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Determinants of the spatial reach of venture capital firms in the United States

Master Thesis

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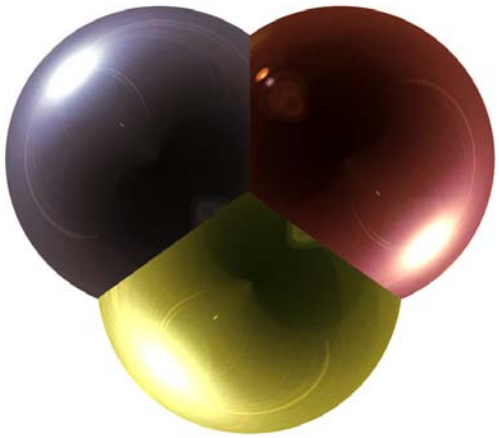

ABSTRACT

Building on elements of human capital, agency and social network theories, this paper analyzes the determinants of spatial reach of the venture capital firms (VC) in the United States. Based on data obtained from Crunchbase website, I develop a sample of VC investments in the U.S. from 2003-2010. I find that VC experience, syndication and VC size expand the spatial reach. I also observe differences in how experience affects geographic scope at the state level. The results show that U.S. VC industry is not homogeneous, exhibits different regional characteristics regarding investment patterns and is concentrated in few areas such as Silicon Valley, California and Route 128, Massachusetts. I find that for VCs located in those regions, experience does not affect geographic preferences regarding in-state investments while a positive effect on the geographic scope of their activities can be observed for the out-of-state investments. For the VCs based anywhere else in the U.S., the results show that accumulation of experience leads to making more investments locally.

Keywords: venture capital, spatial proximity, experience, syndicate, VC size

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1. INTRODUCTION

The venture capital industry has played an important role for the economic development of the United States in the last decade. In 2006, it was estimated that venture-backed companies which went public accounted for 10.4 million jobs and $2.3 trillion in revenues, which represents a share of 17.6 % in the total U.S. Gross Domestic Product (Global Insight 2007). Furthermore, venture capital (VC) contributes to the growth of innovative activities and fosters regional development (Florida & Smith, 1993). Unlike public debt and equity markets, the U.S. VC market is not integrated nationwide but reveals a great level of fragmentation (Bengtsson & Ravid, 2009). Therefore, geographic dissemination of venture capital is important when analyzing their investment patterns and it would subsequently be interesting to investigate the question: "Which factors influence the geographic scope of venture capital investments?"

Previous research contends that VCs often invest locally (Chen et al., 2003; Gupta & Sapienza, 1992; Stuart & Sorensen, 2001; Tian, 2008). An interview conducted by Zook (2002; p. 163) with the founder of an e-commerce company based in San Francisco Bay illustrates the importance of ''local'' between investors and their target firms: ''You cannot be anywhere. To start companies you need to raise capital and investors would prefer to make investments locally because they have to spend time with the companies. I know some venture firms that say, 'if I cannot drive there within an hour, I don't make the investment'. Especially in an early stage company, you want to have regular contact with the company […]''. Recent evidence has shown that knowledge clusters in the highly developed economy are found to be a fertile ground for the VC growth and development (Florida & Smith 1993; Powell et al., 2002; Zook, 2002). Furthermore, venture capitalists have concentrated a large share of their investments in few areas in the United States (Florida & Smith 1993; Gompers et al., 1998; Gompers & Lerner 2001; Mason & Harrison 2002; Sorenson & Stuart 2001) where they often ally with other local VCs to form strong syndication networks (Hochberg et al., 2007). Spatial proximity to their portfolio companies and access to the networks was found to reduce screening and monitoring costs (Lerner 1995; Sorenson & Stuart 2001; Tian 2008). However, little research has been done to investigate the factors that expand the spatial reach of the VCs in light of human capital, agency and network theory concepts, and this paper aims to fill in that gap.

This study is based on data from Crunchbase[1] website which includes comprehensive information about U.S. venture capital firms in the high-tech, IT and Internet industries from 2003-2010. The results show that more partners involved in a syndicate and larger number of offices, expand the geographic scope of the VC. The findings for the experience of the VCs, measured as the number of previous investments, show mixed results due to the state heterogeneity and other factors that drive the patterns of venture capital investments.

The rest of the paper is organized as follows: Section 2 provides a brief overview of the existing literature on venture capital. Three hypotheses are discussed in Section 3. Section 4 introduces the data, method used to investigate the geographic scope of the VC and the results which are discussed in Section 5. Conclusion follows in Section 6.

2. LITERATURE REVIEW

2.1. Introduction to venture capital

The venture capital firm (VC) is generally defined as an organization whose main activity is to finance the founding or early growth of new companies, which are not yet able to access either the public securities market or institutional lenders, such as banks and insurance companies (Perez, 1986; Pratt, 1987).

VC involvement in a venture can begin in the form of seed financing or, much later, in the form of one or more rounds of refinancing. The relationship nearly always ends when the venture's stock is sold in the public securities market or when the firm merges with a larger corporation and the investor VCs "cash out" (Pratt, 1987). Unlike regular business enterprises, such as Microsoft or IBM, venture capital firms do not usually engage in operational activities. They merely act as intermediaries between financial institutions or wealthy individuals and start-up companies by raising money from the former and financing the latter in order to benefit from the fast growing potential of these early stage enterprises (Florida & Kinney, 1988). There is an important difference between traditional lenders and venture capital firms. While the

[1] http://www.crunchbase.com

former provide a regular loan and charge interest, VCs usually purchase a stake in the company and assume an active role in the start-up's development. This monitoring role is realized through taking seats in the board of directors and participating in the decision making process (Cumming & Johan, 2007). By purchasing a stake in the company, venture capitalists are able to alleviate some of the information gaps and reduce capital constraints. Thus, it is not only the non monetary aspects of venture capital that are critical to its success (Gompers & Lerner, 1999). This provides early start-ups with an incentive to look for venture capital funding. Young companies usually have few tangible assets that could be used as collateral which creates the problem of adverse selection since the borrowers are unable to determine precisely the potential return on the investment (Robbie & Wright, 1996). Given the existence of information asymmetries between lenders and borrowers, which can result in an increase of costs, VCs represent a good option for the retrieval of funds in risky environments. (Jeng & Wells, 2000; Wright & Robbie, 1998).

The need for information and oversight has led venture capitalists to focus on local firms in an effort to minimize the cost of their involvement (Gompers & Lerner, 1999). Previous literature argues that there are two main reasons why is geography of venture capital important to analyze: first, it is well documented that venture capital industry and its investments are spatially concentrated (Cumming & Dai, 2010; Sorenson & Stuart, 2001; Tian, 2008) and second, the industry is considered to have a positive impact on the regional development (Green, 2004).

It can be concluded that venture capital investments involve far more than just a monetary aspects. VCs are dependent on information for monitoring and guiding portfolio firms both in the screening and post-investment phase. VCs rely heavily on knowledge that is often network-based, personalized and informal, sometimes even tacit, which explains why venture capital activities tend to be localized, especially when monitoring is intense, as in seed or early-stage investments (Zook, 2004).

In the next section, I will discuss further in detail the relevance of geographic proximity for venture capital firms.

2.2. Spatial distribution in the United States

Based on the information from Crunchbase database, Figure 1 displays the geographical distribution of the venture capital firms in the United States. It is possible to notice that there is a significant concentration of clusters on both West and East coasts with some others areas represented, such as Chicago and Houston, although the majority of VCs are clustered in the three most important centers – Silicon Valley, New York and Boston (Table 1). Furthermore, Figures 2 and 3 depict the upward trend in the number of investments in these regions in the last seven years, contributing to the explanation of the spatial concentration.

Florida and Kenney (1988; p.33) argue that there are diverse motives for this intensity of agglomeration. Firstly, they recall the "information intensive nature of the investment process" and then they emphasize the role of VC networks as a valuable means for "locating investments, mobilizing resources, and establishing business start-ups". The presence of VC networks in particular areas has a positive and crucial impact on the stimulation of innovativeness and economic growth in those regions.

Coval and Moskowitz (2001) advocate the importance of information gathering on fund managers' earnings and show that the fund managers have higher profits and perform better when investing in stocks of companies located nearby. The superior performance is a result of the using the valuable the information collected about the local firms when making investment decisions. This information may derive from increased monitoring capabilities or access to private information about the neighboring companies.

Sorenson and Smith (2001) discuss the importance and the flow of information within the venture capital networks. They emphasize the need for awareness of investment opportunities before they are capitalized, followed by the careful evaluation of these investment opportunities before deciding whether to support them or not, and finally a close monitoring in a post investment stage in order to maximize chances for successful exit. Further literature expands this view and contends that the information flow is bi-directional, i.e. from the VC to the start-up and from the start-up to the investor (Sapienza & Gupta, 1994; Sapienza et al., 1996; Schaefer & Schilder, 2006). Therefore, there is a general consensus that the proximity between an investor and a start-up decreases the costs of monitoring and supervision (Mason & Harrison 2002; Sorenson & Stuart, 2001).

Other literature adopts an agency perspective and discusses the problems arising from high task uncertainty – the difference between the information required to perform a task and the information already possessed (Galbraith, 1973:5), which creates a need for joint decision making by the principals and agents (Sapienza & Gupta, 1994). Kaplan and Strömberg (2004) describe four generic agency problems that VCs face in an investment process and possible solutions to those problems. First, if entrepreneur's effort is unobservable by the VC, the investor will face a classical moral hazard issue and, in this case, the entrepreneur's compensation will depend on the performance. Therefore, the more severe the information problem, the more the contractual agreement will be tied to performance. Second, there is a problem of asymmetric information about entrepreneur's ability – venture capitalist may be concerned that the entrepreneur knows about her ability more than the venture capitalist does. One way an investor could screen good entrepreneurs in this case is to see the level of the liquidation rights the entrepreneur will agree on (Ross, 1977; Diamond, 1991). Third, in a post investment stage, there may be disagreements in decision making processes. Extensive literature on control theories suggests that in some cases control should be given to the entrepreneur and in others to the VC (Aghion & Bolton, 1992; Dessein, 2002; Dewatripont & Tirole, 1994). Last but not least, in the post investment stage, VC may be concerned that the entrepreneur will threaten to leave the company if his requirements are not met. This leads to a "hold-up" problem because if the entrepreneur is particularly valuable to the firm, the VC might be at loss due to erosion of human capital if the entrepreneur leaves. The VC might reduce the entrepreneur's incentive to leave by vesting the entrepreneur's shares (Hart & Moore, 1994).

Hence, from the agency theory point of view, previous literature agrees that the spatial proximity may help to reduce, but not to eliminate agency problems (Wood & Parr, 2005; De Clercq et al., 2001; Klagge & Martin, 2005).

2.3. Overcoming the distance barrier

Applying a strong theoretical framework can greatly enhance the understanding of the factors that influence the spatial propinquity of venture capital investments. In this paper I argue that the combined elements of human capital, agency and social network theories can be implemented to shed light on VCs' motives for expanding their

geographic scope (Figure 4). In the following section I will start by making a distinction among the aforementioned theories.

2.3.1 Human capital theory

One of the main key factors involved in the generation of new economic knowledge is human capital (Audretsch, 1998). Human capital in its broadest form can be defined as "the combined knowledge, skill, innovativeness and ability of the company's individual employees to meet the task at hand (Bontis, 2005; p. 45)." According to Florida and Kenney (1988), in well developed venture capital networks "venture capital functions as an integral component of indigenous technology infrastructures which are characterized by significant concentrations of human capital, close proximity to universities and substantial public R&D expenditure" (p. 34-35). As previously mentioned, the VC industry is very knowledge intensive and because it provides not only financial, but also non-monetary support, it would make sense that human capital plays a crucial role in this environment (Gompers & Lerner, 1999; Zook, 2002). Dimov and Shepard (2005) support this statement and conclude that start-ups which are VC-backed and receive human capital in form of management skills, experience, and expertise, perform better. Furthermore, they argue that more experience leads to better performance. However, they emphasize that it is also the type of experience that makes a difference. For example, a venture capitalist with experience in the semi-conductor industry will be more successful investing in companies from the same industry (Franke et al., 2008). In line with these results, previous literature has suggested that more experience (i.e. human capital) would reduce the local bias and increase the geographical scope of an investor (Cumming & Dai, 2010).

2.3.2 Agency theory

In the previous paragraph I have portrayed the literature discussing four generic agency problems that the venture capitalist faces in an investment process. Now, I will discuss how agency problems interact with geographical distance specifically and the ways a venture capitalist can overcome those complications.

Syndication can be defined as two or more VC firms co-investing in one start-up in the same financing round (Wright & Lockett, 2003). Extensive literature (Brander et al., 2002; Lerner, 1994; Sorenson & Stuart, 2001; Tian, 2008; Zook, 2002) suggests that

VCs should engage in syndication as a way to alleviate risks related to asymmetric information and reduce monitoring costs. The traditional finance perspective shows that by constructing a well-diversified portfolio, risk can be diminished without reducing expected returns. By spreading investments across a great number of investments that do not covary, syndication has the potential to reduce risk considerably (Markowitz, 1952). Partners in the syndicate can exchange the information when performing due diligence, which, in turn, also improves the selection process (Brander et al, 2002; Lerner, 1994). Moreover, investors can share specific knowledge and complementary skills in order to add value to the target company (Brander et al. 2002; Bygrave, 1987). Furthermore, syndication may be the result of a fixed-fraction equity contract at a second-round investment stage that helps resolve potential agency conflicts between the entrepreneur and inside investors on the one hand, and inside investors and new outside investors on the other hand (Admati & Pfeiderer, 1994; Lerner, 1994). Finally, partners in the syndicate, through cooperation may leverage their negotiating power toward the entrepreneur and secure more advantageous financing terms (Brander et al., 2002).

2.3.3. Social network theory

Social network can be defined as "a set of nodes linked by a set of social relationships of a specified type" (Laumann et al., 1978: p. 458).

Social networks also feature prominently in the venture capital (VC) industry. VCs tend to syndicate their investments with other VCs, rather than investing alone (Lerner, 1994). Thus, VCs are strongly linked with each other through the joint investments they have made in the past (Bygrave, 1987; Sorenson & Stuart, 2001, 2008). Once they have invested in a company, VCs may use their networks of service providers (e.g. head hunters, patent lawyers, investment bankers, etc.) to help the company succeed (Gorman & Sahlman, 1989; Sahlman, 1990). This social capital derives from the (social) network of professionals, experts (e.g. for industry, market, technology, and law issues), and other VCs with which the VCs cooperate. As a result of the social networks arising from such past syndication, VCs receive from and pass on to each other strategic information about current investment opportunities as well as future innovation and technological trends. This helps them to reduce the uncertainty they face (Bygrave, 1987, 1988). In particular, depending on the amount of social

capital they have, VCs will have access to more or less of such information, which they will then exploit to the advantage of the firms in their portfolio (Hsu, 2006; Pratch, 2005). Thus, any effect of social capital that VCs receive from their position in social networks should result from their superior access to high-quality information (about any type of resource), and their ability to use it to the benefit of the firms they (intend to) invest in. Possession of such information could give VCs the confidence to extend their geographic scope. Regarding the post-investment phase, Pratch (2005) and Hsu (2006) show that VCs actively try to improve the odds of success of their investments using their social capital. Privileged access to information highlighting such opportunities should consequently lead to the VC either evaluating future cash flows of the venture more positively, or attributing them with lower risk (Alexy, et al. 2010).

Spatial proximities strongly influence investment and co-investment decisions. On the basis of this assumption, some recent articles have shown that there is a positive impact of the size of VC network on the outcome of the investment. Due diligence might alter the effect of the geographic distance between a target company and an investor and, hence, contributes to overcome the information asymmetries. The latter result can be achieved also through a syndicated investment with partners that are located in proximity to a selected company. (Sorenson & Stuart, 2001).

3. HYPOTHESES

3.1 VC Experience

Previous literature has mostly dealt with venture capital experience from two perspectives – either as a function of performance (Butler & Goktan, 2008; Dimov & Shepard, 2005) or as a function of the probability of a start-up receiving VC funding (Sorenson & Stuart, 2001; Hsu, 2004). To my best knowledge there has not yet been a study that directly analyzed experience as a function of spatial distance. The one dealing with the similar topic, investigated the influence of VC experience on local bias and concluded that greater experience reduces local bias (Cumming & Dai, 2010). The authors suggest that more reputable VCs are better capable of reducing the information asymmetry associated with distance. Sorenson and Stuart (2001) argued that

information asymmetry is related to the cost of monitoring and information gathering. An experienced VC is better able to deal with these issues because, with practice, it develops competences to write effective contracts, to reduce agency costs, and to recognize signs of the potential problems that might arise in the evaluation process. Effective monitoring also helps to recognize the necessary level of effort that maximizes the desired outcome. This means that experienced VC will need to spend less time on monitoring, which will in turn provide opportunities for investing in distant locations because the time costs of monitoring at a distance would drop.

Apart from the information asymmetry argument, another important implication to consider is the positive effect that experience has on the VC's reputation in the investing community. With each investment, VCs gain experience, become more reputable and expand information network thereby gaining better access to private information and expertise advice. Venture capitalist can use this network when screening potential investments in order mitigate agency costs and reduce risk. Also, the likelihood of receiving information about potential distant investments increases, making the VC confident enough to expand its geographical scope and make the investment. Based on the arguments outlined above, the following hypothesis is proposed:

H_1 - Experienced VCs are more likely to invest in geographically distant companies.

3.2 Syndicate

VCs frequently form syndicates when investing in a new venture. Previous literature has discussed extensively the motives for such practice: VCs may invest smaller amounts in more companies, resulting in portfolio diversification (Brander et al., 2002). Moreover, as indicated before, syndication may reduce information asymmetries between investors and portfolio-company, which can positively influence the outcome of the investment since each partner adds value to the network with its knowledge and expertise (Manigart et al., 2006; Lerner, 1994).

Lerner (1994) also suggests that syndication may benefit venture capitalists because they could "window dress" the results they present to their investors, which they may be accomplished by getting invited to invest in a company which is in a later

stage even though the full growth potential has already been reached, and financial gains are low. This way a VC could state that it has invested in a successful company, which would be beneficial for its reputation. Sorenson and Stuart (2001) go beyond the particular motives for syndication and conclude that syndication strengthens the network of relations within VC community where information flows in a faster and more efficient way. Furthermore, repeated joint transactions foster trust between partners, which is important when investing in early stage ventures because such cases are characterized by high levels of uncertainty and information asymmetry (Manigart et al., 2006).

Syndication is important in this context as it may help to overcome distance. Previous literature suggests two ways this may happen. First, Sorenson and Stuart (2001) suggest that venture capital firm that is a part of large syndication network can find potential interesting investment opportunities located farther away. Second, syndication may help overcome the agency costs related to the greater distance, because a syndicated partner that is located closer can help with monitoring and oversight (Bienz & Hirsch, 2009; Sorenson & Stuart, 2001). Gupta and Sapienza (1992) define this syndicated partner as the so – called lead – investor, who is located close to the target company and undertakes the main role in process of evaluating, monitoring and consulting. Based on the mentioned arguments the following hypothesis is suggested:

H_2 – Larger number of investors joined in a syndicate are more likely to invest in geographically distant companies.

3.3 VC size

Most of the previous literature measured the size of venture capital firms as the amount of assets under management (Bygrave, 1987; Gupta & Sapienza, 1992). In line with Hall and Tu (2003), I propose the number of offices as an alternative and more fitting measurement to analyze the effect of the VC size on the spatial reach.

Gupta and Sapienza (1992) state that most of a VC's assets comes from the infusion of fresh capital from the outside investors. Such measurement of size could be biased because it relies on the assumption that outside investors act rationally and provide capital to VCs that have demonstrated a successful track record. It does not take into account that VCs might signal better performance on paper by "window dressing"

(Lerner, 1994) or that in times of economic over-optimism, the capital could be provided based only on future growth expectations (Green, 2004).

The increase in the number of offices could signal the organic growth in VC's size, since it implies infrastructural investments in overhead and human capital. Unlike VCs with single offices, venture capital firms with multiple offices would need to duplicate costs and have the same set of experts in every office. Following Gupta's and Sapienza's (1992) reasoning, this implies high levels of human and financial capital with the base capabilities necessary for the efficient functioning of such decentralized setting. Interaction between the experts would bring about better exchange of information that would improve the process of identifying, screening and controlling potential investments. Furthermore, the more offices a VC has, the more likely it will be that these offices will be spread out across the country in order to cover areas with most investment opportunities. Also, based on Gupta's and Sapienza's (1992) argument, larger VCs which are present in multiple cities, are likely to interact with other local VCs and receive valuable information regarding potential investments as well as insight regarding market conditions. Finally, a larger VC is likely to have a complex governance structure and therefore high governance costs. In order to maintain a certain rate of return, it is likely to be less sensitive to distance and actively search for investment opportunities beyond its local geographic scope. Therefore I expect that:

H_3 – Larger VCs are more likely to invest in geographically distant companies.

4. EMPIRICAL ANALYSIS

4.1. Data

The data is drawn from the web site CrunchBase[2] which describes itself as a "free database of technology companies, people, and investors that anyone can edit." It is operated by TechCrunch[3], one of the most prominent blogs that promotes technological innovations related to the Internet. Crunchbase is an extensive and detailed overview of start-up companies, individuals, and investors with a focus on U.S. high-tech sectors such as Internet and IT.

For this empirical study I have developed a unique dataset based on the data obtained from CrunchBase in May 2010. The raw dataset contains information on 40,235 companies, 4,684 financial organizations, and 14,996 funding rounds. First, I start by limiting the dataset to companies and financial organizations that reside in the United States. Second, I deleted those companies that did not receive any funding and third I have excluded those companies that have been funded by the individuals (e.g. angel investors). Final dataset contains 4,007 companies and 1576 financial institutions that have made 12,785 funding rounds from 2003 to 2010.

4.2. Operationalization

4.2.1. Description of the variables

Dependent variable

Geographical distance – In order to construct this variable, I needed obtain the geographic coordinates of a venture capital firm and a target company. For this purpose, I used the geocoding service of the University of Southern California[4] which converts postal addresses into geographic coordinates. The benefit of this service is that it provides very accurate results[5] which enable the observation of the smallest distances between the VC and the start-up. Before obtaining the coordinates however, I manually researched and entered the missing addresses of 456 companies and 167 VCs in order

[2] http://www.crunchbase.com
[3] http://www.techcrunch.com
[4] https://webgis.usc.edu/
[5] If all the elements are included (i.e. address, zip code, state code) the coordinates are "rooftop" accurate implying the highest level of precision – actual position of the building instead of the estimated position.

not to lose observations from the dataset. Following the methodology of Sorenson and Stuart (2001) and Tian (2008) the resulting pairs of longitude and latitude are then used to calculate the distance based on the Great Circle Distance Formula:

$$Distance_{ij} = C \times \{\arccos [\sin (lat_i) \times \sin (lat_j) + \cos (lat_i) \times \cos (lat_j) \times \cos (|long_i - long_j|)\},$$

where lat_i and $long_i$ represent the coordinates of the start-up, lat_j and $long_j$ represent the coordinates of the venture capital firm and C is the radius of the Earth and equals to 6, 378.8 kilometers. Finally, I take the natural logarithm of the distance.

Independent variables

VC Experience – VC experience variable is constructed by counting the number of previous rounds of investments the venture capital firm has made before the deal year (Cumming & Dai, 2010; Sorenson & Stuart, 2001) and taking a natural logarithm.

Syndicate – The variable is constructed by counting the number of VCs that invest in the same company in the same round and taking a natural logarithm.

Size – VC size variable is constructed by counting the number of offices of the venture capital firm and taking a natural logarithm. The missing values were substituted with the mean.

Control variables

VC size control – A dummy variable that takes a value of 1 if there was a missing value for size and 0 otherwise. Constructed to control for the possible bias that might arise from assigning a mean value to the size variable.

Early VC – A dummy variable that takes a value of 1 if more than 50% of the investments made by a VC were in seed, angel or a round and 0 otherwise. It was constructed by counting the number of investments in each round type and taking the mode value. Round types were coded 1 for seed, angel and a round, 2 for b round and so on. Therefore, mode values higher than 1 were recoded to 0. This variable was included in the model to control for VCs' preferences regarding investments in early stage companies.

Investment amount – The amount of money raised in the respective round (raised_amount). Due to the highly skewed nature of the variable, natural logarithm is taken. Included in the model to control for the size of financing rounds.

Company Age – A variable constructed by subtracting the founding year of the company from the deal year. The missing values were substituted with the mean. Included in the model to control for company experience.

Company age control – A dummy variable that takes a value of 1 if there was a missing value for company age and 0 otherwise.

Previous funding – A dummy variable that takes a value of 1 if the company has been previously funded and 0 otherwise. Included in the model to control for heterogeneity among VCs that receive funds for the first time and those that receive repeated financing.

Multiple offices – A dummy variable that takes a value of 1 if a company has more than one office and 0 otherwise. Included in the model to control for possible distance bias.

Geo error – Some companies or VCs do not post their contact information and therefore it was not possible to get the postal address. Geocoding process would then estimate the coordinates based either on the zip code or the state code which could result in imprecise measure of distance. This dummy variable controls for this imprecision and takes a value of 1 if either a VC or a company did not have exact information regarding their addresses and 0 otherwise.

Year, *round* and *industry* dummies are constructed to control for differences in industries and financial rounds over time

State dummies for *VCs* and *companies* have been constructed to control for heterogeneity of venture capital investments across the United States.

4.3. Descriptive statistics

Table 1 reports summary statistics for the geographic distribution of the companies and venture capital firms in the United States. I report the top three states in terms of the number of investments and the raised amount per round.

----- Insert Table 1 about here -----

It can be noted from Panel A of the Table 1 that California is a number one state with over 33% of the VCs that have invested over 53% of the total $203 billion from 2003 to 2010 in the venture capital market. Followed by the state of New York where 15% of the VCs reside. Those VCs have contributed 12% to the total raised amount in the observed period. State of Massachusetts is in the third place with about 9% of the VCs that have invested 9% of the total amount. Panel B of the Table 1 reports the geographical distribution of the companies – about 65% of them are located in California, Massachusetts and New York and they received over 68% of the total venture capital investments.

Table 2 shows the descriptive statistics of the key variables used in the analysis based on the full sample. An average distance between the VC and the target firm is 1211.3 km with the median of 238.4 km. Figure 5 shows the trend of the mean and median distance of the VCs and the companies in the sample from 2003 to 2010. The trend indicates that average spatial reach of the venture capital firms has remained relatively stable and did not change much in the last decade.

----- Insert Figure 5 about here -----

The average number of partners in the syndicate in each round is 4.22 with the median of 4. The average number of offices of the VC is 1.6 with the median of 1. Finally, the average age of the company in a deal year is 5.4 with the median of 5.4.

----- Insert Table 2 about here -----

Tables 3, 4, 5 and 6 show the descriptive statistics of the key variables used in the analysis based on subsamples.

----- Insert Tables 3-6 about here -----

Table 7 shows the correlation matrix among the aforementioned variables. None of the key variables are highly correlated.

----- Insert Table 7 about here -----

4.4. Method

When one chooses a suitable model, the nature of the dependent variable is crucial. In this paper the nature of the dependent variable (geographical distance) is continuous and therefore I used linear regression. The form of the linear model is (Heij et. al., 2004):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

where Y is the dependent variable (geographic distance) and X_1, X_2 and X_3 are the independent variables (VC experience, syndicate and VC size) and e is random error. b_0 , b_1, b_2, are known as the regression coefficients, which have to be estimated from the data.

4.5. Results

I use the results of the linear regression to illustrate factors that influence the geographic reach of the venture capital investments. Table 8 reports ten models used to test the dependent variable distance. Models 1 and 2 include VC specific variables whereas in model 3 I add company specific control variables. In models 4-7 I include further controls for years, rounds, industries and states, respectively. Furthermore, I analyzed interaction between VC specific variables in the models 8-10.

----- Insert Table 8 about here -----

In order to analyze the factors that influence distance on the state level I performed additional regressions for the states of California, New York, Massachusetts and the rest of the U.S. The results are reported in tables 9, 10, 11 and 12 respectively. For each state, model 1 includes VC specific variables, company specific control variables and controls for year, rounds and industries while in model 2 I added state controls. I also analyzed interaction terms on the state level shown in models 3-5.

4.5.1. Full sample

The estimated coefficients for experience in the full sample provide weak support for *hypothesis 1*. The results of model 7 are significant and positive when

controlling for state heterogeneity but they are negative when state dummies are excluded (model 1-6). In fact, when inserting state dummies one by one, I find that the state dummy for California is the one that makes the coefficient for experience switch signs. Estimated coefficients for interaction between experience and syndicate did not show any significant results while the interaction between experience and size showed negative effect. This means that when controlling for state heterogeneity size reduces the positive effect of experience on distance.

Next, the results show positive effect of the syndicate on distance supporting *hypothesis 2*. This suggests that VCs that have more syndication partners will be more likely to invest in geographically distant companies. Interaction terms between syndicate and other variables did not show any significant results.

Finally, the empirical findings show positive effect of size on distance supporting *hypothesis 3*, which means that the VCs with more offices will be more likely to invest in geographically distant companies. There were also no significant results reported for the interaction terms apart from the previously mentioned interaction between experience and size.

4.5.2. California subsample

Empirical results for California show positive coefficients for experience and size when company state dummies are excluded (Model 1), however, the results become insignificant when state dummies are included (Model 2). Syndicate shows positive and significant effect on distance in both models. When inserting company dummies one by one, I find that the state dummy for California makes the results for experience and size insignificant. That means that experience and size do not affect distance between the VCs and companies in California. Model 3 includes the interaction terms and reports the significant result only for the interaction between experience and size. The effect is similar to that at the state level – size reduces the positive effect of the experience on the distance.

----- Insert Table 9 about here -----

4.5.3. New York subsample

The results show that experience has a negative impact on distance in the state of New York while syndicate and size have a positive impact in both models 1 and 2. Model 3 includes the interaction terms and shows significant results for the interaction between experience and syndicate and experience and size. The coefficients of interaction show that both syndicate and size reduce the negative effect of experience on distance.

----- Insert Table 10 about here -----

4.5.4. Massachusetts subsample

The results for the state of Massachusetts show positive coefficients of all three variables on distance when company state dummies are excluded (Model 1). However, in Model 2, which includes the dummies, no variables show significant results. When inserting company state dummies one by one, I find that inclusion of California and Massachusetts dummy renders the results insignificant. This means that experience, syndicate and size do not affect distance between VCs and companies in Massachusetts as well as when VCs in Massachusetts invest in companies in California. Model 3 includes interaction terms but no significant results were reported.

----- Insert Table 11 about here -----

4.5.5. The rest of the U.S.

The results for all the other states in both models 1 and 2 show that experience has a negative impact on the distance while syndicate and size have positive impact. Model 3 includes interaction terms but I no significant results were reported.

----- Insert Table 12 about here -----

5. DISCUSSION

5.1. Experience

In the previous chapters it was established that the distribution of the venture capital industry is not homogenous across the United States (Gupta & Sapienza, 1992; Sorenson & Stuart, 2001). The empirical analysis has revealed that VC experience has a significantly different effect on spatial reach for the VCs located in the major VC centers (Silicon Valley, Route 128) than for the VCs located in the other parts of the United States. On the national level, I find that experience has a positive influence on distance, but it is difficult analyze the genuine effect without observing what happens at the state level. Therefore, the empirical evidence only partially supports *hypothesis 1* which states that experienced VCs are more likely to invest in geographically distant companies. The results were surprising since most of the previous research agrees that experience expands the spatial reach of the VC. Cumming and Dai (2010) argued the opposite, but they could not find the evidence for such claim in their empirical findings. Their argument however, serves as a fruitful ground on which further explanation can be build upon.

California and Massachusetts

Figures 6 and 7 show that VCs located either in California or Massachusetts make most of the investments in their respective states. This indicates a large concentration of prospective start-ups in those areas that receive funding from the local VCs. It is also in line with the previous literature which argues that a venture capital industry is a local business (Florida & Kenney, 1988; Sorenson & Stuart, 2001). The results of this empirical research show that experience does not influence the spatial reach when the VCs located either in California or in Massachusetts make the in-state investments. There are two possible explanations for these findings. First, in California and Massachusetts there is a dense concentration of the VCs and start-ups which are interconnected by formal and informal ties. It is likely that entrepreneurs after successfully taking their company public decide to start a venture capital fund. It may also happen that venture capitalists start their own companies (Fritsch & Schilder, 2008). Therefore, VCs' lack of investing experience may be compensated by the knowledge of the market and industry as well as being part of an informal network

where human capital, skills and expertise, go back and forth from VCs to companies, which provides privileged access to information about promising investments (Fritsch & Schilder, 2008). This implies that VC can expand its geographic reach within the state, regardless of the number of previous investments it has made, drawing resources from the informal (social) network and relying on the information received from the network.

Second explanation is related to the concepts of information asymmetry and two-sided matching process proposed by Cumming and Dai (2010). According to the information asymmetry argument, experienced VCs are better able to deal with uncertainty which arises from the risky nature of investing in the early stage venture. They are better at identifying, screening, and evaluating business opportunities thereby reducing the monitoring costs when investing in distant companies. Similarly to the previous argument, experience also provides them with an access to the network which can help in identifying potential business opportunities located farther away.

On the other hand, the two-sided matching argument posits that companies located in areas with intensive competition among VCs, can choose the investors based not only on the financial terms but also on their reputation (Cumming & Dai, 2010). In areas such as Silicon Valley and Route 128, reputation, essentially based on experience, might be a barrier to entry for the new VCs that would need to look for the investments farther away. As they build their portfolios of distant companies, they would gain the experience and reputation needed to successfully compete locally. Therefore, there are two different forces that drive the influence of experience on distance in opposite directions rendering the net effect ambiguous for the states of California and Massachusetts.

For the VCs, based either in California or in Massachusetts and investing across the state line, results show a positive influence of experience on distance. As VCs leave their known environment to scout for the potential investment opportunities in distant locations they can rely less on their network based resources and more on their own skills, expertise and experience. It is also likely that in order to monitor their distant investments they would have more contacts via telecommunication than in person. Recent evidence however, suggests that such contacts are not substitutes for face-to-face contacts but should be viewed as complements (Fritsch & Schilder, 2008). Therefore, it is likely that VCs will try to establish their presence in a distant location by opening a

satellite office, thereby increasing in size. On-site presence would allow even the moderately experienced VCs to tap into resources of local community and take advantage of location specific benefits which may also serve as an explanation for my findings that increase in size weakens the positive effect of experience on distance.

New York and the rest of the U.S.

Figures 8 and 9 show that VCs located in the state of New York and in the other states exhibit significantly different pattern of investments - the largest share of investments have been made in California, indicating that those VCs find California the most lucrative place to invest despite the distance. Empirical findings for those states show that experience has a negative effect on distance. There are two explanations for such results. First, it is possible that a lack of business opportunities in certain areas drives local VCs to look for profitable ventures in distant locations, namely California. The increased monitoring costs could be mitigated by syndication or as previously discussed by opening a satellite office. Positive interaction between experience and syndication and experience and size for the state of New York supports this statement. Second, two sided matching argument can also be applied here. Unlike California, which is characterized by informal networks and laid back culture, other areas might exhibit less flexible and more formal attitude. New and inexperienced VCs might find it challenging to gain contacts and exposure in those tightly knitted communities and hence look for profitable opportunities elsewhere.

The two opposite forces that drive the influence of experience on distance seem to tip over in the favor of information asymmetry argument on the aggregate level. A positive effect of experience on distance on the national level could also be attributed to the bias due to the large share of the VCs from California and Massachusetts in the dataset.

5.2. Syndicate

As expected, the results are consistently positive in models 1-7, supporting the *hypothesis 2*. This is in line with the previous research, which found that participating in a syndicate may help to reduce the distance barrier. There are three explanations for this result: First, VCs that cooperate with other VCs might learn about the business

opportunities that are outside of their geographic scope, second, the presence of syndicate might reduce information asymmetries, transaction and agency costs and third, the VCs tend to invest in growing companies at later stages in order to add a non monetary value to their portfolio by reporting that they have participated in financing of a star company.

I first start with the "awareness" argument. Sorenson and Stuart (2001) have argued that the VCs before deciding on investing in a new venture must be aware of the business opportunity. Start-ups usually lack visibility and need time and resources until they become known. Therefore, it is likely that a VC that is located in the same city as the start-up would learn of the company's existence before another VC located in another state or on the other side of the country. Since VCs interact through informal social network, it is possible that the local VC takes the lead and invites a remote VC to participate in a deal. The incentive for the remote VC to accept the deal is that the local VC, due to its proximity, would be more efficient in monitoring and oversight. By participating in the process, the remote VC would extend its usual geographic scope.

The "agency argument" posits that being a part of the network reduces agency issues when investing in a start up (Tivkova & Schertler, 2009). Furthermore, when a venture capital firm becomes part of a syndicate, it enters a network in which information, expertise, and both financial and human capital flow among the partners (Sorenson & Stewart 2001). Given that there is a substantial amount of ex-ante uncertainty about the probability of success of a start-up and opaqueness of its expected payoffs, VCs might be unable to properly observe entrepreneur's ability to turn her ideas into viable enterprise. This raises moral hazard issue and adverse selection problems which could be solved by tying entrepreneur's compensation to performance (Kaplan & Stromberg, 2004). Previous literature suggests that syndication reduces information asymmetries and monitoring cost and facilitates risk sharing which can increase the probability of start-up's success since each partner adds value to the network (Manigart et al., 2006). Therefore, relying on joint effort provided by the syndicate partners might reduce agency problems in at least two ways: First, partners of the syndicate might set for a more effective contractual agreement tied to performance because of their access to the legal expertise provided by the network, and second, the information and the expertise available in the network are also accessible to the entrepreneur in case she shows a lack of managing abilities. This is very common when

an entrepreneur comes from, say, an engineering background and is not trained in business skills, lacks experience in managing people and dealing with day-to-day company routines. In this case, the VC's network acts as a safety net to avoid common pitfalls that an inexperienced entrepreneur might face in early stages of venture development. Since it was established that the distance is positively correlated with the agency costs and syndication reduces these costs, it is reasonable to conclude that the venture capital firms that invest in distant companies would get a higher pay off when being a part of the syndicate than those VCs that invest alone.

The third argument is related to the Lerner's (1994) concept of "window dressing". Investing in later stages of a growing company is less risky because the company has already established itself on the market, became profitable and it is ready to be taken public. It also means that the period of the highest growth and largest returns has finished, so the VCs trade the lower pay offs for the opportunity to invest in a successful venture. Furthermore, it is likely that a company has received syndicated investments in the previous rounds and therefore became highly visible in the venture capital community. The information about company's success would spread across the venture capital network and reach the other VCs that might be interested in investing in a company for the purposes of "window dressing". Therefore, it is possible that the VCs will invest in a later stage company even if it is located far away in order to reap the non monetary benefits of having the successful company in their portfolio.

5.3. VC size

Empirical evidence supports *hypothesis 3* which states that larger VCs are more likely to invest in geographically distant companies. The results are in line with the previous literature and can be clarified by tree explanations. First, larger VCs prefer greater industry diversity and broader geographical scope (Gupta & Sapienza, 1992) because they have resources in form of human capital, expertise and skills to identify, screen and evaluate large number of projects. They can afford to have specialized teams assigned to look for potential investments in specific industry or a region. This implies that the larger VCs will be less sensitive to distance in order to reach balanced portfolio diversification. From the perspective of financial resources they have more access to internal financial resources and can create larger portfolios within which it is easier to diversify risk. In fact, VCs located in hi-tech centers such as Silicon Valley might

expand their spatial reach if they see a lack possibilities to diversify their portfolios locally, since most of the start-ups in that region belong to IT and high-tech industries, or if they have exhausted all the growth options in the local market.

The second explanation relates to the governance cost argument. VCs may establish their presence at the distant location in three ways: commuting to the distant location and controlling the investment from the central office, entering a syndicate or opening an office. Controlling the investment at the distance implies high monitoring costs which VCs may solve by joining a syndicate. Participating in a deal through syndicate is especially beneficial for the small VCs because they lack resources to pursue the investment individually, while for large VCs such hybrid governance arrangement may be less appealing because it requires more coordination and may be less adaptive than non syndicated investments (Williamson, 1991). Based on the transaction cost economics, large VCs would choose hierarchy structure that maximizes "comparative adaptive coordination efficiency to unexpected future contingencies" (Verwaal et al., 1991; p. 9). Therefore, opening a satellite office is a way of internalizing operations since hierarchic structure allows for more efficient controlling of the investments (Williamson, 1999). As the VC grows, it is possible that it will rely less on the outside resources provided by the syndication and draw competitive advantage from the internal capabilities. Higher governance costs derived from such organizational structure would require adequate rate of returns which would prioritize the need for high quality investments over their geographical location.

The third explanation is related to the network-based argument. I have established in previous sections that the VCs benefit from formal and informal networks in their local environment. Under the assumption that the VC relies heavily on those networks it can be argued that the maximum spatial reach of the VC is approximately equal to the spatial reach of the network itself. Since larger VCs tend to rely less on the local network, they are able to extend their spatial reach to the areas where they open satellite offices. New location will probably have its own network of professionals that a VC will be able to tap into. The advantage of having access to multiple separated networks and utilizing the strength of the internal network would endow a VC with superior information that it could use when evaluating distant investment opportunities.

6. CONCLUSION

This study investigate factors that influence the geographic scope of venture capitalists investment. I believe I am the first to empirically study and document which factors expand the spatial reach of the VCs in light of human capital, agency and network theory concepts. Summary of the findings is reported in Tables 13, 14 and 15.

The primary finding of this paper is that VC experience has a significantly different effect on spatial reach for the VCs located in the major VC centers, such as Silicon Valley and Route 128, than for the VCs located in the other parts of the United States. In particular, I found that VC experience has a positive influence on distance on a national level, but shows mixed results when observing the state level.

VC experience does not influence the spatial reach when VCs, located either in California or Massachusetts, make in-state investments. This can be attributed to the two forces that drive the effect of VC experience on distance in two opposite directions. On the one hand, two-sided matching argument (Cumming & Dai, 2010) states that new and inexperienced VCs would have barriers to entry in areas of intense competition, resulting in making more investments in distant locations where there is little or no competition. On the other hand, information asymmetry based arguments (Cumming & Dai, 2010) hold that experienced VCs will tend to invest farther away because acquiring experience would increase the ability to reduce information asymmetry and monitoring costs arising from investing at distance. Based on these arguments, the results show that these two forces are equally strong for the VCs, located either in California or Massachusetts, making in-state investments. Information asymmetry issue appears stronger on the national level and for the VCs, located either in California or Massachusetts, making out-of-state investments, while the two-sided matching issue is stronger for the VCs located in New York and other states.

Another factor that influences distance is syndication. In line with previous research, I found that participating in a syndicate may help reducing the distance barrier. Through co-investments, VCs become aware of business opportunities outside their geographic scope and learn how to reduce information asymmetries, transaction and agency costs. Moreover, they have a chance to invest in growing companies at later stages to add a non monetary value to their portfolio.

Finally, this study also suggests, in accordance with previous literature, that larger VCs are more likely to invest in geographical distant companies. In fact, larger VCs have human and financial resources to allocate to screening and evaluation of potential investments that, even if distant, may be suitable to create larger portfolios in which is easier to diversify risk. In order to achieve this result, smaller VCs would enter syndicates while larger VCs would choose to internalize and create hierarchy structures that minimize their transaction costs. Moreover, while small VCs are limited to the information they get from their local networks, large VCs are able to gain access to multiple separated networks in the areas where they open satellite offices. These strategies endow VCs with superior information that can be used when evaluating distant investment opportunities.

One of the limitations of this paper is its potential bias regarding the focus on IT and Internet industries in the United States. An interesting extension would clearly be to investigate factors that influence distance using an international sample and including other industries. The second limitation is the time frame of the analysis – the sample includes investment rounds from 2003-2010. Further research could analyze the effects of economic cycles on the geographic scope of the VCs by including longer time a frame (eg. Gompers et al., 2008).

Managerial implications of this paper are twofold. On the one hand, venture capitalists should continue to build their human and social capital as well as to expand their (social) networks by developing strong professional and informal ties with members of the community. On the other hand, entrepreneurs should be aware of these implications when approaching VCs, and can thus maximize their chances at raising capital.

The results of this study also have implications for regional development policies. For example, to encourage the development of the new ventures in the local area, policy makers can provide incentives to attract VCs to that area. Such practices could be beneficial for local employment and it would encourage the creation of innovative activities and knowledge-spillovers.

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8. APPENDICES

Figure 1. Spatial distribution of VCs across the United States

Figure 2. Number of investments received by the companies located in the state in the period 2002-2009

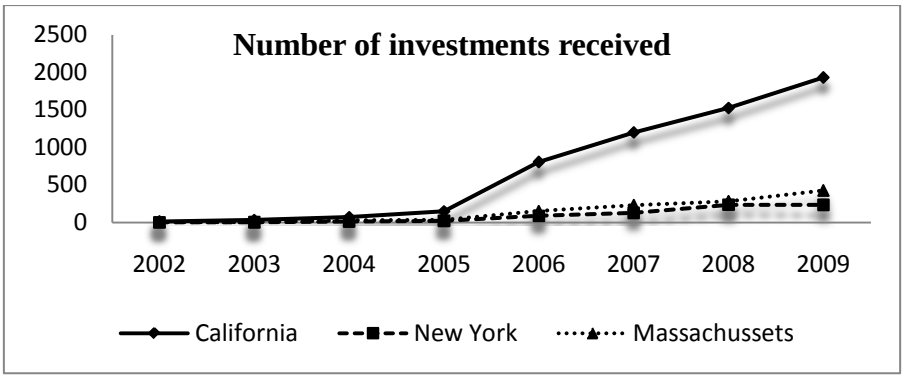

Figure 3. Number of the investments made by the VCs located in the state in the period 2002-2009

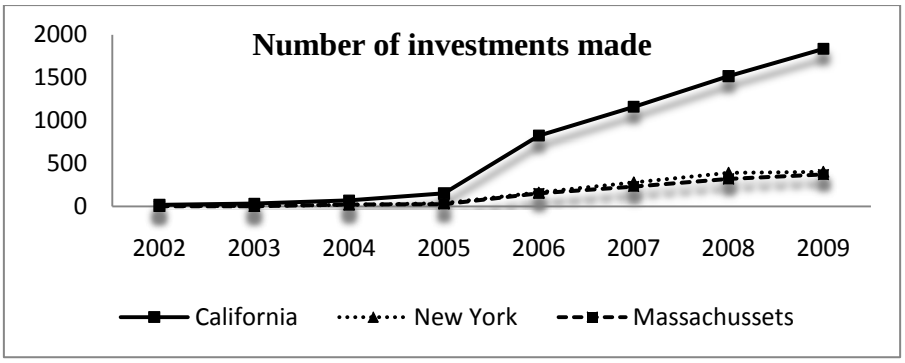

Figure 4. The theoretical framework

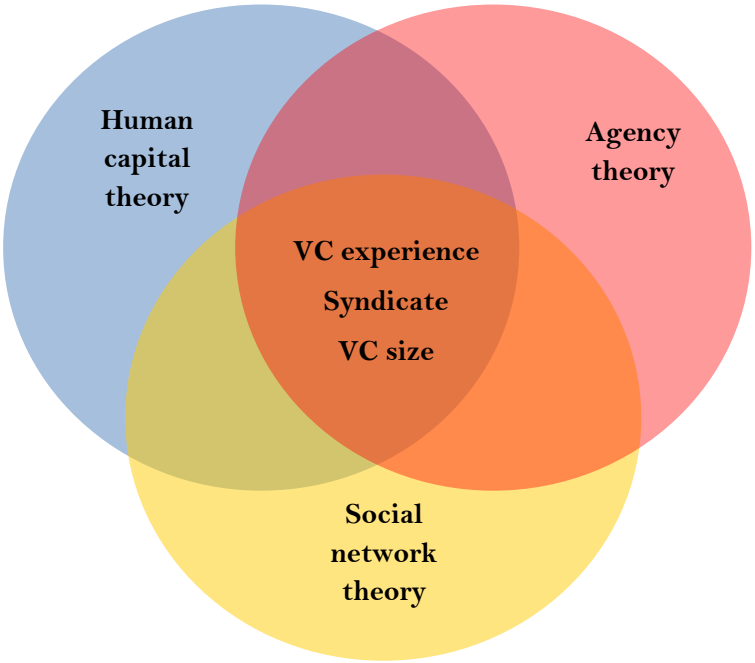

Figure 5. Mean and median distance between VCs and companies in the period 2003-2010

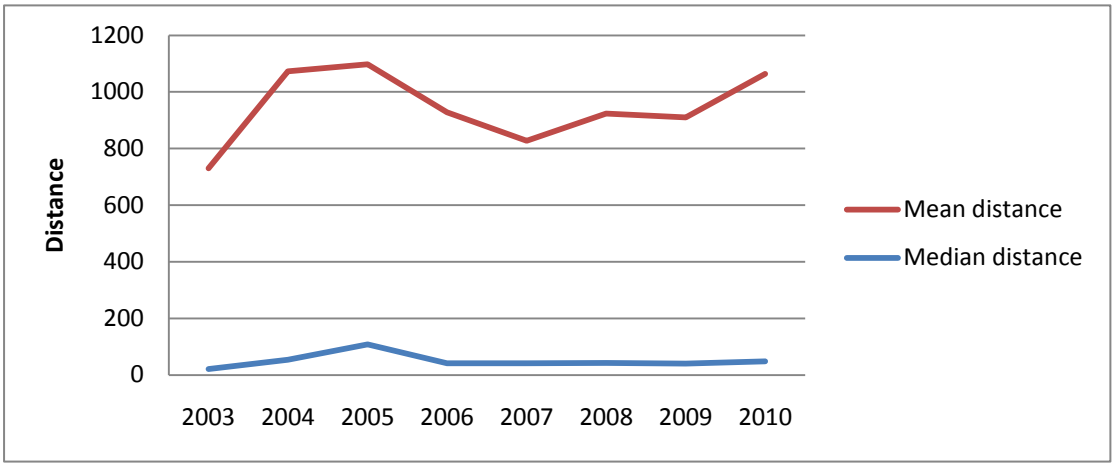

Table 1: Summary statistics for the VCs' and companies' distribution across the United States

Panel A: Geographical distribution of Venture Capital Firms across U.S.

Number of Venture Capital Firms			Total Investments Made				
State	Number	Percentage	State	No. of investments	Percentage	Amount(bn)	Percentage
California	532	33.76%	California	6678	52.23%	109	53.71%
New York	237	15.04%	New York	1551	12.13%	24.8	12.22%
Massachussets	143	9.07%	Massachussets	1322	10.34%	18.86	9.29%
Rest of U.S.	664	42.13%	Rest of U.S.	3234	25.30%	50.29	24.78%
Total	1576	100.00%	Total	12785	100.00%	202.95	100.00%

Panel B: Geographical distribution of Entrepreneurial Firms across U.S.

Number of Entrepreneurial Firms			Total Investments Received				
State	Number	Percentage	State	No. of investments	Percentage	Amount(bn)	Percentage
California	1921	47.94%	California	6276	49.09%	107.16	52.80%
Massachussets	410	10.23%	Massachussets	1431	11.19%	21.73	10.71%
New York	303	7.56%	New York	910	7.12%	9.61	4.74%
Rest of U.S.	1373	34.27%	Rest of U.S.	3718	29.08%	64.44	31.75%
Total	4007	100.00%	Total	12785	100.00%	202.95	100.00%

Table 2: Descriptive statistics of the key variables included in the models

Full sample

Variable	N	Min	Max	Median	Mean	Std.
Distance	12785	0	7945.567	238.394	1211.287	1616.957
VC Experience	12785	0	258	9	24.997	39.505
Syndicate	11071	2	20	4	4.222	2.172
VC Size	12610	1	15	1	1.576	1.288
VC Size control	12785	0	1	0	0.014	0.116
Early VC	12785	0	1	0	0.191	0.393
Amount (in millions)	12257	0.002	4,300	10.00	16.60	67.60
Age company	12785	0	61.833	5.436	5.436	3.215
Age control	12785	0	1	0	0.339	0.473
Previous funding	12785	0	1	1	0.570	0.495
Multiple offices	12785	0	1	0	0.053	0.223
Geo error	12785	0	1	0	0.0434	0.204

Table 3: Descriptive statistics of the key variables included in the models

California subset

Variable	N	Min	Max	Median	Mean	Std.
Distance	6678	0	4352.094	43.015	933.69	1519.836
VC Experience	6678	0	258	16	35.885	48.975
Syndicate	5936	2	18	4	4.212	2.184
VC Size	6634	1	8	1	1.721	1.452
VC Size control	6678	0	1	0	0.007	0.081
Early VC	6678	0	1	0	0.18	0.386
Amount (in millions)	6419	0.003	4,300	10.00	17.00	59.00
Age company	6678	0	56.33333	5.436	5.237	2.968
Age control	6678	0	1	0	0.332	0.471
Previous funding	6678	0	1	1	0.595	0.491
Multiple offices	6678	0	1	0	0.048	0.215
Geo error	6678	0	1	0	0.041	0.198

Table 4: Descriptive statistics of the key variables included in the models

New York subset

Variable	N	Min	Max	Median	Mean	Std.
Distance	1551	0	7945.567	1744.400	2069.231	1874.784
VC Experience	1551	0	130	7	15.827	22.256
Syndicate	1338	2	16	4	4.49	2.356
VC Size	1533	1	15	1	1.682	1.265
VC Size control	1551	0	1	0	0.011	0.107
Early VC	1551	0	1	0	0.188	0.39105
Amount (in millions)	1479	0.003	530	9.00	16.800	32.000
Age company	1551	0	29.041	5.436	5.567	3.409
Age control	1551	0	1	0	0.353	0.478
Previous funding	1551	0	1	1	0.581	0.494
Multiple offices	1551	0	1	0	0.057	0.232
Geo error	1551	0	1	0	0.051	0.220

Table 5: Descriptive statistics of the key variables included in the models

Massachusetts subset

Variable	N	Min	Max	Median	Mean	Std.
Distance	1322	0	4360.093	293.257	1421.167	1832.174
VC Experience	1322	0	112	11.5	21.97	25.618
Syndicate	1174	2	20	3.00	3.96	2.08
VC Size	1307	1	7	1	1.228	0.489
VC Size control	1322	0	1	0	0.011	0.106
Early VC	1322	0	1	1	0.234	0.424
Amount (in millions)	1275	0.1	530	9	14.8	26.2
Age company	1322	0	61.833	5.436	5.552	3.739
Age control	1322	0	1	0	0.343	0.475
Previous funding	1322	0	1	1	0.589	0.492
Multiple offices	1322	0	1	0	0.064	0.244
Geo error	1322	0	1	0	0.0303	0.171

Table 6: Descriptive statistics of the key variables included in the models

The rest of the U.S. subset

Variable	N	Min	Max	Median	Mean	Std.
Distance	2914	0	4333.818	515.224	1221.046	1420.4
VC Experience	2914	0	93	4	7.929	11.719
Syndicate	2343	2	16	4	4.147	2.0358
VC Size	2914	1	12	1	1.385	1.103
VC Size control	2914	0	1	0	0.032	0.177
Early VC	2914	0	1	0	0.193	0.394
Amount (in millions)	2774	0.002	43.00	7.50	16.20	43.00
Age company	2914	0	33.46872	5.435606	5.669	3.302
Age control	2914	0	1	0	0.349	0.477
Previous funding	2914	0	1	1	0.502	0.500
Multiple offices	2914	0	1	0	0.053	0.223
Geo error	2914	0	1	0	0.051	0.220

Table 7: Correlation matrix of the key variables

		1	2	3	4	5	6	7	8	9	10	11	12
1	Distance	1											
2	VC Experience	0.001	1										
3	Syndicate	0.085***	-0.023**	1									
4	VC Size	0.058***	0.319***	-0.038***	1								
5	VC Size control	0.027***	-0.070***	0.011	0	1							
6	Early VC	-0.031***	-0.022**	-0.059***	-0.031***	-0.008	1						
7	Amount	0.028***	0.001	0.054***	0.009	0.002	-0.043	1					
8	Age company	0.062***	-0.007	0.165***	-0.013	0.024	-0.168***	0.035***	1				
9	Age control	-0.003	-0.033***	-0.011	-0.007	0.002	-0.006	0.022**	0	1			
10	Previous funding	0.010	0.231***	0.097***	0.031***	-0.046	-0.083***	0.010	0.057***	-0.068***	1		
11	Multiple offices	0.041***	0.018**	0.004	0.017*	-0.010	-0.012	0.005	-0.008	-0.037***	0.080***	1	
12	Geo error	-0.023***	-0.017*	-0.043***	-0.017*	0.011	0.071***	0.004	-0.085***	0.051***	0.005	0	1

Figure 6. Number of investments that VCs located in California made per state

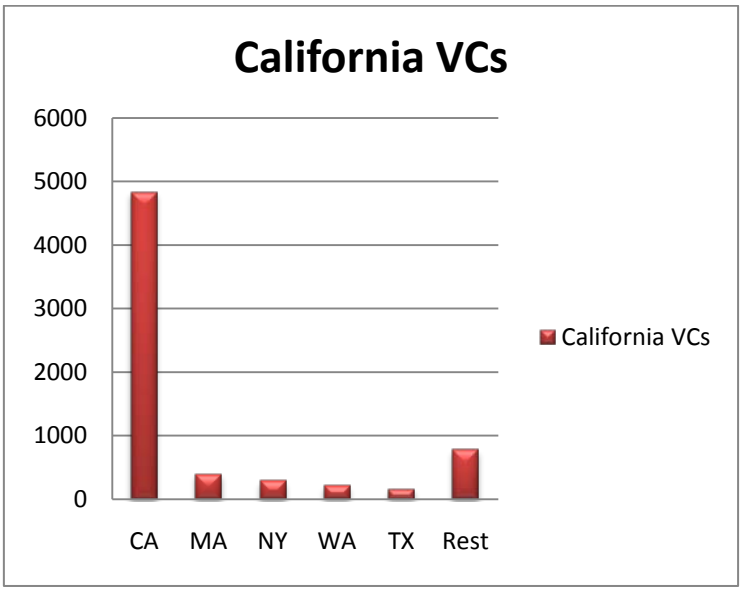

Figure 7. Number of investments that VCs located in Massachusetts made per state

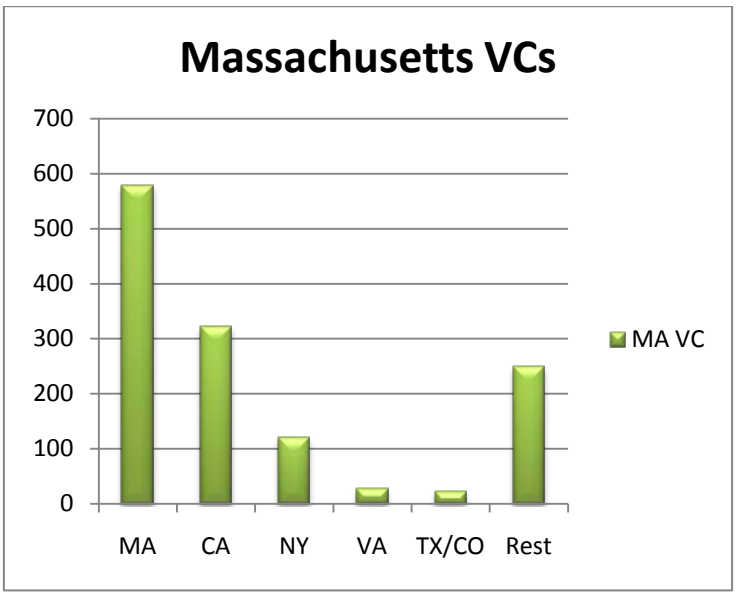

Figure 8. Number of investments that VCs located in New York made per state

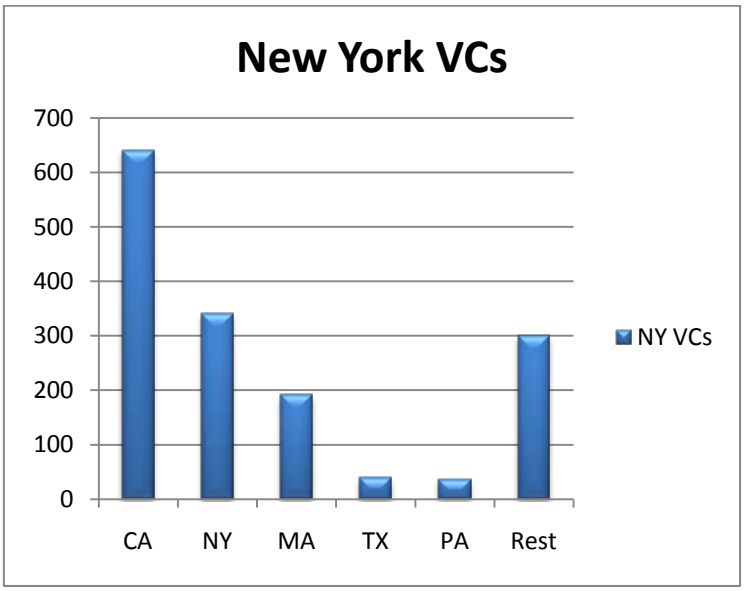

Figure 9. Number of investments that VCs located in the rest of the U.S. made per state

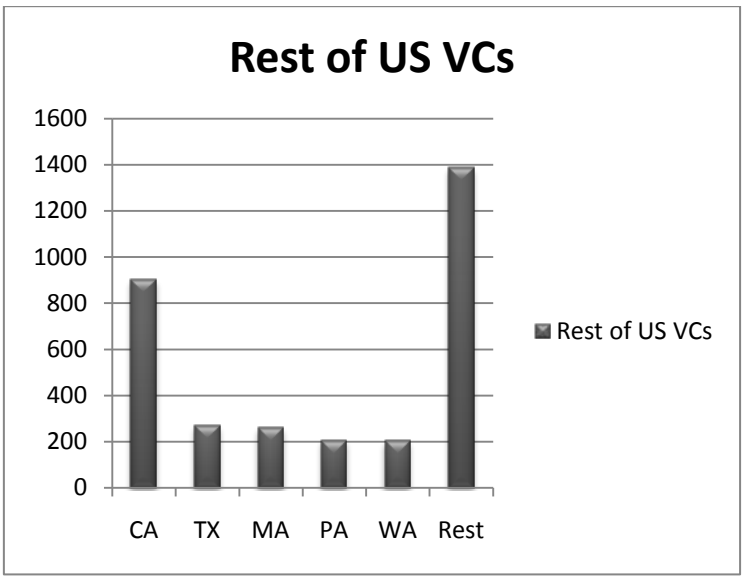

Table 8: Results of the regressions for the distance between VCs and companies

Full sample			Dependent variable		distance (in km)	
Independent variables	I	II	III	IV	V	VI
VC characteristics						
VC experience	-0.12***	-0.12***	-0.11***	-0.13***	-0.13***	-0.11***
	-6.57	-6.29	-5.72	-6.05	-6.02	-4.95
Syndicate (# participants)	0.54***	0.42***	0.37***	0.37***	0.34***	0.28***
	10.19	7.69	6.63	6.43	5.73	4.53
VC size	0.45***	0.39***	0.40***	0.41***	0.41***	0.42***
	8.91	7.73	7.83	7.91	7.90	7.93
Controls						
VC size control		0.77***	0.74***	0.70***	0.71***	0.71*
		3.37	3.26	3.06	3.10	3.09
Early VC		-0.24***	-0.18***	-0.21***	-0.17**	-0.13***
		-3.66	-2.71	-3.06	-2.43	-1.85
Investment amount		0.20	0.19***	0.20***	0.21***	0.19***
		9.21	8.63	8.78	8.37	7.25
Company characteristics						
Controls						
Age company			0.05***	0.05***	0.04***	0.05*
			6.63	6.30	4.84	4.98
Age company control			-0.01	0.01	0.01	-0.07
			-0.03	0.03	0.05	-1.29
Previous funding			-0.05	-0.11*	-0.15**	-0.08
			-1.01	-1.92	-2.35	-1.19
Multiple offices C.			0.52***	0.60***	0.61***	0.62
			4.61	5.19	5.30	5.26
General control						
Geo error		0.05	0.11	0.09	0.09	0.18
		0.38	0.91	0.68	0.71	1.38
Year dummies				YES	YES	YES
Round dummies					YES	YES
Industry dummies						YES
State dummies C						
State dummies VC						
Interaction terms						
Experience X Syndicate						
Experience X Size						
Syndicate X Size						
Constant	4.58***	1.51***	1.45***	0.75	0.12	0.60
Number of observations	11017	10673	10673	10461	10461	10202
R^2	0.0181	0.0295	0.0352	0.0378	0.0402	0.0469

*** , ** and * denote significance level of 1%, 5% and 10% respectively
Describing each variable first row denotes coefficient and second one denotes t value

Table 8: Results of the regressions for the distance between VCs and companies

Full sample	Dependent variable		distance (in km)	
Independent variables	VII	VIII	IX	X
VC characteristics				
VC experience	0.07***	0.09**	0.07***	0.07***
	2.96	1.89	2.93	2.96
Syndicate (# participants)	0.30***	0.30***	0.30***	0.30***
	5.08	5.1	5.02	5.08
VC size	0.43***	0.43***	0.59***	0.42***
	8.47	8.44	10.19	3.59
Controls				
VC size control	0.65***	0.65***	0.53**	0.65***
	2.97	2.96	2.41	2.96
Early VC	-0.18***	-0.18***	-0.16**	-0.18***
	-2.69	-2.67	-2.39	-2.69
Investment amount	0.19***	0.19***	0.19***	0.19***
	7.53	7.51	7.50	7.53
Company characteristics				
Controls				
Age company	0.03***	0.03***	0.03***	0.03***
	3.82	3.83	3.76	3.82
Age company control	-0.06	-0.06	-0.06	-0.06
	-1.11	-1.11	-1.13	-1.11
Previous funding	0.01	0.01	0.01	0.01
	0.03	0.03	0.07	0.04
Multiple offices C.	0.44***	0.44***	0.42	0.44***
	3.88	3.89	3.78	3.88
General control				
Geo error	0.17	0.17	0.17	0.17
	1.32	1.31	1.37	1.32
Year dummies	YES	YES	YES	YES
Round dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
State dummies C	YES	YES	YES	YES
State dummies VC	YES	YES	YES	YES
Interaction terms				
Experience X Syndicate		-0.02		
		-0.48		
Experience X Size			-0.19***	
			-5.73	
Syndicate X Size				0.01
				0.07
Constant	5.21	-2.28	-2.08	-2.27
Number of observations	10168	10168	10168	10168
R^2	0.1613	0.1613	0.164	0.1613

*** , ** and * denote significance level of 1%, 5% and 10% respectively
Describing each variable first row denotes coefficient and second one denotes t-value

Table 9: Results of the regressions for the distance between VCs and companies

California subsample	Dependent variable	distance (in km)			
Independent variables	I	II	III	IV	V
VC characteristics					
VC experience	0.79***	-0.01	0.04	-0.01	-0.01
	3.21	-0.92	0.78	-0.86	-0.92
Syndicate (# participants)	0.17**	0.08*	0.10**	0.08*	0.08*
	2.35	1.78	2.09	1.79	1.74
VC size	0.22***	-0.02	-0.02	0.04	-0.05
	3.62	-0.59	-0.64	0.96	-0.66
Controls					
VC size control	1.57***	0.40*	0.40*	0.37*	0.40*
	3.97	1.78	1.78	1.66	1.77
Early VC	0.05	-0.19***	-0.19***	-0.18***	-0.19
	0.61	-3.73	-3.65	-3.53	-3.74
Investment amount	0.15***	0.05**	0.04**	0.04***	0.05**
	5.26	2.28	2.24	2.18	2.29
Company characteristics					
Controls					
Age company	0.04***	0.03***	0.03***	0.035***	0.03***
	3.64	4.67	4.7	4.67	4.67
Age company control	0.01	-0.02	-0.03	-0.02	-0.02
	0.09	-0.60	-0.63	-0.57	-0.6
Previous funding	-0.37***	-0.03	-0.03	-0.03	-0.03
	-5.33	0.68	-0.69	-0.67	-0.68
Multiple offices C.	1.23***	-0.01	-0.01	-0.01	-0.01
	8.08	-0.13	-0.08	-0.16	-0.13
General control					
Geo error	0.00	0.33***	0.33***	0.33***	0.33***
	0.01	3.43	3.43	3.41	3.42
Year dummies		YES	YES	YES	YES
Round dummies		YES	YES	YES	YES
Industry dummies		YES	YES	YES	YES
State dummies C		YES	YES	YES	YES
State dummies VC		YES	YES	YES	YES
Interaction terms					
Experience X Syndicate			-0.04		
			-1.38		
Experience X Size				-0.05**	
				-2.13	
Syndicate X Size					0.03
					0.45
Constant	0.69	6.70***	6.61***	6.73***	6.72***
Number of observations	5732	5460	5460	5460	5460
R^2	0.0333	0.7059	0.7060	0.7062	0.7059

*** , ** and * denote significance level of 1%, 5% and 10% respectively
Describing each variable first row denotes coefficient and second one denotes t value

Table 10: Results of the regressions for the distance between VCs and companies

New York subsample	Dependent variable	distance (in km)			
Independent variables	I	II	III	IV	V
VC characteristics					
VC experience	-0.13**	-0.05**	-0.17***	-0.06***	-0.05**
	-1.97	-2.31	-3.72	-2.61	-2.36
Syndicate (# participants)	0.33**	0.10*	0.12**	0.11**	0.10**
	1.93	1.94	2.27	2.06	2.01
VC size	0.81***	0.11***	0.13***	0.09**	0.19**
	5.48	2.81	3.13	2.25	1.98
Controls					
VC size control	0.74	0.39**	0.36*	0.41**	0.39**
	1.06	2.09	1.93	2.21	2.09
Early VC	-0.63***	0.25***	0.24***	0.26***	0.25***
	-2.92	3.96	3.86	4.13	4.04
Investment amount	0.29***	-0.01	-0.01	-0.01	-0.01
	4.21	-0.55	-0.7	-0.64	-0.56
Company characteristics					
Controls					
Age company	0.07***	0.02	0.02***	0.02***	0.02***
	3.12	3.33	3.3	3.31	3.31
Age company control	-0.14	0.08*	0.08*	0.09**	0.09**
	-0.89	1.81	1.78	1.88	1.81
Previous funding	0.12	-0.03	-0.02	-0.03	-0.03
	0.68	-0.49	-0.49	-0.51	-0.48
Multiple offices C.	-0.99***	0.06	0.06	0.07	0.06
	-2.98	0.61	0.62	0.7	0.61
General control					
Geo error	1.20***	0.34***	0.34***	0.34***	0.34
	3.23	3.25	3.29	3.23	3.26
Year dummies		YES			
Round dummies		YES			
Industry dummies		YES			
State dummies C		YES			
State dummies VC		YES			
Interaction terms					
Experience X Syndicate			0.1***		
			2.99		
Experience X Size				0.06*	
				1.96	
Syndicate X Size					-0.07
					-0.85
Constant	0.69	6.61***	7.28***	6.66***	6.62***
Number of observations	1287	1202	1202	1202	1202
R^2	0.0897	0.9452	0.9456	0.9454	0.9452

*** , ** and * denote significance level of 1%, 5% and 10% respectively
Describing each variable first row denotes coefficient and second one denotes t value

Table 11: Results of the regressions for the distance between VCs and companies

Massachusetts subsample	Dependent variable		distance (in km)		
Independent variables	I	II	III	IV	V
VC characteristics					
VC experience	0.22***	-0.02	0.02	-0.02	-0.02
	3.32	-0.85	0.37	-0.89	-0.92
Syndicate (# participants)	0.43**	0.10	0.11*	0.10	0.08
	2.32	1.65	1.72	1.63	1.25
VC size	0.98***	0.06	0.05	0.07	0.22
	3.60	0.70	0.6	0.74	1.18
Controls					
VC size control	1.26	-0.05	-0.06	-0.06	-0.04
	1.53	-0.20	-0.25	-0.25	-0.17
Early VC	0.02	-0.06	-0.06	-0.06	-0.06
	0.11	0.94	-0.9	-0.88	-0.88
Investment amount	0.26***	-0.07**	-0.07**	-0.07**	-0.07**
	3.18	-2.40	-2.45	-2.38	-2.42
Company characteristics					
Controls					
Age company	-0.01	-0.01	-0.01	-0.01	-0.01
	-0.16	-0.15	-0.17	-0.16	-0.11
Age company control	-0.21	0.03	0.03	0.03	0.03
	-1.23	0.49	0.51	0.49	0.52
Previous funding	0.24	0.05	0.05	0.05	0.05
	1.35	0.71	0.72	0.7	0.68
Multiple offices C.	-0.59*	-0.12	-0.1	-0.1	-0.1
	-1.83	-1.15	-1.06	-1.15	-1.14
General control					
Geo error	-0.62	-0.05	-0.05	-0.05	-0.05
	-1.23	-0.32	-0.29	-0.31	-0.31
Year dummies		YES			
Round dummies		YES			
Industry dummies		YES			
State dummies C		YES			
State dummies VC		YES			
Interaction terms					
Experience X Syndicate			-0.04		
			-0.94		
Experience X Size				-0.02	
				-0.26	
Syndicate X Size					-0.17
					-0.97
Constant	-0.33	8.60***	8.58***	8.61***	8.58***
Number of observations	-0.25	1087	1087	1087	1087
R^2	0.0529	0.9247	0.9247	0.9247	0.9247

*** , ** and * denote significance level of 1%, 5% and 10% respectively
Describing each variable first row denotes coefficient and second one denotes t value

Table 12: Results of the regressions for the distance between VCs and companies

The rest of the U.S subsample	Dependent variable		distance (in km)		
Independent variables	I	II	III	IV	V
VC characteristics					
VC experience	-0.13***	-0.11**	-0.01	-0.11***	-0.11**
	-2.63	-2.3	-0.05	-2.18	-2.31
Syndicate (# participants)	0.74***	0.29***	0.21*	0.29***	0.28***
	6.42	2.79	1.71	2.8	2.69
VC size	0.52***	0.50***	0.50***	0.52***	0.59**
	4.36	4.94	4.93	4.84	2.41
Controls					
VC size control	-0.14	-0.50**	-0.52**	-0.48**	-0.5**
	-0.44	-1.99	-2.05	-1.88	-1.99
Early VC	-0.79***	-0.21	-0.21	-0.21	-0.21
	-5.41	-1.58	-1.59	-1.52	-1.55
Investment amount	0.29***	0.14***	0.14***	0.14***	0.14***
	6.87	3.31	3.33	3.31	3.32
Company characteristics					
Controls					
Age company	0.04**	0.02	0.02	0.02	0.02
	2.25	1.53	1.55	1.52	1.52
Age company control	0.14	0.02	0.02	0.02	0.02
	1.35	0.22	0.2	0.21	0.2
Previous funding	0.18*	-0.06	-0.06	-0.06	-0.06
	1.72	-0.63	-0.62	-0.63	-0.64
Multiple offices C.	0.03	0.02	0.02	0.03	0.02
	0.12	0.11	0.1	0.14	0.1
General control					
Geo error	0.29	0.55**	0.54**	0.54**	0.55**
	1.1	2.5	2.49	2.5	2.52
Year dummies		YES	YES	YES	YES
Round dummies		YES	YES	YES	YES
Industry dummies		YES	YES	YES	YES
State dummies C		YES	YES	YES	YES
State dummies VC		YES	YES	YES	YES
Interaction terms					
Experience X Syndicate			-0.10		
			-1.29		
Experience X Size				0.05	
				0.51	
Syndicate X Size					-0.09
					-0.41
Constant	-0.07	1.81	1.72	1.75	1.80
Number of observations	2253	2162	2162	2162	2162
R^2	0.0917	0.4954	0.4958	0.4954	0.4954

*** , ** and * denote significance level of 1%, 5% and 10% respectively
Describing each variable first row denotes coefficient and second one denotes t value

Table 13: Summary of the results

	I	II	III	IV	V	VI	VII
Experience	-	-	-	-	-	-	+
Syndicate	+	+	+	+	+	+	+
VC size	+	+	+	+	+	+	+

Table 14: Summary of the results – subsets

	No dummies			
	California	New York	Massach.	Rest of US
Experience	+	-	+	-
Syndicate	+	+	+	+
VC size	+	+	+	+
	Dummies included			
	California	New York	Massach.	Rest of US
Experience	NS	-	NS	-
Syndicate	+	+	NS	+
VC size	NS	+	NS	+

Table 15: Summary of the results - interaction

Full sample				**California**		
	Exp	Syndicate	VC size	Exp	Syndicate	VC size
Experience	•			•		
Syndicate	NS	•		NS	•	
VC size	-	NS	•	-	NS	•
New York				**Massachusetts**		
	Exp	Syndicate	VC size	Exp	Syndicate	VC size
Experience	•			•		
Syndicate	+	•		NS	•	
VC size	+	NS	•	NS	NS	•
Rest of US						
	Exp	Syndicate	VC size			
Experience	•					
Syndicate	NS	•				
VC size	NS	NS	•			