledge and networks as well as promising investment targets on a national economy is commonly neglected.

Fourth, the majority of macro-studies on venture capital are designed surprisingly static. Historically grounded evolutionary theories able to explain the creation and development of a national venture capital industry are, except of a few positive examples [e.g. [Avnimelech and Teubal, 2008](#); [Avnimelech et al., 2006](#)], sorely missed.

Fifth, when offering policy implications and recommendations, focus lies almost exclusively on the supply side of venture capital. This leads to common advices such as the increase of venture supply demand via public investment or the creation of investment incentive such as capital gains tax reduction, assuming that the capital then automatically channels through a capable venture capitalists to a suitable venture. Money is commonly considered as adequate substitute for a holistic consideration of the environment necessary to develop and maintain a sustainable domestic venture capital industry.

Chapter 3

Uncertainty and the Financing of Innovation

Preface

Novel ideas, inventions and concepts are due to their very nature always related with the Knightian concept of uncertainty. If something is new, unproven and not even entirely understood up to now, obviously its future development and impact on the society and economy cannot be completely predicted. This chapter shall discuss the problems which may arise if investment decisions have to be made under high uncertainty, first in general and later particularly in venture capital investment. Focusing on the different actors in the investment process, their rationales and knowledge base, and the degree of tacitness of the knowledge content, it is shown how the dimensions and amplitude of uncertainty differs between the stages of the process. Finally it is illustrated how the venture capital industry developed new forms of organization which enables them to cope with increasing uncertainty.

3.1 Theoretical Background

Prior to the following discussion, it has to be distinguished between risk and uncertainty. When talking about risk, I will refer to the perceived probability of loss as interpreted by the decision maker [Chiles and McMackin, 1996; MacCrimmon et al., 1988]. Since it contains a probability, one is able to optimize expected profits by optimizing the risk and return ratio of a investment portfolio. Venture capital investments are usually characterized as highly risky investments. On a highly aggregated level, such as diversified fund-of-fund investments, that may be true. Single venture capital investments are more subject to true uncertainty, as it is described by Knight [1921]. Neither the outcome of an investment nor the corresponding probability are entirely predictable. In a funds portfolio, usually the vast bulk of portfolio companies cannot be brought to a successful exit, while it also may contain some really big successes that develop to high-growth *gazelles* such as Skype, Facebook, Medtech *et cetera*. In general, venture capital investments are statistically characterized by a high variance and a fat-tail distribution of returns [Cumming, 2010]. However, to depict the successes of chosen firms as totally random would not be right either. What we call uncertainty is basically a result of insufficient information about possible *states of nature* and/or insufficient capabilities of interpreting available information, thus agent-dependent [Knight, 1921]. While an investment on the stock market would be highly uncertain for a totally uninformed and unexperienced private agent who spontaneously decides to test her luck, it would be way more predictable for an informed and experienced professional investment banker.

On the other hand, a direct venture capital investment would be highly uncertain for the investment banker too, because the information to assess the investment are not codified and available on official datastreams she commonly uses, but have to be gathered by herself, since no efficient information market for new knowledge based firms exists [Fiet, 1996; Fiet et al., 1997]. And even if she had the information, they are not of the kind that can be used with the methods of her analytical toolbox. That is why she never would invest, and that is basically why venture capitalists exist. Agents in general may be willing to accept more or less uncertainty in their professional work, but no agent is willing to

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constantly work in a state total uncertainty. Imagine an investment banker that makes his living with investments randomly chosen by his college, a chimpanzee that throws darts on a stock market chart. Without doubt, the chimpanzee represents a very inappropriate and uncertain method to predict outcomes, though the whole scenery sounds somewhat ridiculous.¹

Still the question remains, what is different about the work of venture capitalists that makes an investment less uncertain for them and their methods more appropriate? In this thesis I argue that it is their unique knowledge base and the resulting absorptive capability, that allows them to progressively convert what for others would be uncertainty to predictable risk. One could say that they are financial intermediaries specialized on uncertainty management. Venture capitalists specialize in acquiring particular types of information, which reduces the costs, time and effort of gathering and interpreting them Hayek [1945]. In the context of the *learning economy* [c.f. e.g. Johnson, 2011; Lundvall and Johnson, 1994], they can be seen as the outcome of learning processes in the financial markets to provide proper financing processes for knowledge based entrepreneurial ventures, which is not given by the traditional capitalistic market systems [Dosi, 1990].

Polanyi [1966] classifies human knowledge as consisting of *explicit* and *tacit* elements. Where *explicit* (also called *codified*) elements are easily transmittable through the use of a standardized formal and systematic language such as mathematics, *tacit* elements are context dependent and personal, hard to formalize and transmit over distance but rather through face-to-face contact and interpersonal interaction, though [Arrow, 1962; Von Hippel, 1994].

Uncertainty management is more about the latter, the dealing with tacit knowledge. Venture capitalists reduce the uncertainty of an investment by gathering tacit information through intense direct interaction with the entrepreneur, their extensive intra- and inter-industry networks and combine them with their knowledge base, and finally transform them to a set of selected explicit and formal information. As Hanusch and Pyka [2007, 283] state:

¹Even if the investment portfolio chosen by chimpanzee Lusha in the same manner in a Russian study 2010 outperformed 94 percent of the portfolios set up by Russian investment bankers.

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“Basically, owing to the increased techno-economic opportunities within knowledge-based economies going hand in hand with the strongly felt uncertainties of scientific and technological innovation, venture capitalists appeared as a blend of financial and technological knowledge, focusing on acquiring capital for risky innovative start-up companies.”

In the following I shall depict which uncertainties appear through the investment process and how the actors deal with it. Ferrary [2010] provides a taxonomy of four types of uncertainties attributed to investment in new technology based firms, namely (i.) managerial uncertainty (quality of the entrepreneur/founder), (ii.) product uncertainty (the quality of the product), (iii.) market uncertainty (the reaction of the market) and (iv.) financial uncertainty (capability to inject the required capital to maintain the business). I argue that these uncertainties are major determinants in explaining the pattern of cross border venture capital flows and syndications, which I will elaborate in the corresponding subsection.

3.2 Uncertainty along the Investment Process

3.2.1 Uncertainty in the Venture Capitalist – Entrepreneur Relationship

When observing the uncertainty along the investment process, the relationship between the venture capitalist and the entrepreneur is of particular interest, since most tacit knowledge accumulation and transformation mentioned above is supposed to happen here. On this stage, the venture capitalist as well as the entrepreneur still have to face all of Ferrary’s uncertainties.¹

First, in the initial investment assessment, the venture capitalist is confronted with the managerial uncertainty regarding the entrepreneurs’ capabilities and intentions. Usually, venture capitalist and entrepreneur have no relationship prior to the investment, thus the initial assessment regarding the entrepreneurs’ characteristics such as personality, honesty and integrity, intellectual and managerial

¹When talking about the venture capitalists, here I first shall have a local one in mind. However, with an foreign venture capitalist in a stand-alone investment, the depicted uncertainties still, in fact they appear in an even higher magnitude.

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capability have to be made in a comparably short time. The presence of codified information such as a track record of prior entrepreneurial successes facilitate this process, but even in their absence, as for instance in the case of fresh entrepreneurs out of the research society, venture capitalists still have to be able to do this assessment. Necessarily this has to be done based on intuition and rules of thumb, embedded in the routines and (tacit) knowledge base of the venture capitalist and developed through accumulated experience through prior investments. The initial assessment of the entrepreneur is nothing that can be learned in textbooks and guidelines (even though a large body of them exists), but rather acquired through *learning-by-doing*. I furthermore argue that to handle managerial uncertainty, venture capitalists use social networks to gather tacit knowledge on the entrepreneur and her project before investing. The first funding of the seed stage is used as a *learning by collaborating* situation in which investors collect knowledge in order to convert uncertainty on start-ups into risk [Ferrary \[2010\]](#).

Second, in case of young venture capitalists without much reputation and lacking a long term track record, or countries with a small or underdeveloped landscape of institutional investors, the firm may also face serious problems in raising sufficient capital for its managed funds. If the venture capitalist can not predict the possibility of raising a sufficient amount of funds for follow-up investments in the portfolio company, this leads to financial uncertainty. This is particularly valid in sectors where after modest initial values, soon huge ramp-up investments are necessary, as for instance in biotechnology.

Third, the venture capitalist faces product, market and technology uncertainty, which are always to some degree present when investing in innovative and therefore unproven products, processes or services. The degree of uncertainty faced in these dimensions is mainly determined by the maturity of the portfolio company and the sector it operates in. Investments in very young companies or even only ideas without an existing company at all, as it is the case in the seed or early stage investment, are obviously subject to a higher degree of uncertainty. There exists none or little public information or performance history and thus no way to forecast the further development in a deterministic way. As higher the novelty of the product, technology or organizational concept, as harder to assess them.

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The maturity of the sector and industry the portfolio company is operating in also highly influences the surrounding uncertainty. Industries in embryonic phases are subject to a tremendously higher degree of uncertainty, since neither the reaction of the market nor the quality of the technology can be properly determined. In these pre-paradigmatic phases, where the dominant design of technology is not established yet, the risk to *bed on the wrong horse* during the *standard race* is high. Furthermore, in sectors, where the knowledge base is mainly of tacit nature, as it is usually the case in emerging sectors, the initial assessment of the product is more complicated.

To summarize, the overall uncertainty the venture capitalist has to manage, is mainly influenced by (i.) the entrepreneurs track record, (ii.) the demanded scale of investment, (iii.) the tacitness of the portfolio company's and sector's knowledge base, (iv.) the maturity of the sector and (v.) portfolio company, and (vi.) the product's, services' or concept's novelty.

The higher these uncertainties, the higher the need of gathering tacit knowledge through frequent face-to-face conversation and as a consequence, the higher the need for spatial proximity, though. This mainly stylizes the present scientific paradigm of venture capital investments. It can in a nutshell be explained more or less with the message of mainstream economic theories on internationalization [e.g. [Dunning, 2000](#); [Hymer, 1979](#); [Vernon, 1966](#)]: What is new, novel and small stays close, what is old, standardized and big goes far.

3.2.2 Uncertainty in Venture Capitalist Syndicates

I argue that syndications between venture capitalists are the most powerful mean to overcome problems associated with uncertainty that call for spatial proximity, thus are the driving forces of the internationalization of venture capital investments. Now my attempt is to show, that the uncertainties a foreign venture capitalist has to face, are in case of syndication with a domestic expert mostly absorbed by the latter, thus the need for spacial proximity becomes redundant.

In the following, I assume that the domestic venture capitalist acts as *lead investor*, who initially spots the investment and thereby obtains the *informal privilege* of inviting others to co-invest. The lead investor usually originates the

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first round of funding and is afterwards most closely involved in the portfolio company's operational management and monitoring [De Clercq and Dimov, 2008; Lerner, 1994; Manigart et al., 2006]. The co-investing *passive investors* commonly do not develop strong ties to the portfolio company and take a more supportive role; they review and evaluate strategic questions and plans, create links to other network partners, *et cetera*. This form of organization in syndicated investment has established as an informal rule in the venture capital industry [De Clercq and Dimov, 2008]. In seldom cases the role of the lead investor is not performed by the domestic venture capitalist, but usually in this cases the local venture capitalist still performs the direct management support, as the following quote of an interviewed venture capitalist from the United Kingdom states:

“The cases when a foreign portfolio company directly applies for funding in our headquarter are relatively rare. Usually we get suspicious if they can or want not find an local investor. However, sometimes the investment really seems promising, then we try to get an local investor who is used to the market conditions, has some domestic networks and is willing and able to manage the day-to-day support on board.”

I start considering the former and more common case, when a local venture capitalist discovers a promising firm, organizes the first investment round and invites further venture capitalists to co-invest. From the perspective of the co-investor, the entrepreneurial uncertainty can be almost ruled out, since the evaluation was already done by the local venture capitalist, who considers the entrepreneur as capable. Thus, if the local partner gathered all necessary tacit knowledge and did the assessment properly, the first source of uncertainty is already absorbed, assuming the local venture capitalist is considered as trustworthy. The role of trust between venture capitalists is crucial at this point. Since I consider this topic later in a separate chapter, for the sake of brevity we here only need to know that venture capitalists have much better possibilities to assess the capabilities and trustworthiness of industry colleges than of an entrepreneur, for reasons such as that they may already had a prior relationship, build up a reputation, and codified informations such as track records of prior investments are available. As a result, most uncertainty associated with missing tacit knowledge

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regarding the entrepreneur and the portfolio company are of minor importance for the foreign venture capitalists investment decision.

What is left is the consideration and assessment of mostly codified information such as the potential of the portfolio companies sector, used technology and market potentials. In the case of a syndication between two venture capitalists who usually invest in their home market, this will not change too much on this stage. Maybe the foreign investor can add experience from his home market, but the uncertainty reducing impact is assumed to be of minor importance, except of the case when this market is of high importance for the portfolio company. However, I assume the case where venture capitalist with a local and international specialization invest together as more likely. As a result of the already discussed division of labor, the international venture capitalist has accumulated more experience in the *macro* selection of portfolio companies based on codified information and the assessment of the international competitiveness of products and technologies, though decrease the market and product uncertainty.

Finally, since the the financial burden is shared now, the financial uncertainty decreases. Since we are talking about uncertainty, this can not be understood as risk sharing that now is divided between the participants. It can be more understood as the pooling of financial capital which secures that unexpected higher capital demand can still be provided – given that the investment still is assessed as lucrative.

3.2.3 The Investor to Venture Capitalist Stage

On the top tier of the investment process, the major share of tacit knowledge is transferred and reduced to a small set of codified informations relevant for the capital allocation decisions of institutional investors. All types of uncertainty associated with the portfolio company's quality are already absorbed by the venture capitalists. Interesting findings hereto are reported in recent research [Groh, 2011; Groh and von Liechtenstein, 2010; Groh et al., 2007] on the investment allocation determinants of institutional investors in venture capital funds. They – for many surprisingly – report that the indicators for innovativeness, entrepreneurial activity and economic growth of the funds destination country are of less impor-

tance than determinants of uncertainty on country level such as lacking property right protection and corruption. Most influential are quality indicators of the venture capitalists in charge of the fund management, such as the track record, reputation and local market experience.

These findings are consistent with my theory when interpreted as follows. On country level, institutional investors do not bother to much with the potential and uncertainties associated with the economy and portfolio company. If the available and mostly codified historical information regarding the venture capitalist indicate a high probability of success, it can be assumed that the micro selection and uncertainty reduction is done properly, thus only country specific uncertainty beyond the influence of the venture capitalist matters.

3.3 Résumé

This chapter aimed to provide a comprehensive discussion regarding the causes and consequences of uncertainty in the venture capital investment process. I showed how the dimensions and degree of uncertainty substantially differs between the stages of this process. In general, uncertainty can be associated with a lack of relevant information or the lacking ability to interpret them. Information from the scientific frontier usually contains a high share of tacit elements, which are difficult to transmit over high geographical and cannot be interpreted without a certain degree of cognitive proximity.

Additional to the technical superiority of the product or concept, the quality of management of the potential investment target is critical for its success. Since historical performance data is rarely available for new technology based firms, this is a forward-looking assessment, based a lot on intuition, rules of thumb and the personal impression of the entrepreneur.

Typical investors on financial markets such as investment banks have neither the time to gather nor the ability to interpret this information. This is in fact one of the major justifications for the existence of venture capitalists as financial intermediaries. Equipped with relevant technical and scientific knowledge to capture the potential of the former, they also take the time and bring the competences to asses the latter.

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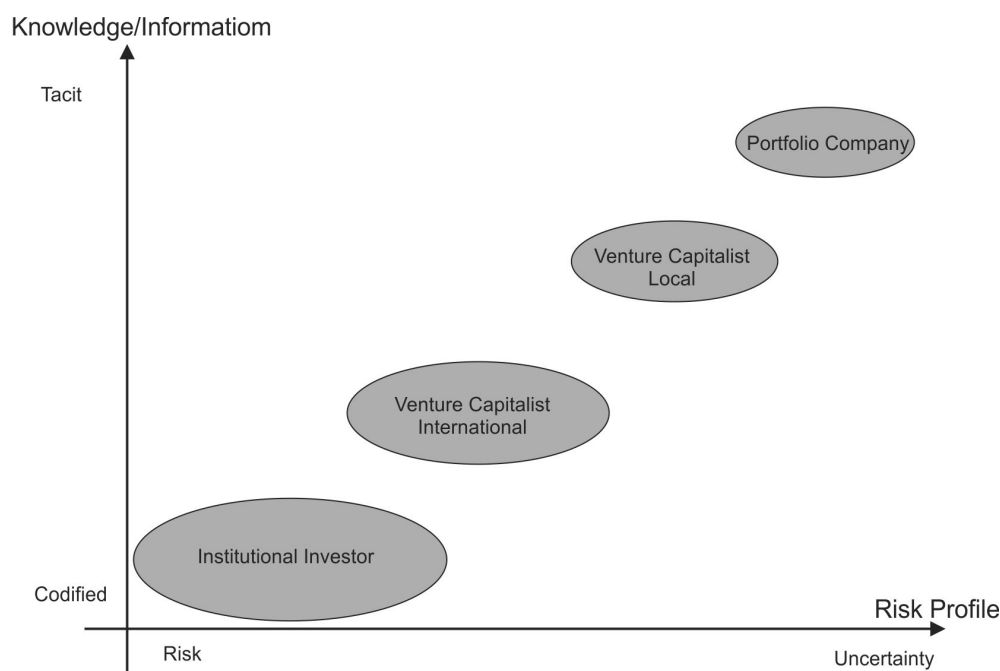


Figure 3.1: Risk, Uncertainty and Knowledge Bases on the Investment Stages

After exhaustive assessment, the gathering of tacit information, constant monitoring and supervising the companies leadership, the venture capitalist has transformed something highly uncertain in – lets say – something highly risky with a certain degree of residual uncertainty. Besides the general uncertainty reducing coaching and scouting quality of the venture capitalist, which can be roughly approximated by historic fund performance, the residual uncertainty is mostly determined in the national and sectoral dimension. Thus, a venture capitalists decision to join a syndicated as well as an institutional investors decision to invest in a fund are determined by (i.) the reputation of the leading venture capitalist, the uncertainty associated with (ii.) the operating industry sector and (iii.) country, whereas portfolio related details are of minor importance. This kind of information is mostly codified and public available, thus these of investments are, from an investors viewpoint, generally associated with a lower uncertainty.

Furthermore, investment portfolio diversification can be used as a mean to reduce the portfolio company associated uncertainties. All these facts facilitate the flow of capital across national borders and over long geographical, social and

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institutional distances, especially in the higher stages of the investment process. Figure 3.1 illustrates the characteristic of investments in the different stages in information and uncertainty space. Table 3.1 provides a summary of highly stylized facts regarding the uncertainty and related characteristics on the different stages of the investment process.

Table 3.1: Stylized Facts – Risk and Uncertainty in the Investment Stages

Stage	Investor to Venture Capitalist	Venture Capitalist Syndicate	Venture Capitalist to Portfolio Company
Risk Profile Uncertainties	Risk Market, Technology	Modest Market, Technology, Product	High uncertainty Managerial, Financial, Market, Technology, Product
Knowledge Base Diversification Specialization	Codified High Asset/Portfolio Management	Mostly tacit Medium Network & Technology Management	Tacit Low Uncertainty Management

Finally it can be stated that, *ceteris paribus*, the investors or syndication partner will choose the deal associated with the lowest uncertainty, which means managed by reputable venture capitalists, in a stable economic and political environment, and mature sectors with a predictable future development. However, a low uncertainty cannot be the only determinant of the investment decision. If investors would be absolutely risk adverse in general, in fact nobody would invest in venture capital funds at all. But in the context of innovation, together with the uncertainty there always comes an opportunity to obtain above normal profits. As [Keynes, 1936, 157] notes:

“Investment based on genuine long-term expectation is so difficult [...] as to be scarcely practicable. He who attempts it must surely [...] run greater risks than he who tries to guess better than the crowd how the crowd will behave.”

An interviewed venture capitalist vividly illustrates this fact with stating:

“Basically, there are only two things we venture capitalists have to balance: greed and fear. if we are to greedy, we have to play with higher stakes. The really predictable investments are the ones everybody can do, so we have to be braver or cleverer than the rest.”

Chapter 4

Venture Capital and the Resource-Base

Preface

As argued in the previous chapters, syndications between venture capitalists is considered as an important mean to overcome obstacles and utilize opportunities associated with cross-border investments. To explain the benefits that may arise out of the syndication as a form of strategic alliance itself, the resource-based view has proven as very rich in explanatory power. This chapter therefore shall introduce theories regarding the resource-based view to the context of venture capital financing, pronouncing the possibilities of utilizing synergies by combining the complementary resources of heterogeneous actors. Again, this is done with a process perspective, distinguishing between the involved actors on different stages, but emphasizing inter-industry relationships. It is demonstrated how the division of labor and the resulting differences in social, human and intellectual capital mobilize opportunities for international cooperation between venture capitalists.

4.1 Theoretical Background

A strand of research I deploy as building block for my framework are theories of the resource-based view of the firm [RBV; Barney, 1991; Dierickx and Cool, 1989; Penrose, 1959; Rumelt, 1991; Wernerfelt, 1984]. Here, the firm is envisioned as a set of tangible and intangible resources, embedded in and interdependent with an organizational structure. The unique endowment, configuration and utilization of resources determine a firm's competitive advantage. To create a sustainable long-run competitive advantage, these resources have to be heterogeneous and not perfectly mobile [Peteraf, 1993], though they will neither be perfectly imitable nor substitutable [Barney, 1991]. Originally, these theories consider the firm as independent entity, whereas more recent work includes a firms network and alliances as valuable resource [Lavie, 2006]. During the last decades, cascading strands of literature augmented resource-based theories with additional facets, for instance emphasizing the role of knowledge as valuable resource [Grant, 1996] or the importance of historical time, path-dependencies and dynamics in a firms resource base and the capability to utilize them [Teece et al., 1997]. Noteworthy is the model of intra-firm social capital and its interdependencies with intellectual capital provided by Nahapiet and Ghoshal [1998, 243], where social capital is, coherent with the resource-based view, understood as the extend to which further resources can be drawn from the network of a social unit.¹

This will be my theoretical point of departure. Obviously, against the background of venture capital financing, I concentrate on innovation driven by entrepreneurship (Schumpeter Mark I), rather than by large multinational enterprises (Schumpeter Mark II). Without doubt, interfirm networks, strategic alliances *et cetera* are of high importance for both, but resulting from very differ-

¹Some comments regarding the nature of this resources have to be added. First, we cannot *a priori* assume that the *the more, the better* theorem holds for all of this assets. According to the overall systematic view i apply, all of these resources are strongly interdependent not only with each other but also with the specific environment they are embedded in. Second, from our process perspective, they are never static but always in transition – they endogenously change with every task performed. Every new task performed comes in line with learning, which increases the intellectual and human capital. Intra- or inter-organizational creates and reinforces relationships and thus social capital, while others may at the same time be neglected and diminish. Third, the historical accumulated stock of this resources mainly shapes their present effectiveness and efficiency.

ent resource bases, the characteristics and implications also differ substantially between them. In particular I emphasize the role of intellectual, human and social capital as valuable resources. In my further work, resource-based theories are deployed to explain the potentials of synergies by combining complementary resources – or in venture capitalists’ jargon: the potentials for adding value – in the relationship between venture capitalists and their portfolio company. Beside the skill to scout the best investment targets, the post-investment value adding by providing access to complementary resources is in fact the venture capitalists primary possibilities to achieve above-average rents, compared to traditional investors.

4.2 Synergies in the Venture Capitalist – Entrepreneur Relationship

To identify the theoretical possibilities how, we first have to take a closer look at the different resources a firm consists of, and in which way the may be composed differently in the case of new knowledge based firms.¹ Burt [1992] distinguishes between three forms of resources: (i.) financial capital, (ii.) intellectual and human capital,² and (iii.) social capital. This very simple taxonomy has proven as rich in explanatory power and it is smoothly applicable in my theoretical framework.³ With pronouncing intellectual instead of physical resources I come

¹Commonly the term *new technology based firms* is used to describe potential portfolio companies. However, in this work I instead use the term *new knowledge based firms* to emphasize the importance of knowledge, which often but not necessarily goes hand in hand with certain technologies. The term *knowledge based entrepreneurship* is sometimes used as a synonym, depending on the content.

²Burt only uses the term *human capital*, but in this context I also add *intellectual capital*. Both are related to knowledge, where the former is more associated with tacit knowledge of particular individuals or groups, the latter more with codified knowledge that is transferable between individuals and thus has to be protected with intellectual property rights.

³One may also add physical capital, such as buildings, machines, production plants or laboratories, as predominant factor in orthodox economics. However, in my understanding they can all be substituted with financial capital. The case where some physical sources are that scarce that access to them can not be obtained with financial capital should be rather seldom and therefore negligible. However, putting an emphasis on intangible rather than tangible appropriately reflects the modern understanding of the innovation process and the origin of comparative advantage.

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closer to a knowledge-based view of the firm, and with adding social capital I additionally capture the embeddedness of the firm in relationships and networks.

All of these resources are vital for new knowledge based firms. However, it can be assumed that they may be lacking in at least one, if not all, of them. First, as it is the curse of most start-ups, the required financial capital is very likely to exceed what the individual entrepreneur can raise alone. One could argue *à la* Schumpeter, for a venture promising enough, the necessary financial capital will be provided by the capitalists, respectively financial markets. However, as discussed earlier, modern capitalistic systems show a tendency to fail when it comes to the financing of new knowledge based firms [Dosi, 1990]. Market based systems, notoriously driven by short-run profit expectations, are unwilling to provide capital to firms which are expected to not provide fast returns. Bank based systems have a more long-run perspective, but due to risk aversion they are also unwilling to provide capital to ventures which are not backed by sufficient securities. Additionally in the case of new technology based ventures, in both systems, the agents responsible for the investment decision mostly lack in competence to assess the quality of unproven technologies and concepts.

If we agree that all necessary knowledge to produce an innovation is can not gathered in one particular individual or even small organization, and furthermore that innovation as an interactive process, we soon come to the conclusion that the embeddedness in networks able to provide complementary knowledge is of high importance. Additionally to scientific knowledge, for entrepreneurs founding and running a firm, knowledge regarding other supporting activities such as accounting, legal issues *et cetera* is also of high importance for the ventures success. For sure there are very experienced entrepreneurs which have accumulated a comprehensive stock of operative knowledge through higher management positions, education in business schools, former entrepreneurial activities *et cetera* and thus are at are at least in the beginning capable perform the task necessary for running a business.

However, in the case of new knowledge based firms, founded by former researchers, this is very likely to not be the case. Furthermore, since we consider innovation as an interactive process, the interaction for its own sake, for instance between users and producers, is valuable and creates new intellectual capital.

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Gathering the necessary resources for running the firm through social and professional networks and relationships though is one of the crucial tasks of every entrepreneur. The resources that can be mobilized in that way strongly depend on the size, strength and configuration of the entrepreneurs network and thus our third necessary resource, social capital. But again, in the case of new knowledge based firms, also insufficient social capital outside of the own sector can be assumed.

Without doubt, exceptions of entrepreneurs with high developed networks can be found, who are able to draw almost all necessary resources from it. Then obviously the possibilities of venture capitalists to add value are from a resource-based view very limited. In this case, only the venture capitalists ability to scout a promising target is of value, and even this should not be a big challenge, since a entrepreneur with such a sophisticated network should be a beacon for every investor.

However, the story gets more interesting if the entrepreneur is lacking in one or all resources to some extent, as it is usually the case for new knowledge based firms. Here the venture capitalist are able to provide sufficient financial capital through her funds, human capital through own managerial and financial knowledge, and access to own well developed networks. In fact, as reported by [Bengtsson and Hsu \[2010\]](#), venture capitalists choose their investment targets according to the expected possibility to add value by complementing lacking human resources of the firms management team.

4.3 Synergies in Venture Capitalists Syndicates

In the previous sections I discussed the role of valuable resources for a new knowledge based firms, and which problems may arise if the firm is lacking in them. Now I raise the question, how a syndication of venture capitalists may be able to add even more value by drawing from a larger pool of potential complementary resources.

The vast bulk of literature more or less implicitly treats venture capitalist as a homogeneous population, comparable in rationales, mode of practice and capabilities. However, to mobilize resource based arguments for syndication, venture cap-

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italists by definition have to be heterogeneous, at least in terms of their resource base. As already stressed, when talking about resources I include the knowledge embedded in a firm as well as the extent and configuration of its network, which are both very likely to differ between venture capitalists. Reasons therefore can be found in the evolution of the industry and the resulting specialization pattern as well as in the localness of tacit knowledge. Not to use my later arguments in advance, at this point I just state that nowadays there coexist different concepts of specialization in the venture capital industry, without bothering with the reasons here. While the major share of venture capitalists still shows a distinct sectoral specialization, others have changed to a *multi-sector* investment pattern. The same is valid for the geographical distribution, where traditional local investors as well as national and international investors. Furthermore, a specialization in a particular stage of finance is possible, where some venture capitalists focus on start-up and even pre-start-up financing of really novel and unproven ventures and ideas, others usually join in later more stable stages with higher amounts of capital and pave the firms' way to public capital markets. These specialization dimensions in combination show a large set of combination of geographical and sectoral specialization and diversification. As a result, the patterns of their network also differs. With ongoing specialization, through repeated interaction inside the same population, the resulting network tends to consist of more close ties between more homogeneous actors, while a higher degree of diversification tends to result in a network consistent of mostly weak ties with heterogeneous actors .

This heterogeneity due to specialization also offers, dependent on the characteristics of the portfolio company, various potential synergies that could be achieved by combining the heterogeneous resource base of venture capitalists. In general, it appears as beneficial to have a local investor on board, who is able to maintain frequent communication and active day-to-day-management participation as well as the proper monitoring of the firms performance. As an internationally active venture capitalist interviewed by [Mäkelä and Maula \[2008, 249\]](#) states:

“The contribution of the local investor is very important. It is very important to be physically close. Geography and culture have an effect. We

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would not invest without a local investor. Good ventures probably always have a local VC. The local investor also knows a lot about the law. They have important information on the local market.”

But what kind of contribution could in turn the foreign venture capitalist bring in the game? Here we can distinguish between three cases. First, a foreign venture capital firm with strong ties to the domestic market can offer valuable knowledge of and access to market and scientific networks. This is of particular importance, if this country represents an important market or contains important research communities related to the sector the portfolio company is active in.

Second, a foreign venture capital firm less geographically specialized but rather active international, may instead provide a widespread international network of weak ties, experience in assessing technologies and products with a broad *global* view and access to international capital markets. This is of particular importance in sectors with a high pressure for a fast internationalization or a globally distributed research landscape. As a international active venture capital fund manager specialized in biotech investments states:

“Usually, we leave most of the day-to-day support to the local partners. That just makes sense. We don’t go too much into detail, but observe the overall picture, steer a bit from time to time to keep them in a promising strategic corridor and create missing links. Especially in the sector we are operating it’s important to get the firm as fast as possible in the right networks, and mostly they are not local. That’s our advantage.”

Third, sectoral specialized venture capitalist can provide sophisticated knowledge regarding the specific technologies and products in and is likely to have a denser network in this sector, though be able to provide superior support in coaching and developing the portfolio company. This is of particular relevance for portfolio companies located in countries that may not have the appropriate knowledge base to support their development.

However, nowadays the lines between sectors can not always be drawn sharp. It is not uncommon that new knowledge based ventures operate in some niche in between two sectors, for instance a software company that develops special

programs for the biotech industry. Additionally, modern cutting-edge technology and science in a particular sector is often highly depended on the results produced in many different sectors [Pavitt, 1984], thus multi-sector operating venture capitalists may contribute with their broad set of knowledge and ties all across sectors.

4.4 Résumé

To summarize, venture capitalists can be seen as a heterogeneous population, which originates from historical path dependent developments, the unique environment they are embedded and emerging specialization pattern in the industry. Venture capitalists either specialize or diversify their knowledge base and network in sectoral and/or geographical space.

As a result of this heterogeneity, resource-based theories suggest the potential of synergies through combining complementaries, which leads to a higher potential to add value to the portfolio company and ultimately achieve above average returns.

Chapter 5

Trust, Networks and the Investment in Innovation

Preface

It appears as if neither the optimization of expected returns in financial theory nor principal agent and transaction cost theory are sufficient to comprehensively explain the venture capital investment process, which builds a bridge from the entrepreneur to the institutional investor, though stretches over a long cognitive and organizational distance. Owing that fact, we are in need for additional approaches and theories to explain the situation a venture capitalist has to face. In contrast to neoclassical theory, where economic transactions are carried out as anonymous market exchange, the necessity for interactiveness and frequent exchange of information results in a persistent relationship between the actors. Establishing and maintaining such a relationship is costly, and is only done if the actors expect it to be beneficial. Due to the uncertainty surrounding venture capital investments, this relationship is governed by implicit rules of practice rather than formal control mechanisms. Though, mutual respect, loyalty, reliability – and as a result trust – between the actors is of high importance. To provide a solid theoretical foundation, this chapter briefly discusses predominant economic interpretation of trust, and afterwards illustrate how trust is of particular importance for venture capital investments and the formation of syndicates.

5.1 Theoretical Background

5.1.1 A Definition and Taxonomy of Trust

As already pointed out, the understanding and application of the concept of trust substantially differs between and inside the scholarly disciplines of social science, such as economics, sociology and psychology. To provide an applicable framework for this thesis, I shall use an interdisciplinary understanding of trust, provided by Rousseau et al. [1998, 395]. Here, trust is defined as:

“... a *psychological state* comprising the intention to accept *vulnerability* based upon *positive expectations* of the intentions or behavior of others.”
[emphasis added]

This definition contains useful features for my further conceptual work. As a psychological state, trust is always rooted in the minds of individuals. It is not a concrete action, but it may be cause or consequence of one. Vulnerability, which is nothing else than the risk, is stated as a necessary condition for trust. Though, if actions can be undertaken with complete certainty and no risk, there is no need for trust. Uncertainty and risk always appear in situations we can neither completely predict nor control. In context of a persistent social or economic relationship, this assessment about if the partner intends and is able to act appropriately in standard and unpredictable future situations. Though, trust can be seen as a necessary condition for economic exchange in a world of imperfect markets, asymmetric information and incomplete contracts. As Burt [1992, 15] states:

“In a perfectly competitive arena, you can trust the system to provide a fair return on your investments. In the imperfectly competitive arena, you have only your personal contacts.”

The article of Rousseau et al. [1998] also provides a taxonomy of three forms of trust, differing substantially in their causes and consequences, namely: (i.) *Calculus-based trust* is determined mostly based on rational choice [Williamson, 1993]. The truster perceives positive intentions and competences of the trustee on basis of the available set of information about her, such as data on the performance history and credible informations provided by others – the trustee’s

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reputation. A trustee's reputation also signals her positive intention, particularly in cases where good reputation has a high economic value and losing it causes serious long-run losses.

(ii.) *Institutional trust* is created through the institutional environment –the set of fundamental political, social and legal ground rules that establishes the basis for production, exchange and distribution [Williamson, 1990] – in which the trustor and trustee are embedded. It includes hard institutional factors related to the legal framework and its enforceability, such as the protection of property right and the effectiveness in setting up contracts as well as soft factors, such as a teamwork culture, a society's attitude to behave fair and honest and if necessary carry out sanctions for misbehavior.

Finally, (iii.) *relational trust* emerges out of repeated interactions over time between trustor and trustee. Proofs of behavioral consistency and successful fulfillment of expectations accumulate and lead to more positive expectations regarding the trustee's future behavior. Furthermore, as emotional factors enter the assessment, the long term interaction leads to the development of reciprocal interpersonal care and concern [McAllister, 1995]. Whereas the first two forms of trust represent facilitating exogenous factors and preconditions for the relationship, this is the point where trust becomes endogenous and develops further during the relationship.

Furthermore it can be distinguished between generalized and personalized forms of trust. Generalized trust refers to the belief in the good-willingness of people in general or at least big parts of, such as trust between two countries, whereas personalized trust is restricted to a particular social entity. Whereas the former is mainly shaped by the society and culture the subject is embedded in and thus relatively static and exogenous, the latter is determined endogenously in the relationship. Repeated interaction leads to a common understanding, better behavioral predictability of the partners and the emergence of trust.

5.1.2 Trust in Economic Theory

In neoclassical theory, there is no place for trust and there can be none. In the perfect market commonly assumed by neoclassicals, agents are anonymous, act

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rational on basis of all necessary information that are assumed to be given. Buying and selling decisions are governed by the price mechanism, and relationships between buyers and sellers appear and disappear spontaneous. Thus, there is no need to build up and maintain relationships at all, no way to disclose necessary information and as a consequence of it, no need for trust.

Due to the acceptance of market failure, this view has changed over time. Neo-institutional and transaction cost economics emphasizes the role of relationships in economic exchange. Assuming moral hazard, economic agents act opportunistic and exploit vulnerability of other agents, if it may be beneficial for themselves. Hence agents have to protect themselves through the creation of control mechanisms, such as the appropriate design of contracts and governance structures. Not surprisingly, trust is a concept that agency theorists commonly ignore, some even explicitly rule out [e.g. [Williamson, 1975](#)].¹ Instead, they offer a theory of notorious distrust and substitute trust by control.

However, even though for the sake of convenience often neglected in models and theories, economic theory in general is well aware of the economic impact of trust. According to [Arrow \[1972, 357\]](#):

“Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence.”

More recent research demonstrates that in high-trust societies agents have to spend fewer resources to protect themselves against opportunistic behavior, make investment and production decisions more focused on the long run, have higher incentives to and return on the accumulation of human capital [[Knack and Keefer, 1997](#)], are more likely to share knowledge [[Dovey, 2009](#)] and participate in open innovation projects [[Nooteboom, 2006](#)]. According to [Guiso et al. \[2009\]](#) trust between countries also positively influences their economic exchange in terms of foreign direct investments and bilateral trade. [Guiso et al. \[2008\]](#) also discover

¹To be fair, [Williamson \[1993\]](#) later takes trust into consideration and even allows for non-calculative forms which emerge through personal relationships. Nevertheless, his approach still highly emphasizes the calculative form of trust, based on rational choice.

a positive relation between a countries trust and the development of its stock market.

5.2 Trust and Venture Capital Investments

If one accepts that venture capital investments are subject to a high degree of uncertainty, and that uncertainty is a necessary precondition for the development of trust, which then in turn acts as a mean to overcome this uncertainty, then consequently trust between the agents appears to be of high relevance for the venture capital investment process.

Trust in venture capital financing is an issue rarely discussed up to now in the literature. Reason therefore is mainly the predominance of principal-agent theories in venture capital research. Well known arguments such as information asymmetry, moral hazard, opportunistic behavior and the prisoners' dilemma call for the design of effective contracts and governance structures to protect the involved actors thereof [e.g. [Bergemann and Hege, 1998](#)]. The entrepreneur here acts as a gatekeeper who manages the information boundary between the venture capitalist and the own firm and may abuse this position. The information initially provided by the entrepreneur is discounted by the venture capitalists and determine the investment decision and her company's valuation. Though, the entrepreneur has high *ex ante* incentives to overstate the firms performance and withhold unpleasant information, such as special technical details which may cause problems in the future [[Bowden, 1994](#)]. *Ex post*, the entrepreneur may act opportunistic in the use of the financial resources, provided by the venture capitalists, since he now faces a different risk and property structure, though more open to more risky courses of action or just focus on other activities which provide more pleasure or reputational gains [[Cable and Shane, 1997](#)].

The same is valid for venture capitalist syndicates, where the lead investors may *ex ante* attract additional participants by overstating the ventures potential and *ex post* neglect own responsibility and participation in the firms development. Similar, institutional investors can be attracted by *tuning* the own performance history through *window dressing* of prior funds, bringing portfolio company public to fast to boost the own IPO count, *et cetera* [[Gompers, 1996](#)]. As a consequence,

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it is argued that the installation of effective monitoring and control mechanisms via sophisticated contract and governance structure design is of high importance.

Recent research started to explore and acknowledge the importance of trust in the venture capitalist – entrepreneur relationship. To the best of my knowledge, [Sapienza and Korsgaard \[1996\]](#) are the first that bothered with this issue. With applying *Procedural Justice* theory they explain how entrepreneurs are able (or not) to convince the venture capitalist that the procedures used by the entrepreneur are beneficial for both. Augmenting this new avenue of research, [Shepherd and Zacharakis \[2001\]](#) offer a theoretical model to explain the emergence of trust between venture capitalists and entrepreneurs consisting of the determinants (i.) signaling commitment and consistency, (ii.) perceived as fair and just, (iii.) obtaining a good fit with the partner, (iv.) frequent and open communication. Most recent, [Duffner et al. \[2009\]](#) and [Bottazzi et al. \[2011\]](#) provide first empirical evidence, showing a strong statistical and economic significance of trust on venture capital investments. This research suggests that generalized and personalized trust *ex ante* reduces the doubts regarding an investment decision and *ex post* provides a good foundation for efficient and effective communication and interaction between them.

Beside the stated exception, this topic has received surprisingly little attention so far. Oddly enough, but moreover only the relationship between the entrepreneur and the venture capitalist is taken into account, whereas the other stages are not considered at all. However, my attempt is to show that trust between the actors is of high importance through the whole process.

5.3 Trust and Venture Capital Syndicates

The effect of trust on the formation of intra-industry networks and syndicates in the venture capital industry has to the best of my knowledge up to now received negligible attention and has never been studied in detail. Nevertheless, I suggest that the effects of trust on this stage is of particular importance for at least three reasons.

First, while the relationship with the entrepreneur is limited to the companies exit, venture capitalists among each others are able to build up persistent long

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term relationship.¹ As a result, relational trust emerges between former syndication partners, if the expectations were met. The higher the relational trust, the lower the uncertainty when joining further investment invitations, since the partner has already proven to be able to properly select and coach portfolio companies.

Second, the worldwide venture capital industry is on average highly connected. National and supra-national venture capital associations, board meetings, conferences *et cetera* provide an environment that makes it likely that venture capitalists in person already know each other prior to a potential investment. This social relationship in fact fosters the establishment of a economic relationships, since the potential partners are able to already get a first impression of each others, and can do first assessments regarding the others intentions and capabilities as well as of the personal *fit* between them. As an interviewed and internationally active venture capitalist vividly states:

“Usually you know the guys you invest together with from somewhere. You sat together in board meetings, meet on a conference or just get introduced through one of your contacts. I think that is quite important. For sure you can just look up the potential partners funds performance and so on, but I made the experience that you have less bad surprises with co-investors you already know personally. I think I am good in assessing people, since it’s a major part of my job, so I figure out pretty fast if there is potential to work together.”

Third, reputation has a high value for venture capitalists, since it strongly influences the possibilities for future deal flows. As Hsu [2004] reports, entrepreneurs are actively seeking for high reputation venture capitalists and are even willing to accept inferior contracts to get funded by them. Furthermore, venture capitalists in general are highly connected among each others, though information’s about their behavior diffuses among each other quickly and influences their future syndication opportunities. Thus, strictly calculative, venture

¹Without doubt, venture capitalists and the financed entrepreneur may still maintain their relationship after the funding period, but the likelihood that they will carry out another venture capital investment together is rather low.

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capitalists *a priori* have an incentive to behave honest and fair with their network partners in order to maintain or build up their valuable reputation. In fact, the loss of reputation appears to be even more harmful than possible deterrence and enforcement mechanisms provided by legal institutions. In the cooperation between venture capitalists, during a syndicated investment, many agreements are made spontaneously and on an informal rather than a contractual basis. As a result, mutual understanding, fairness and justness of the partners are of high importance for the efficiency and effectiveness of the cooperation and appear to outweigh the protection provided by sophisticated contracts. As a venture capitalist interviewed by [Sweeting \[1991, 619\]](#) states:

“VCs [...] were seeking to establish whether or not they could simply *get along with* team members and trust them. The benefits of this mutual understanding and trust were evident even before the deal was made.”

First empirical evidence can be provided by [Sorenson and Stuart \[2008\]](#). They observe syndication between venture capitalists on dyad-level. Whereas they overall come to the conclusion that sectoral and geographical distance decrease the likelihood of a syndication between the potential partners, this effect is totally eliminated if the whole syndicate contains only one trusted partner.

5.4 Social Capital and the Venture Capital Industry

5.4.1 Background and Definition

As already discussed, one of the valuable resources of the firm is social capital. When talking about social capital, I will refer to the work of [Nahapiet and Ghoshal \[1998, 243\]](#), where social capital is defined as:

“... the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit.”

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This often by scholars used definition has proven as very coherent with the theories of the resource-based view and smoothly applicable in my work. Though, the extent to which individuals and social units such as firms, regions and countries are able to draw additional resources from outside is determined by their social capital. In this section I shall discuss the influence of social capital between firms, of a country and between countries on venture capital investments.

For a venture capital firm, social capital mainly determines its' ability to identify promising investment targets. Reasons therefore are information benefits that arise in a large and well structured network. Opportunities spring up everywhere, and the network is the channeling device that finally leads the information regarding it to the venture capitalist [Burt, 1992]. In my work, I take into account three levels of social capital. First, the level of an individual or a firm, second the national social capital in a specific country, and third, international social capital between a country dyad.

5.4.2 Causes of Social Capital

In the following, I depict how the formation of relationships and though of social capital can be explained with sociological theories regarding interpersonal interaction.

Propinquity

Propinquity is nothing else as the sociological jargon for spatial proximity. As proven by studies manifold, as closer two individuals or social units are, as higher the likelihood that a relationship between them establishes. Hawley [1971] states in his *law of distant interaction* that the probability of social interaction declines as a multiplicative function of the distance between them. This holds for all kinds of interpersonal relationships, such as friendships, patronage and marriage [Blau, 1964; Blaug, 1985].

Since the venture capital industry provides many international social foci, the negative effects of geographical distance on the establishment of relationships is supposed to be weaker than it would be in other industries. However, the effects are apparently still present and have to be taken into consideration.

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Reciprocity

As a result of the reciprocal nature of venture capital syndications, it is very likely that former syndication partners will provide each others with informations regarding good investment opportunities they are not able to carry out on their own or offer the former syndication partner in exchange access to the own home market in follow-up investments [Hochberg et al., 2007, 2010]. To explain this behavior, approaches such as the *Gift Exchange* theory of the anthropologist Mauss [1923] can be considered, where the initial offer to join a syndicate can be seen as an initial gift to the potential partner, which is expected to be reciprocated in the future.

Homophily

The degree of similarity (or in sociological jargon, homophily) between individuals and social units strongly influences the likelihood that a relationship establishes between them and the pattern how it evolves. Already Aristotle [1934] noted that people “love those who are like themselves”. McPherson et al. [2001, 415] states that:

“... people’s personal networks are homogeneous with regard to many sociodemographic, behavioral, and intrapersonal characteristics. Homophily limits people’s social worlds in a way that has powerful implications for the information they receive, the attitudes they form, and the interactions they experience.”

For global inter-industry networks in the relatively small venture capital industry, there is already a high baseline homophily given, which means that people in this industry are quite similar in general. People active in this industry are assumed to be of a very distinctive nature, though they share industry specific codes and languages, narratives, differently stated, an industry specific culture has developed worldwide, which fosters the identification among venture capitalists. The archetype of a venture capitalists holds a technical masters or PhD degree plus an MBA at one of the prestigious US business schools, though due to comparable backgrounds the population of worldwide venture capitalists can

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be assumed to be somewhat homophil in many behavioral and cognitive aspects. Furthermore, language barriers are supposed to only have marginal effects, since due to the described background venture capitalists are supposed to be able to communicate in appropriate spoken and written English.

Additionally, the venture capital industry offers many social and organizational foci, which are places and occasions where venture capitalists all over the world have the opportunity to meet each others, such as conferences of the national or supra-national venture capital associations, boards of directors, business groups *et cetera*. However, the influential work of Feld [1981, 1982] suggests that even with a certain baseline homophily, social foci tend to produce a even higher inbred homophily, which means that people at this places show a propensity to establish relationships with people that are most similar with them. For instance, on a international venture capital conference, theory suggests due to similar interests, culture and a common identification, that U.S. venture capitalists get in touch with others from the U.S. or what is most similar, for instance Canadian ones. The same should hold for the sectoral specialization of venture capitalists, biotech investors stick to biotech, and ICT to ICT investors. Though, what we economists label (social, institutional, cognitive) proximity and sociologists homophily is supposed to influence the way, how relationships and networks in the venture capital industry establish and develop. Rather than arguing with in a deterministic manner that the lack of proximity leads to increasing transaction costs, here it is argued that people just (McPherson et al. [2001] calls it a *cognitive process*) like to be together with people that are similar.

This may have the following implications. Even if the venture capital industry in general offers a common group for frequent meetings and interactions, they are nevertheless supposed to be somewhat biased towards a homophil pattern. This pattern may even be persistent when transaction cost associated obstacles such as differences in legal, financial, accounting systems *et cetera* tend to diminish through the ongoing regulatory harmonization around the world. Though, if one accepts that networks are crucial for venture capitalists and their success, and networks show a tendency to develop in a homophil pattern, then differences not associated with traditional transaction costs, such as for instance culture, may be of high importance when explaining cross-border venture capital flows.

Transitivity

Literature on social interaction commonly agrees that a common contact shared by two individuals or social entities strongly increases the probability that a relationship between both of them also establishes. Reasons therefore are first that due to their common contact, a personal meeting between both of them becomes more likely [Davis, 1963; Granovetter, 1973]. Formally spoken, if A spends time with C and B also spends time with C, then it is likely that A also spends time with C. The likelihood that this happens increases with the intensity of their relationship with the common contact. The famous work of Granovetter [1973] even excludes the possibility that two actors share a strong common tie with a third one and are not connected on their own.

Second, a shared common contact that is considered as trustworthy also signals a certain trustworthiness of her network, as the common phrase “I don’t know her in person, but a trustworthy contact of mine speaks good of her” states. Though, a share of the trustworthiness of first tier contact is also transferred to second, maybe even third tier contacts.

Following this argumentation, transitivity is assumed to highly promote the syndication of formerly not introduced venture capitalists. If both potential syndication partners share a common tie to another, they are more willing to trust in each other, since information about each other provided by a already trusted third party are perceived as much more valuable. A part of the already established relational trust and reputation of the common tie will also be projected to the potential new syndication partner.

Chapter 6

A Socioeconomic Model of International Venture Capital

Preface

In the former chapters I discussed the role of venture capital in promoting innovation in general and stressed the need to consider this relationship from a systematic and process perspective and depicted it as a user–producer relationship. This relationship represents the foundation for mutual learning and can lead to an competitive advantage. Now I shall develop a conceptual framework which captures the necessary dimensions to identify (i.) the source of a venture capital firms or industry’s competitive advantage, (ii.) its rationales for internationalization and syndication, and (iii.) the means to overcome cross-border investment obstacles. I argue that the likelihood of cross-border venture capital deals and the potentials that may arise out of them are determined by (i.) the opportunity created through the potential deals composition, (ii.) the actors awareness of promising deals, (iii.) the commitment and trust between the actors, and (iv.) the deals uncertainty. Major building blocks thereby shall be a process perspective of venture capital investments, a consideration of opportunities created through a deals setup with resource-based theories, theories on social interaction and social capital to elaborate the creation of deal awareness and trust, industry life-cycle and evolutionary theories, the concept of the user-producer relationship.

6.1 Introduction

After exhaustively discussing the determinants of cross-border venture capital flows, I am now able to develop a theoretical framework to illustrate how country and firm specific similarities or differences influence cross border venture capital investments. The vast bulk of literature explains the patterns how cross-border venture capital is allocated around the globe with general macroeconomic conditions, which make investing in a particular country attractive. Some go further and argue that with the existence of transaction costs, associated with geographical distance, information deficits and different legal and financial systems, this attractiveness decreases. Without doubt, these arguments are valid in one or another way and supported by much theoretical work and empirical evidence. [Avdeitchikova \[2008\]](#) goes further and develops in line with theories regarding social and economic interaction a multi-dimensional framework that beside geographical also includes cognitive, organizational, social and institutional proximity as relevant dimensions to consider.¹ Proximity in general is supposed to reduce the uncertainties, solve coordination problems and thus foster cooperation and interactive learning. What unites the different dimensions of proximity is that they facilitate communication, and as a result interactive learning and innovation. From this point of view, geographical proximity *per se* is in many cases of less importance than expected, but it is likely to strengthen the other dimensions [[Boschma, 2005](#)]. However, it is also stressed that too much proximity can also be harmful, especially in dynamic and innovative settings, since it can lead to lock-ins and rigidities. Furthermore, without a certain degree of distance – especially cognitive distance, which mainly refers to the actors knowledge base – the probability that the cooperation of two actors lead to a novel outcome is rather low and it is barely possible to create synergies through the combination of complementary assets. As [Nooteboom \[2000, 153\]](#) states:

“... a tradeoff needs to be made between between cognitive distance, for the sake of novelty, and cognitive proximity, for the sake of effective

¹This theoretical framework, here applied in the context of informal venture capital, initially originates from the work of [Boschma \[2005\]](#) regarding proximity and innovation in general.

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absorption. Information is useless if it is not new, but it is also useless if it is so new that it cannot be understood.”

In my theoretical framework, cross-border venture capital investments are determined by the dimensions discussed in the previous chapters, namely: (i.) awareness, (ii.) associated opportunity and (iii.) uncertainty, and finally (vi.) the trust between the actors. To make it even more complicated, all are assumed to be heavily influenced by the different dimensions of proximity. The first is the precondition that the investment is possible at all, the second indicates if the investment is considered to have the potential to be beneficial, and the last two are opposing factors which finally determine if the investment is carried out. However, after a purely theoretical discussion, the effect of some of these factors still remain somewhat ambiguous. Especially the question, when distance outperforms proximity and *vice versa* remains open to some degree and will stay so during this chapter. Therefore, the following discussion will present some contradicting hypothesis to be tested in the following econometrics part. However, limited by the scope of the thesis, not all arguments stated in the following can be tested empirically, though for some exists no own hypothesis. However, main attempt of this chapter is to provide a comprehensive theoretical framework that enables for further research on isolated components without losing the overview of their interdependencies with the others in a broader content.

In the previous chapters I defined the three stages of the investment process, namely the (i.) venture capitalist to portfolio company stage, (ii.) venture capitalist syndicate, and the (iii.) institutional investor to venture capitalist stage. On all of the three stages, the above listed dimensions are relevant, even if their influence will differ. As already illustrated, the actors are assumed to assess investments mainly by the characteristics of their direct partner on this stage and somewhat neglect the characteristics of the upper and lower tiers. This fact is mainly underpinned by the employment of trust as a criteria relevant for the decision making process. If the actors on one stage trust each other, they assume that the partners have selected their partners on the lower stage appropriately and are able to work with these partners towards a successful exit. As a consequence, the decision on every stage can be observed more or less separately.

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Without doubt, through path dependencies and the accumulateness of knowledge, dynamics appear and let past events on one stage influence current decisions on another. For instance, financial investors may at some point of time show a tendency to invest in some particularly *hot* sector or geographical region. Therefore, they will put more trust in venture capitalists which have proven to be successful in this sector or region, which in turn depends on the industrial environment they are embedded in and the extend and configuration of their networks with other venture capitalists and entrepreneurs. There already exists an exhaustive body of literature regarding the selection of portfolio companies through venture capitalists. What happens between the investor and the venture capitalist is widely unknown, beside some survey based work [e.g. [Groh, 2011](#)], since venture capitalists treat information regarding their investors very sensitive, though gathering data is quit challenging to impossible. Without doubt, the rationales of institutional investors, how to compose their portfolio regarding the country, sector and managing venture capital firm is of high importance, since it constraints the amount available for venture capital investments and thus mainly determines its supply. Nevertheless, even though this stage of the investment process is without doubt of high relevance and interest, due to a lack in available data I shall focus mainly on the following stages.

6.2 Awareness and Proximity

First obvious precondition for a deal to be carried out is that the venture capitalists are aware of the potential investment target. This kind of information is usually not open to the public, though it can not actively be spotted for instance by monitoring some databases but rather reach the recipient through private or professional networks. [Burt \[1992\]](#) illustrates how information channels through networks and how this networks extend and configuration determines the amount, quality and topicality of available information. Together with the work of [[Granovetter, 1973](#)] regarding distant networks, this strand of literature has proven as very rich in arguments suitable to explain venture capital investments as an outcome of available informations, subject to the characteristics of a venture capitalists network.

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However, to explain how this networks initially emerge, sociological literature on interpersonal interaction and the formation of networks offer four major reasons for the emergence of relationships, namely (i.) propinquity (how close are actors to each others), (ii.) homophily (how similar are actors), (iii.) transitivity (to what degree do the actors share common relationships), and (iv.) reciprocity (how do actors reply to actions of their partner) [Davis, 1967]. The first two are captured by the dimensions of proximity described by Boschma [2005], the third by the configuration of the current network as done by Granovetter [1973] and Burt [1992], the fourth finally can be seen as the relationship-endogenous factor.

Against the background of venture capital investments, that leads us to the first obvious implications. On country level, a propensity to establish networks, cooperate and communicate, which I shall on macro level approximate with a countries social capital and generalized trust, is assumed to positively affect venture capital investments. The higher the overall awareness of potential deals as a result of open and cooperative information sharing and a high connectivity, the higher the chance that potential investment targets and investors match.

Hypothesis 1 *The higher a country's internal social capital and generalized trust, the more is invested by venture capitalists domestically, relative to the countries GDP.*

In the same vein, it also can be assumed that in highly networked societies, also venture capitalists show a tendency to cooperate, build up relationships and form alliances, which manifests in a higher share of syndicated investments.

Hypothesis 2 *The higher a country's social capital and generalized trust, the higher the propensity of venture capitalists to carry out domestic investments in a syndicate.*

In the context of cross-border venture capital investments, the effects of proximity enter the picture. Geographical proximity, as stated by the *old paradigm* highly facilitates venture capital investments. Beside the *ex post* advantages of more efficient interaction and communication, *ex ante* the awareness of an opportunity increases with spatial proximity. Usually a venture capitalist gets aware of an opportunity if the entrepreneur applies for funding by sending his business plan, but often venture capitalists also pro-actively screen the market and

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their network for promising targets. In both cases, this is more likely to happen locally. Entrepreneurs usually apply for funding at venture capitalists in their close environment, simply because they are aware of their existence through their own social network, for instance fellow researchers or other entrepreneurs founded by the same venture capitalist. Same is valid for the venture capitalist, whose inter-industry networks with entrepreneurs, consultants, researchers, universities *et cetera*, which may report promising targets, are assumed to be more dense local. This is already proven manifold by former research and not in need for an own hypothesis.

However, frequent social and economic exchange between country dyads creates interaction and fosters the establishment of relationships. Even if these relationships may *a priori* not be expected to lead to investment activities, for instance persistent friendships between domestic and former visiting students in a country, they may in the end be a pipeline that channels valuable information and create investment awareness.

Hypothesis 3 *Social and economic interaction and exchange between country dyads positively affects the amount of venture capital flows between them.*

If local investors are involved, *ex ante* access to local information and awareness of investment opportunities as well as *ex post* an effective monitoring and coaching of the portfolio company can be provided by them. Between venture capitalists, the need for proximity can be assumed to be less, since shared norms and rationals in the international venture capital industry as well as a high cognitive proximity may enable them to bridge general geographical, social and institutional distance.

Hypothesis 4 *The negative effects of geographical, social and institutional distance are higher for venture capitalists that invest in a foreign country without a syndication partner.*

Beside having a domestic investor *on board*, it is also possible that the foreign investor has already carried out prior investments in the destination country and is now established in the domestic network, which provides her with necessary information regarding promising investments.

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Hypothesis 5 *The negative effects of geographical, social and institutional distance are higher for venture capitalists that invest for the first time in the destination country.*

However, to exploit the benefits of a local partner such as an increased awareness of investment opportunities in the partners close environment, this connection first has to exist. As already stated, relationships in general are more likely to establish between homophil actors. As McPherson et al. [2001, 415] states:

“Similarity breeds connection. This principle – the homophily principle – structures network ties of every type, including marriage, friendship, work, advice, support, information transfer, exchange, co-membership, and other types of relationship. The result is that peoples personal networks are homogeneous with regard to many sociodemographic, behavioral, and intrapersonal characteristics.”

Networks *breed* out of similarity, though the more similar two venture capitalists are, the more likely they are to initially build up a relationship. After first successful deals carried out together, mutual trust develops and leads to further syndicated activities. Furthermore, the connection between this firm dyad may serve as a bridge for other venture capitalists in both countries and lead to further syndications between the members of both’s networks. Indicators for similarity on the macro level may be shared soft institutions such as cultural characteristics or hard institutions such as similar legal systems. On the other hand, the lower the geographical, organizational, social and cognitive distance, the lower the less necessary it becomes to cooperate with other venture capitalists. Though, venture capitalists also could be more likely to dare investing without a local partner. However, the net effects of proximity are according to this argumentation assumed to be positive.

Hypothesis 6 *The venture capital flow between a country dyad increases with proximity.*

6.3 Opportunity

Obvious precondition for a venture capital investments is the existence of a promising target where to invest in, though an investment opportunity. With

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the term opportunity I refer to the perceived attractiveness of the target and its local, national and sectoral environment as well as the synergies between the deal participants and the portfolio company.

On a macroeconomic level, the first approximation for growth and thus investment opportunities may be found in the annual GDP growth rate. Having life cycle theories in mind [e.g. [Utterback and Abernathy, 1975](#)], we can furthermore assume that venture capital flows from mature economies characterized by stagnating growth to young high growth economies.

Hypothesis 7 *Venture capital investments are higher in countries with high economic growth rates, and show the propensity to flow from low to high growth countries.*

However, economic growth is at least in the short run not necessarily associated with the demand for venture capital. This demand is caused by the existence of potential new technology based ventures, which means a promising invention plus an entrepreneur willing to bring it to the market, what not necessarily have to be correlated with overall economic growth. No idea, no innovation, no venture capital demand; that much seems obvious. In a nutshell, the demand for venture capital is the outcome of the national innovation systems configuration, especially the education-, research-, and production-subsystems.¹ As we already know, some systems may be more efficient in producing ideas and inventions suitable for later venture capital financing than others. For instance, an innovation system which emphasizes research and development in large firms (Schumpeter Mark II) and/or in mature sectors are less likely to produce inventions and ideas with the potential to become a radical and entrepreneurial innovation, suitable for venture capital investments

There may simultaneously exist more than one configuration that proves to stimulate the demand for venture capital. To now explain cross-border venture

¹For the sake of simplicity, at this point I will neglect the interdependencies between the financial system – and thus also the supply of venture capital – and *potential* innovation. I assume that finance only gets important the point where the invention has to be commercialized. However, reality may not be that simple. The existence of a vivid venture capital industry also represents a *ex-ante* potential entrepreneur to spend effort in his idea or even to choose a scientific career at all, since there is a high chance of getting *ex post* finance.

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capital flows on dyad level, taking a closer look on the configuration of the national innovation system appears to be a promising avenue of research. Consistent with the resource-based view, profitable opportunities emerge out of utilizing synergies through the combination of complementary resource-bases, in this content especially complementary knowledge bases and sectoral specialization of the production system. To determine which particular combination of national resources proves as complementary is beyond the scope of this research, I can only approximate that complementary is equal to different.

Hypothesis 8 *Cross-border venture capital shows a propensity to flow between countries with different configurations of the national innovation system, especially in terms of the production system and the knowledge base.*

The relative domestic venture capital supply provides another possible explanation for cross-border venture capital flows. If the supply of venture capital, exceeds the suitable investment targets, venture capitalists have to expand their geographical reach, preferably to countries with a thinner venture capital industry, which allow for *cherry picking* of high potential ventures. In contrast, in countries with shortage in venture capital supply, entrepreneurs may desperately search for foreign sources and domestic venture capitalist search for foreign investment partners.

Hypothesis 9 *Venture capitalists located in countries with a high venture capital supply show a higher propensity to invest abroad.*

Finally, the knowledge base of the venture capital firm itself may be the origin of opportunities. It can be assumed that venture capitalists specialized in investments in a certain sector, and though historically have accumulated a high stock of experience there, are able to internationally spot promising investment targets easier and provide them with superior support. Their sophisticated knowledge about technologies, products and markets of a particular sector reduces the uncertainty associated with the investment in new knowledge based firms, and as a result makes them more likely to invest abroad.

Hypothesis 10 *Sectoral specialized venture capitalists show a higher propensity to invest abroad.*

6.4 Trust and Social Capital

If the venture capitalists is aware of an investment opportunity, the assessment if or not to invest is determined by the ratio between the associated opportunity, risk and uncertainty. Risk and uncertainty are associated with states of nature that can not totally be predicted or controlled. Many general aspects of an investments, such as the sharing of profits and risk, the division of tasks and responsibilities *et cetera* can be controlled through sophisticated contracts. For the rest, the venture capitalists have to trust their potential new partners, have positive expectation regarding their reliability and capability to act in their favor. As discussed, the level of uncertainty is higher on early stages of the investment process, so the need for trust increases downstream. Generally, venture capitalists located in high trust societies are assumed to be more open to invest abroad, since the general belief in the trustworthiness of investment partners decreases their perceived uncertainty associated with cross-border investments.

Hypothesis 11 *A higher level of generalized trust increases the propensity of domestic venture capitalists to invest abroad.*

From a country-dyad perspective, the foreign venture capitalists have to trust that the domestic ones have gathered all uncertainty reducing tacit informations, interpreted them correctly and communicated them completely. The domestic ones also have to trust the international venture capitalist regarding his competences such as the assessment of the market and product from an international perspective, gather finance and value adding resources through his network *et cetera*, and their willingness to do so. At least the partners which bring more of the required resources into the deal also has to trust in the willingness and potential of the resulting reciprocal activities.

This trust originates from institutional, calculative, and relational aspects. Institutional trust is determined by hard as well as of soft institutional factors. Hard institutional factors are mostly associated with *ex ante* deterrents such as a legal systems that effectively protect individual rights and property and the enforcement of contracts [Fukuyama, 1996], which acts as a deterrent from opportunism. Soft institutional factors are embedded in general cultural attributes

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and values, such as the general nonacceptance of dishonest behavior and breaking laws – deterrence mechanisms that cause a loss of reputation – but also cooperative attributes such as a low power distance and teamwork cultures [Miles and Creed, 1995] or generalized trust between two nations as an outcome of historical development.

Hypothesis 12 *A higher level of bilateral trust between a country dyad increases the bilateral venture capital flows.*

Institution based trust can ease the way to develop both relational and calculus-based and trust. Insofar, in absence of complete contracts and complete information on one, and calculus based or relational trust, they are the most important for settling the initial cooperation from which other forms of trust can emerge.

Hypothesis 13 *Institutional trust is of higher importance for cross-border investments in destination countries where the foreign venture capitalist has no prior experience.*

Calculus based trust, as the outcome of rational choice, is based on the perception that the trustee intends and is competent enough to perform an action that is beneficial for the truster. This may be through direct signaling of the trustee by certifications (for instance a diploma or ISO certificate), by other codified informations about the trustee such as performance histories or track records, or the trustees reputation through credible information provided by others. Also deterrence mechanisms caused by nonperformance and opportunism trough the loss of reputation are considered. Hence, calculus based trust is supposed to interact with institutional trust, since the more reliable signals and more likely and severe deterrence, the more trust can be created though their presence. In absence of relational and institutional trust, calculus based motives are the next instance of the truster to rely on.

6.5 Résumé

To summarize the framework developed in this and the previous chapters, venture capital flows between countries can be explained with the dimensions (i.) Invest-

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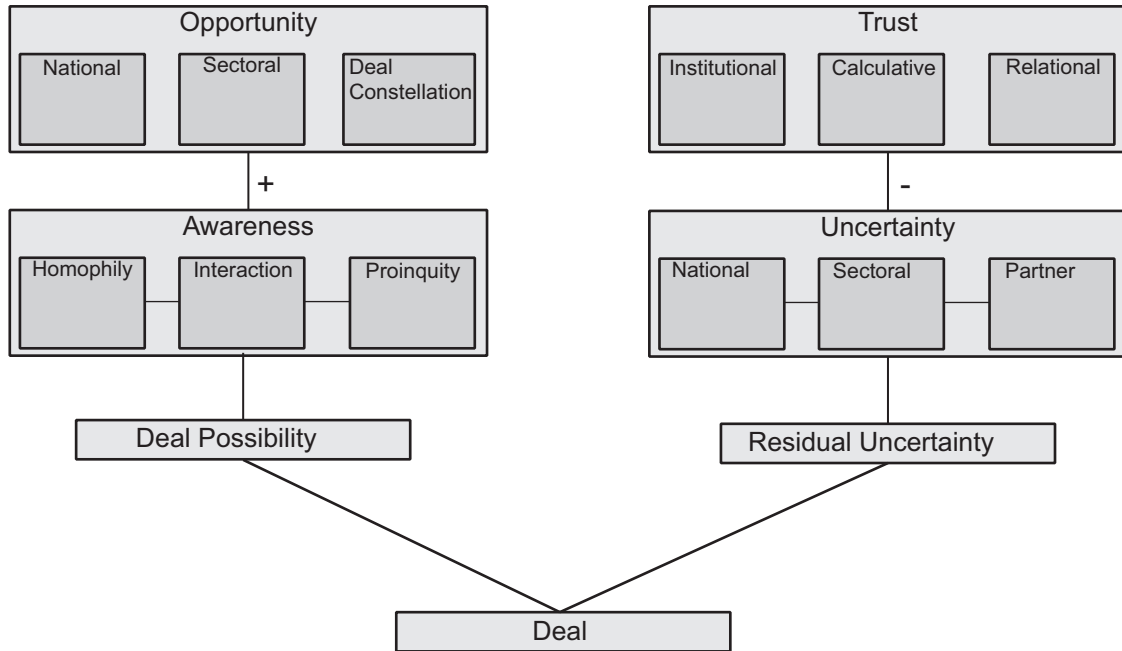


Figure 6.1: The Dimensions of International Venture Capital

ment opportunities, which exploit differences in venture capital supply and demand, project intangible assets in investments abroad, or utilize synergies through the combination of complementary resources, facilitated by the heterogeneity of countries and actors. (ii.) Deal awareness, originating from social and economic interaction, communication and exchange, facilitated by geographical, social, institutional, and cognitive proximity. (iii.) Trust and social capital, which decreasing the perceived uncertainty of investments, facilitated by the institutional setup and relationships between the actors. (iv.) Uncertainty, originating from the immaturity and novelty of sectors, industries and firms, political and economical instability, and the tacitness of the knowledge base.

Figure 6.1 illustrates this theoretical framework, which is going to be tested in the next chapter, according to the previously stated hypotheses.

Chapter 7

Econometric Analysis

Preface

In the previous chapter I developed a theoretical model of international venture capital flows, industry and firm evolution, where I emphasize socioeconomic rather than pure macroeconomic determinants. This chapter shall provide first empirical evidence for the stated hypotheses and the overall validity of the model. Since the model is supposed to be a comprehensive one, the empirical tests carried out here can not provide absolute and detailed evidence for it. It rather shall be seen as illustrative attempt to provide a first intuition regarding the general interplay of the large set of stated determinants and as a solid foundation for further in-depth research on this topic. Together with the commonly used macroeconomic determinants, my attempt is to show the influence of awareness, opportunity, trust and social capital. This shall be done on macro level by investigating venture capital flows between countries, and on firm level by investigating the characteristics of internationally active venture capital firms.

7.1 Data Sources and Description

7.1.1 Data on Venture Capital Investments

As source of data regarding national and international venture capital investments, I draw from the Zephyr database, provided by the Bureau van Dijk Electronic Publishing. It is an information platform for M&A transactions, but it also includes venture capital investments and IPOs. Measured by the raw number of covered transactions, Zephyr has proven as slightly inferior to the commonly used Thompson VentureXpert database, but very rich in additional information to every investment and the participating actors, such as a detailed business descriptions, financial facts and industry affiliations. Another advantage of Zephyr is that it is not that biased towards investments in the United States as VentureXpert, which shows a tendency to exclude non-U.S. investments in the earlier periods. Recently also a growing body of research international venture capital flows [e.g. [Schertler and Tykvová, 2009](#); [Tykvová and Schertler, 2010](#)] started to use the Zephyr database.

In my dataset I include venture capital investments with source and destination in eighteen selected OECD countries for the period between 2000 and 2010, since the quality of the investment data sharply decreases in prior years. Even though the chosen period is relatively short to observe the development of venture capitalist networks and relationships, including prior data would lead to high biases. I restrict on investments that fulfill the following conditions. (i.) The deal financing classification in the Zephyr Database contains *venture capital*. By doing so, exclude pure business angel investments, private equity and corporate venturing. Comparable research settings commonly include them, substantially differ in their characteristics and the involved actors rationales. This leads to a lower number of deals than found in comparable studies [e.g. [Schertler and Tykvová, 2009, 2010](#); [Tykvová and Schertler, 2010](#)] but assures that only real venture capital deals enter the observation. (ii.) The investors acquire a minority stake in the portfolio company. (iii.) At least one of the investors can be identified as a venture capitalist. I do so by analyzing the investors' major sectors, business and trade description that can be found in the database. The final dataset includes

around 18,000 deals carried out by 56,500 participants, 10,000 venture capital firms and 13,000 portfolio companies.

The most important measurement I apply on macro level is the number of venture capital deals which are carried out in the observation period between country dyads. For this bidirectional comparison of deal-flows, I use the following approach. If a deal is carried out by investors of different countries, every country pair between source and destination country¹ gets one deal count. If for instance two french and a german venture capitalist invest together in a portfolio company in Ireland, the country parts FR – IE and DE – IE both gets one additional count for this deal.

In addition to the number of deals, also their monetary value was extracted. Zephyr only reports the total investment per deal but not the contribution of every investor, I distribute the investment in equal parts among them. To give an example, if an U.S. and an U.K. venture capitalist jointly invest in a target in Denmark, both the U.S. and the U.K. and the respective venture capitalist gets a deal count and half of the total deals value accounted. Unfortunately this information is missing for around 20 percent of the deals. A detailed investigation of the data shows that its quality constantly increases during the observation period, though disproportionately more deals in the beginning lack in data regarding the deals value. For ordinary least squares regressions with longitudinal data, dropping these deals would lead to an overestimation of effects over time. Therefore I create estimates for the deals with missing values. I use deals characteristics such as the number of participants, if it is a cross-border deal and furthermore dummies for targets industry, the deals source and destination country and the deals year to create a linear regression model to estimate these values. In this model most deal characteristics prove to be significant at least at ten, most at one percent level. Nevertheless, with an R^2 of 0.33, the predictive power of the model is limited, but still preferable to the bias resulting in dropping all deals with missing values.

¹With the term *source country* (SC) I refer to the source of capital, though the venture capitalists country of residence. The term *destination country* (DC) refers to the portfolio company's country of residence.

The dataset was further improved and augmented as follows. Usually, the investor is filed on firm level, but in some cases instead the investing fund is stated. To give an example, some investments carried out by the same company are labeled with *3i group* (an U.K. venture capital firms) and some with *3i bio-science* (one of the funds managed by *3i*). Using this unprepared data would lead to wrong results in the model, since the fund would be threaten as an own venture capital firm. Furthermore, some investments are carried out by the venture capitalists domestic subsidiaries, though would be counted as domestic instead of cross-border investments, what obviously is wrong in my understanding. To avoid possible biases regarding these issues, all investments were aggregated on the highest possible instance, the global ultimate owner, to identify its real origin.¹ If for instance some venture capitalist has subsidiaries all over Europe (again for example the U.K. venture capital firm *3i*), their deals are still accounted for the parent company and its country of residence.

All used dependent and independent variables are explained in the description of the corresponding model. Additionally an exhaustive description of all used, created and modified variables, their sources, computation *et cetera* are provided in the appendix.

7.1.2 Data on Trust and Social Capital

A powerful measure for generalized trust, which is the perception that other people and the society as a whole can be considered as trustworthy, is provided by the [World Value Survey \[2009\]](#), a survey is published since 1981 that explores the values and beliefs of people in almost 100 countries. It is considered the only source of empirical data on attitudes, which covers nearly 90 percent of the world's population. The survey reveals individual attitudes towards gender values, minorities, trust, traditions, religion, happiness and life satisfaction. For this research, the variable indicating generalized trust was extracted.² This mea-

¹This illustrated one of the advantages of the high quality of the data of Zephir. Here exhaustive information regarding the ownership structure of the investors can be found.

²The precise question of the WWS is: "Generally speaking, would you say that most people can be trusted?" Though it depicts the perceptions about the trustworthiness of a society and mankind as a whole.

surement has been used by several studies regarding the economic implications of social capital and trust [e.g. [Knack and Keefer, 1997](#)]. The average population may not be representative for the subpopulation of venture capitalists, who are all supposed to hold at least a masters degree, thus only the subpopulation holding an university degree was included. Since the different waves of the survey not all ways covers all countries, in some cases survey results of older waves between 1995 and 2000 where used. The correlation coefficient across the different waves always lies above 90 percent, which indicates that the phenomenon of trust is persistent over time.

However, the generalized trust of a countriy's citizens in each other is likely to differ from the trust they have in citizens of other countries. Though, for the dyadic observation data provided by the [Eurobarometer \[1990–2011\]](#) was used. This data originates from a survey annually carried out by the European Union since 1970, which examines social and political attitudes of the European Union's citizens. Here, a powerful variable for country-dyadic trust is provided, which allows a way more differentiated observation of trust between country pairs.¹ In recent research [e.g. [Bottazzi et al., 2011](#); [Guiso et al., 2009](#)], this variable is often used as measure for bilateral trust. The data shows that bilateral trust in some cases substantially differs between country dyads. To give an example, citizens of the United Kingdom have way less trust in french citizens than in the rest of Europe, and the French behave.reciprocal Tests show that the Eurobarometer variable for domestic trust strongly correlates with the one provided by the WWS,² which indicates that the results are independent of the exact survey method.

7.1.3 Other Sources of Data

A huge amount of complementary macro- and microeconomic variables, such as data on patents, GPD, market capitalization *et cetera* are used in the the following

¹The question in the survey is: "How much do you trust in [people of a particular country]?". Possible answers are "A lot." and "Not at all", where the percentage of answers with "A lot" was extracted. When isolating the subgroup of participants from a particular country, variable for bilateral trust between a country-dyads is obtained.

²The correlation coefficient between both measures is greater then 0.50, significant at one percent level.

econometric observation. They are mostly collected from the rich databases of the World Bank, UNCTAD and OECD. As indicator for the innovation output of a country and therefore a approximation of the demand for venture capital, I use the countries last years patent applications at the PCT.¹ An exhaustive depiction of all sources used is provided in the appendix.

7.2 Model Specifications and Empiric Strategy

7.2.1 Venture Capital Investments on Domestic Level

Attempt of the first set of ordinary least squares regressions is to identify the influence of a countries social capital and generalized trust on domestic and international venture capital investment activities. Depended variables are (i.) total domestic investments of local venture capitalists relative to GDP, (ii.) only syndicated investments between them relative to GDP, and (iii.) the share of syndicated in total domestic investments. For all three variables, besides the number of deals an unreported robustness check with the aggregated value of the deals as alternative measure was carried out.

Model one controls for macroeconomic variables considered as important by the vast bulk of existing literature [e.g. Baygan and Freudenberg, 2000; Groh et al., 2007; Romain and Van Pottelsberghe, 2004]. First, the demand for venture capital is approximated by the last years GDP growth rate and the current

¹Note: To find appropriate measurements for the innovativeness of a firm, region, or country is not at all a trivial task and none where one can find a common consensus across the scholarly community. Indeed, there exist numerous approaches how to measure innovation. Kleinknecht et al. [2002] illustrates how most indicators as standalone measures are of very limited explanatory power. Additionally, the relationship between input and output is neither linear nor as obvious at all as one may assume. Recent theories consider innovation as a systematic and interactive process, stressing the interdependencies between the systems elements. Single measures such as patent counts, increased government spending in R&D may prove as very effective in one, but show no result at all in a different systems setup. emphasizes the non-linearity of the process. Furthermore, the innovation capacity of a country consists not only of science and technology but also of many tacit factors, such as routine based *learning-by-doing*, *-using* and *-interacting* [Lundvall, 1999, 2007, 2010]. However, working with comprehensive composed indices such as the [Global Innovation Index \[2011\]](#), which appears against the described background as most appropriate, has proven to cause massive multi-correlation problems when these indices used together with isolated macroeconomic and socioeconomic variables

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Table 7.1: Descriptive Statistics – Domestic Venture Capital Investments

	N	Minimum	Maximum	Mean	Std. Deviation
Patents	196	0.00	506.00	135.11	121.27
GDP growth	198	-8.23.00	9.30	1.69	2.56
GDP per capita	198	17,753.96	61,331.96	33,081.87	7,312.04
Capitalization	198	12.89	317.02	84.13	55.17
Bank credit	194	48.61	328.41	152.30	58.34
Trust WWS	198	0.14	0.90	0.53	0.21

years patent application filed in at the PCT per thousand citizens.¹ Second, it is controlled for the country’s GDP per capita as measurement for general economic wealth, since rich countries may generally show higher investment activities. Finally, controls for the countries market capitalization and credit provided by the banking sector, both relative to GDP, are included. The former provides lucrative exit options and is supposed to positively affect venture capital investments. The latter could, beside the discussed drawbacks of financing innovation through banks, act as a substitute for venture capital financing, though negatively affect the investment activity.

Table 7.2: Correlation Matrix – Domestic Venture Capital Investments

	(1)	(2)	(3)	(4)	(5)
(1) Patents					
(2) GDP growth	0.058				
(3) GDP per capita	0.236**	-0.139			
(4) Capitalization	0.567**	0.273**	0.146*		
(5) Bank credit	0.004	-0.257**	0.252**	0.139	
(6) Trust WWS	0.611**	0.011	0.608**	0.233**	-0.077

*, ** indicates significance at five percent, one percent level (two-tailed Pearson correlation)

Considering the correlation between the variables provides the following insights. The variable for generalized trust shows high and significant correlation coefficient for three of five control variables. Especially the correlation with the country’s GDP per capita and patent application with coefficients above 0.5 appears rather high. Though high-trust countries are characterized by economic wealth and a high patent output. Besides that, a high positive correlation of relative market capitalization with patent applications and GDP growth can be observed, though countries with a vibrant stock market in general show the tendency to account for more patents per citizens and a higher economic growth.

¹Alternative measures with EPO and USTPO applications were carried out as well, but always led to decreasing explanatory power of the model.

The relative credit granted by domestic banks on the other hand correlates negatively and significantly with the GDP growth rate, indicating a certain rigidity of bank based financial systems.

7.2.2 Venture Capital Flows on Country Dyad Level

The second set of ordinary least squares regressions investigates the determinants which increasingly trigger cross-border venture capital investments on macro level. To enhance the understanding of the underlying mechanisms, a dyadic observation between country pairs, instead of independent country observations, appears as most promising. This approach enables me to use not the characteristics of one but rather the differences and similarity between countries as determinants. Though, I am able to fully employ resource-based theories of complementary assets as well as social capital and trust theories, which are to a certain degree endogenous to a dyadic relationship.

Dependent variables are (i.) unidirectional venture capital investments between the corresponding country dyads, (ii) the same measure only for a subsample of syndicated cross border deals, and (iii.) for foreign venture capitalists that invest the first time in the destination country. For the sake of brevity, in this set of regressions only the results with deal counts measures for the dependent variable are reported.¹ Year, destination and source country dummies are included in all models to capture fixed country and random time related effects.

In my theoretical framework, cross-border venture capital flows between countries can be explained with the dimensions (i.) opportunity, (ii.) awareness, (iii.) social capital and trust, and (iv.) uncertainty. These dimensions are likely to show strong interdependencies among each others. For instance, countries that maintain frequent economic and social exchange are likely to have high awareness for investment opportunities as well as to show high bilateral trust, all as causes as well as consequences of each others. Additionally, many single determinants suitable to explain this major factors are likely to correlate among each others. To capture economic exchange, for instance variables such as the amount of bi-

¹The measure for the deal value comes to comparable results, what suggest a certain robustness. However, in all setups the count measures lead to a slightly better model fit.

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lateral trade or FDI investments can be used, which in most cases show similar pattern. As a consequence, the selection and treatment of variables has to be done very careful in order to avoid problems associated with multicollinearity. Simultaneously adding to many these variables may result in an increasing R^2 but decrease the explanatory power of the single variables as well as bias the amplitude of their coefficient.

To deal with this issue, the following approach was applied. Based on the formerly developed framework and other empiric and theoretical research, bundles of possible variables, which are likely to capture the different dimensions of cross-border venture capital flows, were chosen. These variable bundles are stepwise introduced to the model, and step by step only the variable with the highest significance is chosen, conditional to an increase of the model fit. All bundles with potential variables which has been tried out can be found in table 1 in the appendix. Table 7.3 here reports the variables that entered the final regressions.

Table 7.3: Descriptive Statistics – Bilateral Venture Capital Flows

	N	Minimum	Maximum	Mean	Std. Deviation
VC value	2,448	0.00	0.10	0.00	0.01
VC value new	2,448	0.00	0.02	0.00	0.00
VC value syndicated	2,448	0.00	0.10	0.00	0.01
VC count	2,448	0.00	0.02	0.00	0.00
VC count new	2,448	0.00	0.01	0.00	0.00
VC count syndicated	2,448	0.00	0.02	0.00	0.00
Δ Capitalization	2,448	-258.09	258.09	0.00	71.77
Δ Patents	2,414	-493.80	12,321.19	399.18	1,367.78
Δ GDP growth	2,448	-9.15	9.15	0.00	2.03
Distance	2,448	5.15	9.32	7.45	0.97
Same language	2,448	0.00	1.00	0.09	0.29
Same legal system	2,448	0.00	1.00	0.24	0.42
Same capitalism	2,448	0.00	1.00	0.18	0.39
Same NSI	2,448	0.00	1.00	0.23	0.42
Trade	2,176	0.00	0.27	0.02	0.02
Co-patents	2,002	0.01	20.29	1.20	1.89
Trust EURO	1,744	0.50	14.40	5.08	2.19

For the sake of brevity, the preliminary model introducing the bundle of variables for macroeconomic opportunities is not reported. The variables that qualified for the first reported model, namely the difference in market capitalization, patent application and GDP growth are all significant when only testing for them. Model one introduces the most significant variables indicating geographical, social and institutional differences. In the following model two the variables that indicate social and economic exchange, and dyadic social capital are introduced.

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Table 7.4: Correlation Matrix – Bilateral Venture Capital Flows

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Δ Capitalization										
(2) Δ Patents	-0.070**									
(3) Δ GDP growth	0.219**	0.101**								
(4) Distance	0.000	0.261**	0.000							
(5) Same language	0.000	0.030	0.000	-0.329**						
(6) Same legal system	0.000	-0.046*	0.000	-0.190**	0.305**					
(7) Same capitalism	0.000	-0.063**	0.000	-0.206*	0.143**	0.136*				
(8) Same NSI	0.000	-0.080**	0.000	-0.485**	0.097**	0.101**	0.386**			
(9) Trade	0.001	-0.124**	-0.009	-0.638**	0.428**	0.336**	0.142**	0.335**		
(10) Co-patents	0.000	-0.068**	0.000	-0.402**	0.534**	0.292**	0.070**	0.092**	0.605**	
(11) Trust EURO	-0.183**	0.367**	0.042	-0.513**	0.195**	0.045	0.131**	0.358**	0.438**	0.313**

*, ** indicates significance at five percent, one percent level (two-tailed Pearson correlation)

The correlation matrix shows only modest correlation between the macroeconomic indicators and the rest, but, as expected, high correlation between the distance, proximity and awareness indicators. Geographical distance is significantly negative correlated all indicators for social and institutional similarities as well as the indicators for interaction and exchange. Among each others, the selected proximity and interaction variables mostly show positive and significant correlations, indicating strong interdependencies between them.

7.2.3 Venture Capital on Firm Level

The last set of ordinary least squares regressions investigates the characteristics of venture capital firms to explain their propensity for cross-border investments. Therefore, out of the formerly used dataset a new one containing aggregated data on firm level for the observation period was constructed.

Dependent variable in this set of regressions is the share of cross border investments in all investments carried out by the particular venture capitalist in the observation period. Again, model one tests for the variables described below, and model two additionally controls for fixed country effects by adding dummies for the venture capitalists country of residence.

Due to the unique legal and investment environment and the maturity of the venture capital industry in the United States, it can be expected that U.S. venture capitalists show a different behavior compared with the rest of the world. Therefore both models are tested for a full sample of venture capitalists and also for a restricted one, only including non-U.S. firms. As often done in venture

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capital firm level observations [e.g. [Hochberg et al., 2010](#)], it is only focused on firms with frequent investment activity, though exclude firms with less than ten deals in the observation period.

Table 7.5: Descriptive Statistics – Venture Capital Firms

	N	Minimum	Maximum	Mean	Std. Deviation
Deal members	985	0.07	7.27	1.63	1.07
Exp.	985	10.00	494.00	33.09	41.73
Exp. cb	985	0.00	242.00	3.12	11.70
Exp. synd.	985	0.00	419.00	30.10	38.59
Share synd.	985	0.00	1.00	0.90	0.159
Share cb	985	0.00	1.00	0.10	0.23
Spec. sector	985	0.20	1.00	0.55	0.16
Spec. country	985	0.25	1.00	0.93	0.15
Trust WWS	985	0.22	0.90	0.58	0.08
Country legal rights	985	0.30	0.90	0.79	0.07
Country VC	985	422.93	130,761.58	97,526.51	54,364.20
Country share synd.	985	1.04	2.68	1.30	0.11

Most of the firms that enter the observation have already been active before the observation period, though the dataset is subject to left censoring. As a result, data regarding the activities and experience of the venture capitalists already existing at the beginning of the period is likely to be underestimated. According to [Sorenson and Stuart \[2001\]](#), increasing investment experience affects venture capitalists positively in terms of (i.) reduce monitoring costs, (ii.) better pre-selection, and (iii.) more inter-industry relationships. However, according to [Argote \[1996\]](#), the effects of experience in a particular field, as here represented by past investments in a country or sector, are likely to have diminishing marginal learning effects. Acknowledging that, for all variables associated with investment experience, the natural logarithm is used, as suggested by [De Clercq and Dimov \[2008\]](#). It was also considered to include the age of the venture capitalist, which can according to [Sorenson and Stuart \[2001\]](#) be used as indicator for the (i.) size of network, (ii.) spacial dispersion, (iii.) accumulated experience, and (iv.) reputation. However, test logically showed a strong correlation with the venture capitalists experience, and since information regarding the firms age was missing for about ten percent of the observed firms, the experience measure was chosen instead.

Of special interest for the stated theories regarding the evolution of the venture capital firm is the propensity of venture capitalists for sectoral specialization. The

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variable applied represents the share of the experience e of the firm k in the most active sector i in total investment experience, as illustrated in equation 7.1 below.

$$s_k = \frac{\max(e_{k,i})}{\sum_{i=1}^n e_{k,i}} \quad (7.1)$$

As further variables were chosen the following. The average number of members per deal in which the firm participated, which offers insights if internationally active venture capitalists tend to invest in more in small or large deal settings. The average deal value, which indicates if internationally active venture capitalists prefer to carry out larger investments than domestically active venture capitalists. The WWS measure for generalized trust in the country of residence is supposed to also influence the domestic venture capitalists behavior. Venture capitalists in countries where people are used to trust others may for instance have, due to this cultural attribute, less doubts in investing abroad.

Table 7.6: Correlation Matrix – International Venture Capital on Firm Level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Members										
(2) Exp.	-0.449**									
(3) Exp. cb	-0.091**	0.418**								
(4) Exp. synd	-0.420**	0.991**	0.412**							
(5) Share synd.	0.331**	0.041	0.080*	0.141**						
(6) Share cb	0.119**	-0.024	0.546**	-0.010	0.151**					
(7) Spec. sector	0.127**	-0.138**	-0.043	-0.120**	0.180**	0.020				
(8) Trust WWS	0.091**	0.043	-0.122**	0.074*	0.273**	-0.160**	0.124**			
(9) Legal rights	-0.079*	0.022	-0.074*	0.008	-0.088**	-0.260**	0.004	-0.343**		
(10) Country VC	0.093**	0.061	-0.334**	0.089**	0.299**	-0.573**	0.146**	0.455**	0.187**	
(11) Country synd.	-0.190**	-0.002	0.052	-0.034	-0.365**	-0.029	-0.160**	-0.535**	0.027	-0.477**

*, ** indicates significance at five percent, one percent level (two-tailed Pearson correlation)

Table 7.6 reports the correlations among the tested variables and provides first interesting insights. In general, venture capitalists tend to join larger deal settings with more members when they are unexperienced, reflecting their limited resources to stem deals on their own. Another interesting first finding is, that experience significantly and negatively correlates with the variable for sectoral specialization, suggesting that the accumulated knowledge through *learning-by-doing* broadens the firms knowledge base, increases its absorptive capacity and enables it to project their experience to other sectors. Surprisingly, experience shows no significant correlation with the propensity to invest abroad. In theory investment experience should also enable the firms to overcome obstacles associ-

ated with the different dimensions of distance. The share of syndicated investments of a venture capitalist positively correlates with the propensity to invest abroad and specialize in a certain sector, lending first support to the theory that sectoral specialized venture capitalists utilize synergies through the combination of complementary resources in syndications with foreign *local* venture capitalists, and that the sectoral focus enables them to overcome obstacles associated with distance. Surprisingly, generalized trust in the venture capital firms country of residence negatively correlates with its propensity to invest abroad, indicating that it may be more inclined to invest in the *trusted* domestic economy.

7.3 Results and Discussion

7.3.1 Preliminary

Table 7.7 summarizes the investment activities on country level. Most domestic venture capital investments can, not surprisingly, be found in the United States, followed by the United Kingdom and Germany. An interesting fact illustrated here is that the foreign investments of U.S. venture capitalists in other countries included in the sample count for the highest total volume but relative to the whole economy and the venture capital industry in the U.S., the outflows are quite modest. The vast bulk of existing literature considers the United States as *the* venture capital exporter number one, but when only taking real venture capital (as done in this study, excluding all private equity investments), this may be right in absolute but by far not in relative terms. Furthermore it can be seen that the venture capital activities of countries under observation show quite heterogeneous patterns. Some countries such as Germany and Spain appear as relatively isolated, though account for high domestic investments but low in- and outflows of venture capital, whereas it is exactly opposite in the case of Japan and France.

To provide a first intuition for bilateral venture capital investment activities, table 7.8 depicts the aggregated in- and outflows between country dyads during the observation period.

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Table 7.7: Venture Capital Flows on Country Level

	AT	BE	CH	DE	DK	ES	FI	FR	GB	GR	IE	IT	JP	NL	NO	PT	SE	US
<i>Domestic investments</i>																		
Volume	400	669	748	6,014	799	1,420	697	0	11,823	15	582	690	352	1,205	292	43	1,498	126,961
Number	80	155	136	1145	166	309.0	167	0	2,433	4.00	201	86	151	224	57	12	362	11,794
<i>Gross cross-border inflow (from all sample countries)</i>																		
Volume	105	363	647	1,444	344	232	241	0	3,593	0	356	226	18	625	166	16	556	10,020
Number	26	98	175	427	105	47	81	0	763	0	137	34	14	117	33	8	182	2,402
<i>Gross cross-border outflow (to all sample countries)</i>																		
Volume	22	576	1,905	2,198	465	104	170	1,270	4,878	0	151	143	1,616	870	229	12	538	3,801
Number	9	185	487	552	138	26	62	367	1,152	0	51	54	367	286	91	6	163	653

Note: This table reports the aggregated venture capital investments, in- and outflows in the period between 2000 to 2010 on country level, measured in million EURO and alternatively in the number of investments.

Table 7.8: Venture Capital Flow between Country Pairs

$i \Rightarrow$ $, j \Downarrow$	AT	BE	CH	DE	DK	ES	FI	FR	GB	GR	IE	IT	JP	NL	NO	PT	SE	US
AT		0.0	0.0	8.3	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	3.8
BE	1.5		13.4	45.4	3.3	2.0	4.3	0.0	139.0	0.0	28.3	12.2	0.0	43.4	0.0	0.0	5.1	278.4
CH	3.0	6.9		226.8	29.9	10.6	2.5	0.0	111.3	0.0	17.8	10.1	0.0	19.0	37.6	0.0	9.6	1419.7
DE	50.7	5.3	144.3		13.2	14.3	5.4	0.0	485.6	0.0	16.3	11.8	1.9	59.7	1.8	3.5	12.0	1,362.5
DK	0.0	0.0	21.0	33.8		0.0	15.4	0.0	59.5	0.0	0.0	0.00	0.0	5.5	0.6	0.0	48.4	280.5
ES	0.0	1.8	8.6	13.5	0.0		0.0	0.0	4.5	0.0	0.0	0.00	0.0	0.0	0.0	0.0	3.6	72.4
FI	3.4	0.0	2.0	1.7	12.8	0.0		0.0	31.3	0.0	0.0	0.00	0.0	3.5	0.0	0.0	47.5	67.9
FR	1.3	82.0	98.6	134.9	19.5	15.0	8.6		198.0	0.0	11.4	23.3	0.0	61.3	6.4	1.8	39.3	569.1
GB	32.3	36.13	105.6	419.9	95.1	125.0	63.0	0.0		0.0	115.9	48.5	0.3	100.9	44.7	0.0	122.6	3,568.4
GR	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.00		0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0
IE	0.0	0.0	0.9	0	0.0	0.0	0.0	0.0	137.0	0.0		0.00	0.0	0.0	0.0	0.0	0.0	13.4
IT	0.0	2.6	2.7	6.8	0.0	10.0	5.3	0.0	49.1	0.0	0.00		0.0	0.0	0.0	0.0	0.0	66.6
JP	0.0	1.4	1.1	15.0	0.0	0.0	4.6	0.0	90.2	0.0	2.7	3.4		1.8	26.6	0.0	4.6	1,465.6
NL	4.5	79.8	26.1	84.4	21.0	8.6	12.3	0.0	170.1	0.0	15.2	13.5	0.0		1.2	1.8	38.7	393.3
NO	0.0	0.0	14.6	5.8	17.0	0.0	0.0	0.0	45.3	0.0	0.00	0.0	0.0	0.0		0.0	44.5	101.7
PT	0.0	0.0	0.0	0.00	0.0	2.1	0.0	0.0	0.00	0.0	0.00	0.0	0.0	0.0	0.0	43.7	0.0	9.7
SE	0.0	0.0	17.7	19.9	55.8	1.0	38.4	0.0	32.0	0.0	2.1	0.0	0.0	0.0	23.9	0.0		347.4
US	8.6	136.9	190.0	427.8	76.0	43.5	81.5	0.0	2,029.4	0.0	146.0	103.7	15.4	329.9	23.1	8.6	180.5	

Note: This table reports the aggregated venture capital flows during the observation period from 2000 to 2010 between country pairs, measured in million EURO. It has to be interpreted as follows. The destination country i in the column receives a venture capital inflow from the source country j in the row, respectively j has an outflow to i .

7.3.2 Domestic Venture Capital Investments

Table 7.9 reports first results for the characteristics of domestic venture capital investments with respect to domestic social capital and trust.

Table 7.9: Regressions – Domestic Venture Capital Investments

	Investments total		Investments syndicated		Share syndicated investments	
	(1)	(2)	(1)	(2)	(1)	(2)
Patents	-0.001**	0.000	-0.000*	0.000	0.000	0.000
GDP growth	0.006***	0.005**	0.004***	0.002*	-0.002	-0.025
GDP per capita	-0.070**	-0.217***	-0.029	-0.158***	0.001***	0.000
Capitalization	0.001***	0.001***	0.000***	0.001**	0.000	0.000
Bank credit	0.000	-0.001***	-0.001	-0.001***	0.000	-0.001
Trust WWS	0.152***	0.403***	0.093***	0.341***	0.101	-0.937*
Country dummies	No	Yes	No	Yes	No	Yes
Year dummies	No	Yes	No	Yes	No	Yes
<i>N</i>	1,744	1,744	1,744	1,744	1,744	1,744
<i>R</i> ²	0.241	0.761	0.207	0.758	0.135	0.436

Note: Ordinary least squares regression, *, **, *** indicates significance at the ten, five, one percent level

Dependent variables:

Y^1 : Amount of deals of venture capitalists of country i in year t domestically, normalized by the country's GDP in billion EURO

Y^2 : Amount of deals of venture capitalists of country i in year t domestically in a syndicate, normalized by the country's GDP in billion EURO

Y^3 : Share of domestic syndicated investments investments of venture capitalists of country i in year t in all domestic investments

Corresponding models:

Model 1

$$Y_{i,t}^{1,2,3} = \alpha + \beta_1 growth_{i,t-1} + \beta_2 GDPcapita_{i,t} + \beta_3 capitalization_{i,t} + \beta_4 credit_{i,t} + \beta_5 trust_i$$

Model 2

$$Y_{i,t}^{1,2,3} = \alpha + \beta_1 growth_{i,t-1} + \beta_2 GDPcapita_{i,t} + \beta_3 capitalization_{i,t} + \beta_4 credit_{i,t} + \beta_5 trust_i + \beta_6 country_i + \beta_7 year_t$$

The results suggest the following. Comparing the models explanatory power according to the different dependent variables used, show that the models model with total domestic venture capital investments always leads to better results as the corresponding one for syndicated investments, suggesting that the classical macroeconomic variables alone are less qualified for explaining syndicated than total domestic venture capital investments. When observing the share of syndicated venture capital investments as depended variable, macroeconomic variables completely loose their explanatory power. The explanatory power of model one without considering random and fixed effects in all cases does not exceeds an R^2 of 25 percent, where adding year and country dummies increases the R^2 value by about 50 percent.

Most control variables behave as expected. Higher GPD growth in the previous year as well as a higher market capitalization to GDP ratio lead to significantly higher venture capital investments, whereas higher bank credit rations result in less investments. Surprisingly, GDP per capita in most models shows a signif-

ificant negative coefficient, suggesting wealthier countries to invest less venture capital domestically. Generalized trust in all models shows a positive coefficient, significant at one percent level. When observing the unreported standardized coefficient,¹ the one for trust is in all models the highest. This finding provides evidence for 1 and suggest high trust societies to be a nourishing environment for venture capital investments and trust to be a mean to overcome the uncertainty associated with them. These findings are in line with the theories of [Shepherd and Zacharakis \[2001\]](#) and the empirical evidence provided by [Duffner et al. \[2009\]](#) and [Bottazzi et al. \[2011\]](#), showing that a high level of trust between actors facilitates venture capital investment.

With the share of syndicated in all domestic investments as depended variable, the coefficient of generalized trust turns negative, while still significant at least at ten percent level. This finding is on first glance quite puzzling and leads to a rejection of hypothesis 2. A possible explanation is, that in high-trust societies the generally more positive expectations of participants reduce the perceived uncertainty of the investment and thus makes syndications as a mean to overcome uncertainty redundant. High trust though fosters the direct investment in portfolio companies without any additional stage, though. Furthermore, domestic syndications may indeed not offer that much potential for mobilizing synergies by combining complementary assets as a rationale to syndicate, though on domestic level the heterogeneity of the industry's population is assumed to be much higher than on international level.

To summarize, testing the influence of macroeconomic variables together with generalized trust as an approximative measure for a country's social capital leads to the following results. The domestic investments of venture capitalists relative to the country's GDP are higher in countries that had a higher economic growth in the last period, representing the increasing demand for venture capital funding. As expected, countries with a higher relative market capitalization, representing better conditions for an IPO exit, also show a higher domestic activity of venture capitalists. However, the strongest effect in terms of statistical and economic significance on relative domestic venture capital investments is the one of gener-

¹Standardized coefficients are divided by their means, which makes them comparable in their impact on the dependent variable

alized trust. Though the cultural attitude to trust others definitely increases the propensity to dare investing in new and innovative ventures which are uncertain in their future development.

7.3.3 Bilateral Venture Capital Flows

This second set of regressions attempts to identify the most important economic and socioeconomic determinants of cross-border venture capital flows between country dyads. After the procedure of stepwise variable entrance explained in the model description, all models reach a proper R^2 of almost 50 percent. For the sake of clarity and an easier comparison between the effects, in this model the standardized instead of the real coefficients are reported.¹

Table 7.10: Regressions – Country Dyad Level

	VC count total		VC count syndicated		VC count new	
	(1)	(2)	(1)	(2)	(1)	(2)
Δ capitalization	-0.057	-0.067	-0.057	-0.066	-0.028	-0.037
Δ patents	-0.056	0.037	-0.056	0.038	-0.022	0.074*
Δ growth	0.029	0.021	0.029	0.021	0.017	0.008
Distance	-0.745***	-0.374***	-0.744***	-0.374***	-0.744***	-0.290***
Same language	0.002	-0.068**	0.003	-0.068**	0.000	-0.084**
Same legal	0.229***	0.162***	0.220***	0.163***	0.2230***	0.165***
Same capitalism	0.188***	0.141***	0.188***	0.142***	0.121***	0.083***
Same NSI	-0.303	-0.197***	-0.303***	-0.197***	-0.241***	-0.133***
Trade		0.229***		0.229***		0.416***
Co-patents		0.216***		0.218***		0.0978**
Trust EURO		-0.118*		-0.118*		-0.107**
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	194	194	194	194	194	194
R^2	0.417	0.466	0.416	0.465	0.378	0.448

Note: Note: Ordinary least squares regression, *, **, *** indicates significance at the ten, five, one percent level
 Dependent variables:
 Y^1 : Number of total investments by venture capitalists located in the source country J in portfolio companies of the destination country i in year t , normalized by the mean of both countries GDP in billion EURO
 Y^2 : Number of syndicated investments with venture capitalists located in the source country j in portfolio companies of the destination country i in year t , normalized by the mean of both countries GDP in billion EURO
 Y^3 : Number of investments by venture capitalists located in the source country j in portfolio companies of the destination country i in year t where the venture capitalist has no prior investment experience in this country, normalized by the mean of both countries GDP in billion EURO
 Corresponding models:
 Model 1:
 $Y_{i,j,t}^{1,2,3} = \alpha + \beta_1 \Delta \text{capitalization}_{i,j,t} + \beta_2 \Delta \text{patents}_{i,j,t} + \beta_3 \Delta \text{growth}_{i,j,t} + \beta_4 \text{distance}_{i,j} + \beta_5 \text{distance}_{i,j} + \beta_6 \text{language}_{i,j} + \beta_7 \text{capitalism}_{i,j} + \beta_8 \text{NSI}_{i,j} + \beta_9 \text{country}_i + \beta_9 \text{country}_j + \beta_{10} \text{year}_t$
 Model 2:
 $Y_{i,j,t}^{1,2,3} = \alpha + \beta_1 \Delta \text{capitalization}_{i,j,t} + \beta_2 \Delta \text{patents}_{i,j,t} + \beta_3 \Delta \text{growth}_{i,j,t} + \beta_4 \text{distance}_{i,j} + \beta_5 \text{distance}_{i,j} + \beta_6 \text{language}_{i,j} + \beta_7 \text{capitalism}_{i,j} + \beta_8 \text{NSI}_{i,j} + \beta_9 \text{trade}_{i,j,t} + \beta_{10} \text{copatents}_{i,j,t} + \beta_9 \text{trust}_{i,j} + \beta_{10} \text{country}_i + \beta_{11} \text{country}_j + \beta_{12} \text{year}_t$

¹Here, all coefficients are divided by their mean. Advantage is the better comparison between the coefficient, drawback that the coefficients effect on the dependent variable can not be interpreted properly anymore.

The results suggest the following. In a first unreported model I test for general macroeconomic differences between countries. The results show, consistent with Schertler and Tykvová [2010], that venture capital tends to flow from countries with high market capitalization to countries with a low one. Further robustness tests, testing the same model on a restricted sample which excludes the two major market based systems in the observation, the U.K. and the U.S., provide similar results. Though, venture capitalists located in countries with vibrant stock markets use this as advantage for foreign investments in countries with more unfavorable conditions, either through the possibility to execute the IPO of the invested company in their home market or through higher experience in bringing companies public in general.

Furthermore, venture capital shows a tendency to flow to destination countries with higher growth rates and more patent applications than venture capitalists country of residence, representing the exploitation and exploration of opportunities in more dynamic locations with high demand for venture capital. These findings lend first support for hypothesis 7.

In model one, variables capturing the cognitive, institutional and geographical distance enter. First obvious effect is that all formerly significant macroeconomic variables turn insignificant, which illustrates the limited explanatory power of macroeconomic variables for explaining the patterns of cross-border venture capital flows.

The indicators for the dimensions of distance behave as follows. As expected, geographical distance shows to be significant and one percent level and has the by far highest standardized coefficient.¹ Confirming the *old paradigm* that venture capital is a more local business, geographical distance indeed seems to be the major obstacle for investments. This surprisingly also holds for syndicated investments and leads to the rejection of hypothesis 4.

¹Here the logarithmic distance in kilometers is used. As argued by Sorenson and Stuart [2001, 2008], geographical distance is assumed to have diminishing marginal effects. Distance is mostly an obstacle for personal contact. With increasing distance, the means of transportation can be substituted, so instead of walking, a car can be used, and by further increasing distance a train or a plane. However, robustness tests with the non-logarithmic distance as variable come to similar results.

Thus, at least on macro level, the claim that venture capital investments are a powerful mean to overcome geographical distance, cannot be supported by evidence. Testing a restricted sample excluding the U.S. as source country even show an almost doubled negative coefficient for geographical distance. Surprisingly, when measuring only deals of venture capitalists which invest the first time in a country, the negative coefficient is smaller and not higher, as stated in hypothesis 5, which also has to be rejected.

The effect of a shared language spoken by at least 30 percent of citizens in the source and destination country enters with a significant and negative coefficient, what is rather counter-intuitive, since a common language strongly facilitates interaction between actors. In th subsample excluding the United States, this effect becomes even stronger. However, even if statistically significant, the small coefficient suggests a negligible economic relevance. As already argued, in a community with a strong baseline homophily, where all actors are expected to communicate, present and publish information relevant for their field of knowledge in English, the effect of a common language may up to now have been overestimated when it is about a professional investment relationship.

Sharing the same family of the legal system and the same cluster of capitalistic varieties shows a positive and significant effect on bilateral cross border investments, though support hypothesis 6. Similar markets and legal systems decrease the *ex ante* information costs and increase the confidence and reduce the (perceived) uncertainty regarding the development of the investment. An interesting finding supporting hypothesis 8 is, that venture capital shows a propensity to flow between countries with a different setup of the national innovation system. The coefficient of the dummy variable indicating that a country dyad shares a similar setup according to Balzat and Pyka [2006] is significant and negative in almost all cases.¹ Again testing for a restricted sample excluding the United States comes to similar results. This finding strongly supports resource-based view arguments of opportunities that appear through the combination of complementary resources.²

¹Robustness tests for innovation subsystems come to similar results, with a different knowledge base and sectoral specialization as most significant.

²Again, it is beyond the scope of this research to evaluate if two systems are really complementary. For the sake of simplicity, I here just observe differences and assume them to be complementary.

In model two, the variables indicating social and economic interaction, awareness and social capital, enter. Here, the amount of bilateral trade and co-patents show the highest significance as well as amplitude of the coefficient. Other variables such as the stock of students studying, immigrants living or labor working in the partner country, the FDI flow between the dyad *et cetera* initially were significant as well but lost – probably due to multicollinearity – most of their explanatory power when the exports and co-patent variables were added. Overall, the findings indicate, as stated in hypothesis three, that frequent economic, social and academic exchange creates dynamic interaction and improve the awareness of investment opportunities between country dyads.

Very surprisingly, the measure for bilateral trust in all final models shows a significant negative coefficient. These results appear on first sign puzzling and lead to a rejection of hypothesis 12. A possible interpretation could be as follows. In high trust societies, potential entrepreneurs may have a higher probability to obtain informal sources of capital, such as private loans by friends, families or affiliates or business angel funding, as substitute for venture capital. Furthermore, as the results on domestic level show and in the following on firm level will show, venture capitalists in high trust societies are more likely to invest domestically and not syndicated. As a result, the domestic venture capital industry appears to be somewhat isolated of the international venture capital investment activities, which may lead to an underutilization of investment opportunities. Uzzi [1997] discusses this phenomenon as the *paradox of embeddedness*, which appears in networks with too strong ties and leads to an exclusion of entities outside of the network. Figure 7.1 illustrates this facts with plotting the relative venture capital investments of the countries under observation against their score in the [Global Innovation Index \[2011\]](#)¹ in 2010, where the top trust quantile countries are marked by green dots. On first glance can be seen, that high trust countries are characterized by a below average venture capital investments with respect to their innovation capacity, which can be interpreted as an indicator for the do-

¹The *Global Innovation Index* (GII) represents a composed index developed by the *Confederation of Indian Industry* and INSEAD Business School. It consists of subindices for innovation capacity/input and innovation output, contending a large variety of weighted factors and takes many hard and soft institutional factors, such as the political, regulatory and business environment, into account.

mestic demand for venture capital. Another interpretation could be found in the general capitalistic systems of high trust countries. However, these interpretations are up to now only speculative, but nevertheless suggest that the demand for venture capital may not only be determined by the innovation potential but also by cultural attitudes and the institutional setup of a country.

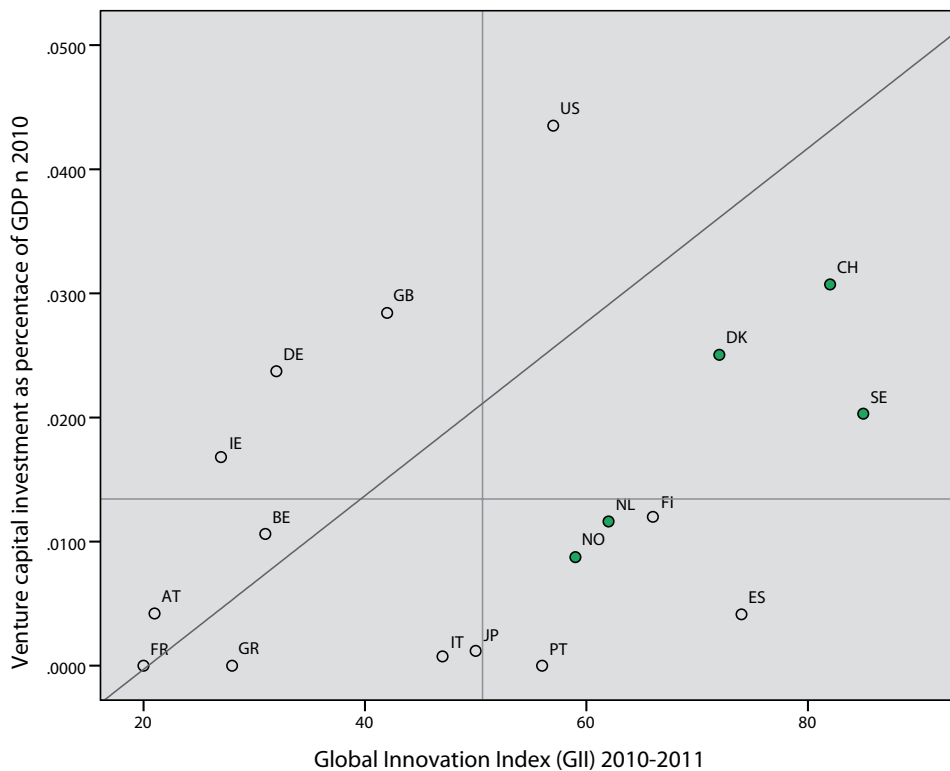


Figure 7.1: Scatterplot – Venture Capital Investment and Innovation Capacity

Further insights can be drawn by considering figure 1 in the appendix, a scatter-plot matrix containing trust, venture capital investment and distance. It reveals a non-linear inverse U relationship between trust and relative venture capital investments, indicating that an *overload* of may indeed have negative effects on venture capital investments. However, the direction of the causality remains up to now unclear.

To summarize, on macro level the results are somewhat ambiguous. In general, they are able to provide support for the theory constructed in the previous chapter. Social and economic interaction, geographical, social and institutional

proximity indeed offer potentials to explain international venture capital flows between countries. In fact, they offer a much higher explanatory power than the traditional macroeconomic indicators. Of particular interest is that venture capital tends to flow between countries with a similar institutional setup but different knowledge bases, indicating a cognitive distance. Support for the theories regarding the positive effect of trust in promoting venture capital investments and syndication could not be provided, at least on macro level. In fact, in the final model high trust between country dyads negatively affects the amount of venture capital flows.

7.3.4 Venture Capital on Firm Level

Table 7.11 reports the results of the set of ordinary least squares regression using firm level data of venture capitalists. Two models are tested, one without and one with dummies for the venture capitalists country of residence. Both models are tested for the full sample and for a restricted one, only taking into account venture capitalists not located in the United States. In all cases, the models show an appropriated R^2 above 0.5. For both samples it only slightly increases in model two when taking fixed country effects into account, and additional robustness checks controlling for firm fixed effects also provide comparable results. This shows that the chosen set of independent variables are indeed suitable for explaining venture capitalists tendency to invest in foreign portfolio companies.

The average deal value enters in all cases with a positive coefficient, but only shows significance for the restricted sample. The total investment experiences of the venture capitalist in all cases a positive coefficient and in most cases significant, but when using the restricted sample it drops from one percent in to insignificant in model one and ten percent in model two. This indicates non-U.S. venture capitalists follow another general development path than their counterpart in Europe and Japan. While the U.S. venture capitalists with growing experience tend to increase their geographical diversification, European and Japanese venture capitalists show the tendency to invest internationally either from the beginning or never. When using the full sample, the results are in line with the findings of [Sorenson and Stuart \[2001, 2008\]](#) as well as traditional theory of the

7. Econometric Analysis

Table 7.11: Regressions – Venture Capital Firm Level

	Full sample		Without U.S.	
	(1)	(2)	(1)	(2)
Exp.	0.025***	0.025***	0.046	0.049*
Deal members	0.015	0.014	0.074*	0.077**
Deal value	0.009***	0.008***	0.025***	0.023***
Spec. sector	0.088**	0.078**	0.188*	0.176*
Share synd.	0.301***	0.284***	0.341***	0.321***
Trust WWS	-0.360***	-0.489***	-0.314**	-0.465**
Legal rights	-0.446***	-0.473***	-0.337*	-0.441*
Country VC	-0.424***	-0.392***	-0.274	-0.332
Country synd.	-0.690***	-0.624***	-0.523***	-0.319**
Country dummies	No	Yes	No	Yes
<i>N</i>	985	985	269	269
<i>R</i> ²	0.549	0.602	0.507	0.576

Note: Ordinary least squares regression, *, **, *** indicates significance at the ten, five, one percent level
Dependent variable:
Y: Share of cross-border investments in all investments of venture capital firm *k* located in country *i* during the 2000 – 2010 period
Corresponding models:
Model 1:
 $Y_k = \alpha + \beta_1 exp_k + \beta_2 dmembers_k + \beta_3 dvalue_k + \beta_4 specsector_k + \beta_5 sharesynd_k + \beta_6 trust_i + \beta_7 legal_i + \beta_8 VCcountry_i + \beta_9 countrysynd_i$
Model 2:
 $Y_k = \alpha + \beta_1 exp_k + \beta_2 dmembers_k + \beta_3 dvalue_k + \beta_4 specsector_k + \beta_5 sharesynd_k + \beta_6 trust_i + \beta_7 legal_i + \beta_8 VCcountry_i + \beta_9 countrysynd_i + \beta_{10} country_i$

growth and internationalization of the firm in general [e.g. Hymer, 1976]. However, stated empirical and theoretical examples strongly focus on firms from the United States. The results of my restricted sample instead indicate that non-US firms show a quite different behavior in their internationalization activities and call for more differenced research settings.

Sectoral specialization shows an positive coefficient, significant at five percent level in the unrestricted, and on ten percent level in the restricted sample, which strongly supports hypothesis 10. Though, venture capitalists specialize, in line with my theory, either sectoral or geographical. Though, when specialized on a certain sector, venture capitalists tend to be more likely to invest abroad. With a large amount of accumulated sectoral knowledge, venture capitalists are able to internationally spot promising investment targets and provide them with superior support. Additionally, they are due to their sector specific knowledge and networks in great demand as syndication partner. Furthermore, their sophisticated knowledge about technologies, products and markets of a particular sector reduces the uncertainty associated with the investment in new knowledge based firms. These results lend additional indirect support to hypothesis 6, which states that sectoral, respectively cognitive similarities as a form of proximity enables firms to overcome obstacles associated with geographical distance.

The average number of members per deal shows only to be significant for the restricted sample, though non-US venture capitalists show the propensity join a larger setting when investing abroad. As previous results show, if investing abroad, non-U.S. firms do start to do so with less experience than their US counterpart. When assuming that less experience indicates that they are younger and less abundant in human and financial capital, it can be argued that they necessarily have to bundle as much financial and intellectual resources as possible when investing abroad. However, it is not that U.S. venture capitalists not use the advantages of local syndication partners when investing abroad, they are just not in need for that a large setting, because they usually only lack in proximity to the portfolio company. This can be illustrated by the fact that the share of syndicated investments shows a positive and highly significant coefficient with a comparable amplitude in both samples. These findings provide evidence for the proposition that the internationalization of venture capital is indeed driven by the ongoing trend to syndicate cross-border investments to bridge social, institutional and geographical distance.

Surprisingly, as in the previous settings, the coefficients for generalized trust and the efficiency of legal rights protection enter in all models negative and significant. The amplitude of both even increases when controlling for country fixed effects. For the generalized trust variable, this finding still remains puzzling. According to the socioeconomic theory it can be expected that venture capitalists embedded in a society encouraging trust to be more likely to dare investing in a portfolio company in an unfamiliar institutional and social setting, as stated in hypothesis 11. In case of legal rights, the results can be interpreted as follows. Due to a poorer protection of property rights in the home country, venture capitalists may have higher incentives to invest abroad in countries with more favorable conditions.

The total venture capital under management of a country enters negatively in all cases, significantly at one percent level in the full but insignificant in the restricted level. This finding leads to a rejection of hypothesis 9. Possible explanations may be found in the formerly stated suspicion, that not necessarily the most developed venture capital industries show a tendency to invest abroad. Even though the cross-border investment activities of the US venture capitalists

account for the major share of international venture capital flows, this seems to be explained more by the sheer size of the industry than by a general tendency. In fact, US venture capitalists appear, measured in the share of their overall capital under management, as less likely to invest abroad.

The overall share of syndicated investments in a country also shows a negative coefficient which remains significant at least at five percent level in all cases. Interestingly, in both models the coefficient shows a higher amplitude in the unrestricted sample, in model two it is almost twice as high. Notwithstanding to initial expectations, these findings more lend support to the idea that dense domestic networks and a trust *overload* may lead to what Uzzi [1997] describes as the *paradox of embeddedness*. Here, too much social behavior and strong bonds between the actors may lock members of these social networks in to established relationships and routines, and let them tend to underestimate opportunities from the outside, which may be particularly harmful in a uncertain world with changing technology regimes, policies and innovation.

Chapter 8

Conclusion

8.1 Summary and Concluding Remarks

In this thesis I illustrated the opportunities and obstacles of international financial investments. The chosen case of venture capital is of particular interest, since investment decisions here are made there under high uncertainty and mostly based on tacit knowledge. Though, face-to-face contact, frequent communication between the involved parties are imperative for the decision making process. The result are persistent relationships, which require mutual respect and understanding, loyalty, and trust.

To capture the described setting, I developed a comprehensive framework which synthesizes resource-based views of the firm with social capital literature. In a nutshell, it depicts how economic interaction over social or geographical distance can be explained with differences, which offer opportunities for synergies, and similarities, which facilitate trust and stimulate interaction. Thereby I show that even in a world of ongoing globalization and regulatory harmonization, geographical, social, organizational, institutional and cognitive distance still matter in economic exchange where a high degree of tacit knowledge and uncertainty is involved. At the case of the venture capital industry I illustrate, how this may be overcome by organizational innovation, intra-industry specialization and networking. Venture capitalists exercise a division of labor by either specializing in certain sectors and technologies, or geographically. As a result, a heterogeneous intra-industry population of firms in terms of specialization developed, which

still maintains enough cognitive and organizational proximity, caused by a strong baseline homophily, to provide a stable foundation for effective interaction and communication.

A major topic of this study was the effect of trust and social capital between actors and countries on venture capital investments, where initially this effect was assumed to be positive. On domestic level, evidence for this positive effect of generalized trust facilitating uncertain investments in young and innovative firms can be provided. High trust societies are indeed characterized by higher domestic venture capital investments, even if not by a higher share of syndication activities across venture capitalists, as expected. Plausible explanations are that generalized trust reduces the uncertainty a way that venture capitalists are more likely to dare investing directly in portfolio companies and make syndications redundant. Furthermore, incentives for syndication caused by synergies through combining complementary assets are through the higher heterogeneity of the venture capitalists on country level assumed to be smaller. However, the results show that generalized trust appears to have a stronger effect on the formation of the relationship between the entrepreneur and venture capitalists than on syndications among venture capitalists, indicating different mechanisms to be at work on both stages.

On an international level, different pattern could be revealed. While on the national level generalized trust, as a form of *soft* institutional trust, facilitates venture capital investments, bilateral trust between countries consistently shows the opposite effect. Furthermore, venture capitalists located in high trust societies show a lower propensity to invest abroad. Even though these findings are not as expected, they are interesting and contribute to the understanding how investment decisions lead to different outcomes when different sets of actors are involved. On the stage between the venture capitalist and the entrepreneur, generalized trust has proven as highly important, where my theory suggests two reasons. First, lacking historical data (calculative trust) and with no prior relationship between the entrepreneur and venture capitalist (relational trust), institutional factors can provide a *critical mass* of trust that permit relationships to form up in the first place, and so ease the way to develop other endogenous forms of trust. Second, processed information on this stage is of highly tacit nature,

though it the participants have to initially trust each others that both show the commitment and ability to maintain open and frequent communication, and none of them discloses important information out of opportunistic motives.

However, in international venture capital investments, a different set of actors is involved, since most cross-border venture capital investments are organized as syndicates between foreign and local investors. In these intra-industry relationships, institutional trust between countries proves to be of less importance, if not even to have a negative impact. Reconsidering the theory developed in this thesis, at least two possible reasons can be suggested. First, generalized trust may not be representative for the subpopulation of venture capitalists. Due to similar backgrounds and many international organizational and social foci, a high social and cognitive intra-industry proximity is given. Shared codes of conduct, routines, symbols and narratives foster the development of an independent *intra-industry identity*. Second, between venture capitalists, calculative and relational trust are likely to be present prior to the investment. The high value of reputation for venture capitalists offers calculative rationales to not jeopardize this reputation by acting opportunistically. The reciprocal nature of the venture capital industry furthermore makes repeated joint investments and thus the establishment of persistent relationships, associated with increasing relational trust, between the same actors likely. As a result, in intra-industry relationships between venture capitalists *soft* institutional trust may be to a high extend substituted by other forms of trust.

Considering the supply and demand for venture capital on country level, my results offer two additional speculative explanation. First, the empirical analysis shows that high trust societies show a propensity to satisfy venture capital demand domestically rather than to invest abroad, and the population of venture capitalists show a propensity to invest domestically, which lets them appear somewhat isolated from the international investment society. As a result, high generalized trust incentives venture capitalists and entrepreneurs to prefer *trusted* domestic instead of foreign partners. Second, potential entrepreneurs in high trust societies are likely to have better opportunity to obtain finance through informal sources of capital, such as friends, family, affiliates and business angels. As a result, trust in general has a stimulating effect on domestic venture capital in-

vestments, but nevertheless all countries in the highest trust quantile show an under-supply in venture capital relative to their innovation capacity. These findings, even if weakly supported by data up to now, reveal possible problems in case of an *overload* of trust and the *paradox of embeddedness*, namely that too close relationships which involve trust, loyalty and commitment cause an underestimation of opportunities from outside the network and leads to lock-in situations between the actors.

In the case of venture capital finance, the implications are twofold. First, if entrepreneurs show a higher propensity and have a higher probability of getting access to informal sources of finance, the major advantages of the venture capital financing, namely efficient market oriented selection of investment targets and value adding post-investment support, are not utilized. Second, if domestic venture capitalists mainly finance domestic firms and do this without foreign participants, the discussed opportunities of obtaining synergies through the combination of complementary resources are not utilized either. This reflects more the excluding *bonding* than the including *bridging* behavior, and ultimately leads to an underutilization of valuable external sources of financial, intellectual, human and social capital.

This thesis applies theories of the formation and evolution of networks consistent with the augmented resource-based view and provides first empirical evidence therefore. I demonstrate how differences especially in the knowledge base, geographical and sectoral specialization, on firm as well as on country level, provide opportunities for international syndications of venture capital investments. The empirical analysis on country dyad level provide evidence that venture capital indeed shows a propensity to flow between countries with different configurations of the national innovation system, especially in terms of the knowledge base and sectoral specialization. On firm level I observe that venture capitalists with a strong sectoral specialization tend to carry out a higher share of their investments internationally, whereas sectoral diversified venture capitalists invest in their close environment. Resource-based motives provide clear suggestions and business practice provides evidence, how proximity, local knowledge and networks can be beneficially combined with superior sectoral knowledge and networks. The *ex post* effects of such investments for the venture capitalists are also supposed

to be positive. First, due to the reciprocal nature of the venture capital industry, further joint investments are likely. Second, transitivity effects let the syndication partner serve as what Granovetter [1973] calls a bridge, a non-redundant connection between two separated (national or sectoral) networks, though also offers deal flow opportunities for up to now not connected members of the syndicates network. This effects are assumed to be particularly beneficial for the venture capital industry and entrepreneurial landscape of the destination country, since it facilitates the *learning-by-doing* of domestic venture capitalists in up to now underdeveloped sectors. If one agrees on that, a high ratio of syndicated international venture capital activities can be seen, besides a global allocation of financial resources into innovative and potentially high growth ventures, as a form of international knowledge exchange and interactive learning.

8.2 Contribution of the Thesis

This study seeks to contribute to the venture capital field and more broadly to the body of social science literature and theory, by offering an alternative and comprehensive framework to explain the rationales of international investments and cooperation in uncertain investment settings.

Its contributions are at least twofold. First, with combining resource-based and social capital and social interaction theories in one model, a novel approach to analyze and explain international capital flows dedicated to innovative and entrepreneurial activities.

Second, it augments existing systematic models of innovation, foremost the *national systems of innovation* approach with additional aspects regarding exogenous (to the national system) sources of finance. More precise, it depicts the role of the national financial and production system and institutional setup for acquiring external sources of capital. Furthermore, it discusses the potentials of *learning-by-doing* and *learning-by-collaboration* of joint investments with foreign partners.

8.3 Implications for Theory and Practice

The implications of this study for theory, professional practice and policy making are numerous. For scholars and research on venture capital, and from a broader perspective, it demonstrates the importance of including the socioeconomic and institutional dimension as pivotal element in international investments and economic exchange in general, especially in settings with high uncertainty and a high importance of tacit information.

For policy design, the following implications can be provided. First and foremost, cross-border venture capital investments in general have to be seen as beneficial and should not be restricted but rather supported by policy and the design of the legal framework, whether they are in- or outflows. The venture capital industry presents itself as more a cooperative than a competitive one, though venture capital firms¹ and industries can peacefully coexist and in fact benefit from each others. Cross-border cooperation between venture capitalists may be a valuable source of financial, intellectual, human and social capital for the domestic population of (potential) entrepreneurs. This is of particular importance for countries with a relatively young venture capital industry, as it is the case in most European countries, that is not able to provide a sufficient amount of these resources. Foreign venture capitalists though represent an important source of sectoral knowledge and general investment practice. Furthermore, the reciprocal nature of the industry makes after the first successful one further investments likely. As a consequence, policies with the attempt to stimulate the domestic venture capital industry should focus on the creation of *missing links* to the international investment society, whereas protectionism policies following the *infant industry* argument appear as highly inappropriate. Positive examples for policies aiming to foster networking and interactive learning can be found for instance in Israels Yozma program, which is described and discussed in chapter one. Furthermore, besides financial incentives, the creation of social and organizational foci, where venture capitalists initially can get *in touch* with each others, can be recommended. When targeting potential partner countries, according to this

¹Exceptions may be very dense and mature domestic venture capital industries, as it can in Europe only be found in the United Kingdom.

study priority should be given those with high social and institutional proximity but differences in the knowledge base and sectoral specialization of the national production system.¹

This study also demonstrates that policy design should not solely focus on stimulating the supply for venture capital, since the venture capital industry co-evolves with the high tech industries that get financed. Though, for an *infant* venture capital industry to emerge, an initial critical mass of innovative ideas and entrepreneurs willing to bring them to the market is a necessary condition. Though, supply focused policies are likely to fail, if this supply of venture capital does not meet an appropriate demand for it. As discussed, beside the quality of the education and research system, and its connection to the industry, cultural attitudes also influence the demand for venture capital indirectly through the supply of entrepreneurs and their choice of finance. Even though cultural attitudes appear persistent over time, the nevertheless can be target of consistent long term policy.

Finally, the somewhat ambiguous influence of a country's social capital and generalized trust has to be considered. While trust in general facilitates information sharing, cooperation, networking, and the willingness to operate under uncertain conditions and though innovation, an *overload* of trust may lead on domestic level to less demand for venture capital due to the usage of informal ways of finance, on international level to a *bonding* behavior of the venture capital industry which separates it from international investment networks and leads to lock-in situations. Here policies to create the public awareness of venture capital as a highly beneficial source of finance on the one hand, and create incentives for the inclusion of foreign investors on the other hand become pivotal.

8.4 Avenues for Further Research

A first step has to be done to understand the complex and interdependent mechanisms which drive international venture capital flows as well as to synthesize and

¹Especially in sectors and industries which require much tacit knowledge, the configuration of the national system of production highly influences the countries knowledge base, since interactive *learning-by-doing* processes leads to a faster accumulation of knowledge in this particular pronounced sectors citeplundvall2010national.

augment the patchwork of theories used therefore. Additionally, the possibilities to augment this framework with further studies are manifold and shall be briefly sketched in the following.

First, further empiric studies on the rationales of syndications can be recommended. Methodically, an observation on syndication partner dyad level as carried out by [Sorenson and Stuart \[2008\]](#) can be recommended. By observing the match of two syndication partner together with the content they meet, in this case the portfolio company, resource-based as well as theories regarding social capital and (endogenous forms of) trust could be sufficiently utilized.

Whereas many mechanisms and characteristics in the relationship between the venture capitalist and the entrepreneur are already exhaustively discussed, they are less understood in the context of syndications between venture capitalists and widely unknown in the relationship between venture capitalists and institutional investors. Reason therefore is the overall lack on data regarding investment activities of limited partners, as institutional investors usually are. However, most recent sources, such as the *PreQuin Investor Intelligence* database, offer first quantitative informations, even if by far complete. Nevertheless, combined with in-depth studies of selected investors and funds, augmented with survey data, the following questions are of high interest and promising avenues for further research. First, how influence geographical, organizational, social, institutional and cognitive distance and proximity investment decisions of institutional investors? Second, are this decisions also influenced by trust, and if yes, which dimension (calculative, relational, institutional) appear to show the strongest effects? Third, are investment decisions here, deep in the financial sphere, really anonymous arms-length transactions, or are persistent relationships and networks here also of importance?

The up to now quantitative approach in general could highly benefit of being augmented by qualitative data on firm level. Here, the following questions could be addressed. How important are the different dimensions of trust for venture capitalists and how show they up in their investment and syndication decisions? Are venture capitalists really more likely to join high uncertainty setting, for instance in unfamiliar cultural and institutional environments in new unproven technologies, if trusted partners are involved? Does this valuation differ between

geographical and sectoral specialized or diversified or hybrid forms of venture capital firms?

Furthermore, up to now only the driving forces that *ex ante* lead to investment activities are observed. Of high interest would now be, if they *ex post* also positively affect the performance of the investments. In depth studies on deal and firm level could reveal, which constellations of partners regarding their specialization and the national environment they are embedded in are associated with a higher success rates.

In this thesis I suggested high trust and social capital in a country and between countries to foster informal types of investment more than formal ones. Further research to provide evidence for this claim appear as highly promising and relevant. Unfortunately, an appropriate ascertainment of quantitative data appears as hardly feasible, though the following can be suggested. First, survey based qualitative data from business angles regarding the influence of relational, institutional and calculative trust for domestic and cross-border investments may lead to interesting finding. Second, also survey data based comparison of the (informal) sources of capital used by entrepreneurs in different social settings may be another step to provide further insights.

As shown, still much have to be done to fully understand the mechanisms driving international venture capital flows, and in a broader setting, international investments in productive equity in general. This study seeks to contribute by offering a comprehensive framework by unifying orthodox investment theories with modern socioeconomic, systemic and evolutionary ones. For my part, I am convinced that it contributes to a more complete understanding of the topic and hope other scholars will join exploring this new opened path, because now at the end, I realized that this study in the end raises more questions than it answers.

Appendix

Table 1: Variable Descriptions – Domestic Venture Capital Investments

Variable	Description	Source
Dependent variables		
VC value	Amount of capital invested by venture capitalists located in country i domestically, normalized by the country's GDP in million EURO	Zephyr [2011]
VC value syndicated	Amount of capital invested by venture capitalists located in country i domestically in syndicated deals, normalized by the country's GDP in million EURO	Zephyr [2011]
VC count	Number of domestic investments by venture capitalists located in country i , normalized by the country's GDP in billion EURO	Zephyr [2011]
VC count syndicated	Number of domestic syndicated investments by venture capitalists located in country i , normalized by the country's GDP in billion EURO	Zephyr [2011]
VC syndication share value	Share of the value of syndicated domestic investments by venture capitalists located in country i in the value of all investments	Zephyr [2011]
VC syndication share count	Share of the number of syndicated domestic investments by venture capitalists located in country i in the number of all investments	Zephyr [2011]
Independent Variables		
Patents	Number of patents applied at the PCT by investors with residence in county i , normalized by the country's population and lagged by three years	OECD [2011]
GDP growth	Perceptual GDP growth rate of the country the county i , lagged by one year.	OECD [2011]
GDP per capita	GDP per capita in the country i	
Capitalization	Ratio of market capitalization to GDP of the country i	OECD [2011]
Bank credit	Ratio of credit provided by banks domestically to GDP of the country i	OECD [2011]
Trust WWS	Percentage of citizens of the country i , who replied to the question: "Generally speaking, would you say that most people can be trusted?" with "Yes". Only the subsample of people with tertiary educations is taken into account.	World Value Survey [2009]

Table 2: Variable Description - Bilateral Venture Capital Flows

Variable	Description	Source
Dependent Variables		
VC value total	Amount of total capital invested from venture capitalists of the source country j in portfolio companies of the destination country i , normalized by the mean of both countries GDP in million EURO	Zephyr [2011]
VC value syndicated	Amount of capital invested in syndications from venture capitalists of the source country j in portfolio companies of the destination country i , normalized by the mean of both countries GDP in million EURO	Zephyr [2011]
VC value new	Amount of capital invested from venture capitalists of the source country j , who invest for the first time in portfolio companies of the destination country i , normalized by the mean of both countries GDP in million EURO	Zephyr [2011]
VC count total	Number of total investments of venture capitalists of the source country j in portfolio companies of the destination country i in year t , normalized by the mean of both countries GDP in billion EURO	Zephyr [2011]
VC count syndicated	Number of syndicated investments of venture capitalists of the source country j in portfolio companies of the destination country i in year t , normalized by the mean of both countries GDP in billion EURO	Zephyr [2011]
VC count new	Number of investments of venture capitalists located in the source country j in portfolio companies of the destination country i in year t , where the venture capitalist has no prior investment experience in this country, normalized by the mean of both countries GDP in billion EURO	Zephyr [2011]
VC syndication share	Share of the number of syndicated investments of venture capitalists located in the source country j in portfolio companies of the destination country i in all investments in this country	Zephyr [2011]
Independent variables		
<i>Macroeconomics</i>		
Distance	Natural logarithm of the distance in kilometers between the source country j and the destination country i	CEPII [1990–2011]
Δ GDP	GDP of the destination county i minus the GDP of the source county j	OECD [2011]
Δ GDP per capita	GDP per capita of the destination county i minus the GDP per capita of the source county j	OECD [2011]
Δ GDP growth	GDP growth in percent of the destination county i minus the GDP growth in percent of the source county j , both lagged by one year	OECD [2011]
Δ Patents	Patent applications at the PCT of the destination county i minus patent applications at the PCT of the source county j	OECD [2011]
Δ Capitalization	Market capitalization to GDP ratio of the destination county i minus the market capitalization to GDP ratio of the source county j	OECD [2011]
<i>Proximity & Distance</i>		
Same language	Dummy variable which has a value of one if the same language is spoken in the source country j and destination country i , zero otherwise	CEPII [1990–2011]
Same legal system	Dummy variable which has a value of one if the source country j and destination country i share a legal system of the same origin (categorized in french, german, english, scandinavian), zero otherwise	La Porta et al. [1998]
Same capitalism	Dummy variable which has a value of one if the source country j and destination country i share the same variety of capitalism, zero otherwise	Amable [2005]
Same NSI	Dummy variable which has a value of one if the source country j and destination country i share the same configuration of the national innovation system, zero otherwise	Balzat and Pyka [2006]
<i>Awareness & Interaction</i>		
FDI inflow	Net Foreign Direct Investments of the source country j in the destination country i	OECD [2011]
Trade	Cumulated bilateral trade in goods and services between the source country j and the destination country i , normalized by the mean of both countries GDP	OECD [2011]
Labor Mobility	Cumulated stock of workers born in country i, j currently working in the other, normalized by the mean of both countries population	OECD [2011]
Foreign students	Cumulated stock of students born in country i, j currently enrolled in higher education in the other, normalized by the mean of both countries population	OECD [2011]
Immigrants	Stock of immigrants born in country i, j currently living in the other, normalized by the mean of both countries population	OECD [2011]
Co-patentship	Scientific articles published with co-authors in the source country j and destination country i , normalized by the mean of both countries population	OECD [2011]
Co-atorship	Patent applications at the PCT with co-inventors in the source country j and destination country i , normalized by the mean of both countries population	OECD [2011]
<i>Trust</i>		
Trust WWS	Percentage of citizens of the destination country i who replied to the question: “Generally speaking, would you say that most people can be trusted?” with “Yes”. Only the subsample of people with higher educations is taken into account.	World Value Survey [2009]
Trust Eurobarometer	Percentage of people in the source country j who replied to the question “How much do you trust in [people from the destination country i]?” with “Very much”.	Eurobarometer [1990–2011]

Table 3: Variable Description – Venture Capital Firm Level

Variable	Description	Source
Dependent variables		
Share cross-border	Share of a venture capital firms k cross-border investments in all of the firms investments during the observation period	Zephyr [2011]
Independent variables		
Experience	Natural logarithm of the number of investments of a venture capital firm k during the observation period	Zephyr [2011]
Deal members	Mean of deal members of all investments of a venture capital firm k during the observation period	Zephyr [2011]
Specialization sector	Share of investments in sector i , where venture capital firm k invested most in all of the firms investments during the observation period	
Share syndication	Share of a venture capital firms k syndicated investments in all of the firms investments during the observation period	
Trust WWS	Share of citizens in the venture capital firms k country of residence who replied to the question: “Generally speaking, would you say that most people can be trusted?” with “Yes”. Only the subsample of people with higher educations is taken into account.	World Value Survey [2009]
Strength of legal rights	The strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 10, with higher scores indicating that these laws are better designed to expand access to credit. It is referred to the value of a venture capital firms k country of residence.	World DataBank [2012]
Country VC	Aggregated amount of venture capital managed by venture capitalists located in the same country as venture capital firm k during the observation period, normalized by the value of the United States.	Zephyr [2011]
Share syndication country	Share of syndicated investments of venture capital managed by venture capitalists located in the same country as venture capital firm k during the observation period in all of their investments	Zephyr [2011]

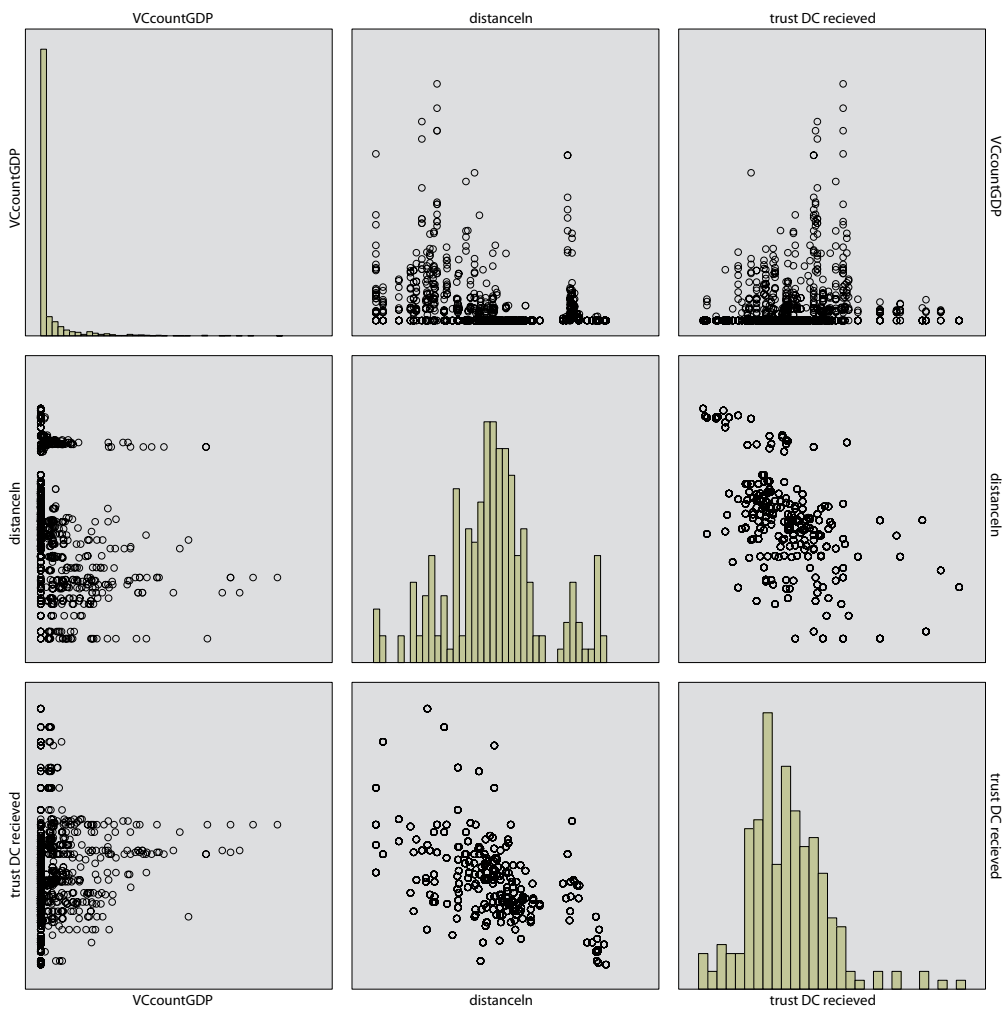


Figure 1: Scatterplot Matrix – Trust, Distance and VC Investment

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