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Geographic Location of a New Venture and the Likelihood of a Venture Capital Investment

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Abstract
Based on 1182 dyads of German new ventures and venture capitalists involved in a financing round between 2002 and 2007, we examine the impact of spatial proximity on the likelihood of an investment. We find that with each triplication of journey time the relative likelihood of an investment decreases by one third. Venture development stage, the experience of the entrepreneurial team, knowledge-intensity of the industry and the investment volume moderate the relationship between journey time and the likelihood of an investment. Our results suggest that even in economies with a dense infrastructure like Germany regional equity gaps may exist.

Keywords: Venture capital, new venture, geographic location, entrepreneurial finance

JEL Codes: G24, G31, M13

1. Executive summary

Venture capital plays a key role in supporting new venture growth and, thereby, economic growth. In large economies like the US, the supply of venture capital is concentrated around a few clusters, but also in smaller countries with denser infrastructures like Germany a number of pronounced clusters of venture capitalists exist. It is important to understand whether new ventures which are located close to these clusters have easier access to venture capital. This would in turn imply that regional equity gaps may exist where new ventures have disadvantages in raising external equity. Prior research has shown for the US that spatial proximity between venture capitalists and new ventures positively affects the likelihood of an investment. However, it remains unclear whether this causal relationship also holds true in denser infrastructures with smaller mean distances between investors and their targets as well as in less mature markets with fewer investment opportunities.

It is valuable for entrepreneurs and policy makers to comprehend whether spatial proximity to venture capitalists is more important for some new ventures e.g. in earlier development stages or in certain industries. For entrepreneurs, this could be helpful for

deciding where to locate the new venture and public policy could understand the circumstances under which a locally established venture capital community is particularly important for a new venture. However, empirical research on new venture characteristics that may influence the relationship between spatial proximity and the likelihood of an investment is still very limited.

In this paper, we contribute to existing research on spatial proximity in venture capital finance by demonstrating that even in dense infrastructures the journey time between the venture capitalist and the new venture positively influences the likelihood of an investment. With each triplication of journey times, the likelihood of an investment decreases by one third. Furthermore, we clarify factors influencing the causal relationship between spatial proximity and the probability of raising venture capital. We show that this relationship is particularly strong in new ventures with less experienced entrepreneurial teams, in earlier development stages and in knowledge intensive industries. Furthermore, we find a non-linear relationship between the investment sum and the importance of spatial proximity. Short journey times to venture capitalists are particularly important for new ventures seeking very small or very large investment sums. Our analysis is based on rare events logistic regression analysis of a sample of German venture capital transactions between January 2002 and March 2007 including 1182 dyads of German new ventures and venture capitalists.

Our results have implications both for theory and practice. Our study reveals that even in economies with a dense infrastructure and with fewer investment opportunities than in mature venture capital markets, short journey times between the new venture and venture capitalist significantly increase the likelihood of an investment. Therefore, regional equity gaps are likely to exist and our results inform both entrepreneurs in their decision whether to locate closer to a venture capital cluster and policy makers attempting to provide easier access to venture capital for high growth new ventures. For

theory, our results indicate that researchers should consider characteristics of new ventures as moderators of the relationship between spatial proximity and the likelihood of a venture capital investment. We confirm that both informational asymmetries as well as transaction costs play an important role for venture capitalists in their investment decision and, taken together, as shown for the investment volume these factors can lead to non-linear relationships.

2. Introduction

Due to internal resource constraints as well as external pressures, it is challenging for new ventures to realize high company growth. Management scholars have acknowledged that the limited access to financial resources is a relevant growth impediment for new organizations. Venture capital as external equity financing for young, high potential companies can therefore play a vital role in elevating new venture growth as it provides financial support. In addition, venture capital firms offer managerial advice and access to networks which can also foster growth in start-ups (Bottazzi et al., 2008; Hellmann and Puri, 2000) and, hence, economic growth (Kortum and Lerner, 2000). Due to this critical role, researchers as well as policy makers have been interested to understand factors which foster an easier access to venture capital (Florida and Kenney, 1988; Mason and Harrison, 1992). In this context, the spatial clustering of venture capitalists may be relevant as evidence suggests that venture capitalists only invest in new ventures which can be reached in a short period of time (Martin et al., 2005; Zook, 2002).

The high concentration of venture capitalists around clusters such as the Silicon Valley or Route 128 in the US could then lead to equity gaps and disadvantages in receiving venture capital for new ventures located outside of these clusters. As the entrepreneurial ecosystem and the venture capital environment cross-fertilize each other, this could then imply an increase in the clustering of new ventures and venture capitalists hindering

economic growth in already deprived regions. Therefore, the importance of spatial proximity in venture capital finance is a relevant topic for entrepreneurs, venture capitalists and policy makers alike. Accordingly, a growing number of business scholars have investigated spatial aspects of venture capital financing.

First, descriptive empirical evidence confirms dense clusters of venture capitalists and venture capital investments in the US and in Europe and, therefore, regional equity gaps may exist (e.g. Florida and Kenney, 1988; Martin et al., 2002; Martin et al., 2005; Mason and Harrison, 2002; Patton and Kenney, 2005). Second, prior studies have analyzed the relationship between the realized distance and different characteristics of the new venture and the venture capitalist. However, these studies apply rough measures of spatial proximity and mainly differentiate between close and distant investments in widely dispersed economies such as the US or Canada. Venture capital deals with short distances between the new venture and the venture capitalist are found to be done primarily by less experienced venture capitalists (Butler and Goktan, 2008) and often involve young companies and ventures in a high-tech industry (Powell et al., 2002). Third, empirical evidence exists on the relationship between the local bias of venture capitalists and their characteristics. Venture capitalists with better reputation and a broader network are found to exhibit less local bias (Cumming and Dai, 2009). Early stage and government-backed venture capitalists prefer a more narrow geographic scope (Gupta and Sapienza, 1992) whereas larger and later stage venture capitalists more often state that they would also invest on a broader geographic reach (Hall and Tu, 2003).

Even though these studies yield important theoretical and empirical results, they do not allow for causal conclusions regarding the impact of spatial proximity on the likelihood that a venture capital investment takes place. The observed patterns are either based on aggregated venture capitalists' characteristics or on stated preferences and not on actual behavior. In addition, the patterns may also be determined by other factors regarding the

supply and demand of venture capital in a region. However, there is one additional study which analyzes the causal relationship of spatial proximity on the likelihood of a venture capital investment. For the US, spatial distance is found to have a negative impact on the likelihood of a venture capitalist investment and the effect is less pronounced for venture capitalists with a well established network and for syndicated deals (Sorenson and Stuart, 2001). Using air distance in miles as measure for spatial proximity, this study reveals the impact of long distances in the US comparing e.g. potential investments on the east coast and west coast for a venture capitalist. European countries differ substantially from the US as they are spatially much more concentrated and have denser infrastructures. Hence, the mean air distance between venture capitalists and their portfolio companies is significantly smaller and it is questionable whether the results on the importance of spatial proximity also hold true for smaller distances.

Empirical evidence suggests that the importance of spatial proximity is less pronounced for denser economies such as Germany. Controlling for potential venture capital demand, no effect of the number of venture capitalists in a district on the number of venture capital investments in that district are shown (Engel, 2003). Other studies based on the German venture capital market further underline these results and argue based on expert interviews that due to a dense infrastructure and a limited number of investment opportunities, distance is not important for German venture capital investments (Fritsch and Schilder, 2007). Furthermore, it is shown that syndication is used as an instrument to overcome disadvantages of longer distances to potential portfolio companies (Fritsch and Schilder, 2008).

We aim to shed further light on the relevance of spatial proximity for the probability of a venture capital investment in countries with dense infrastructures such as Germany. We make three contributions with our study. First, we analyze the impact of geographic

distance on the likelihood that a venture capitalist invests in a certain new venture in the German venture capital market using the minimum journey time as realistic metric for spatial proximity. Thereby, we are able to take account of the well established infrastructure and different means of transport. We are able to show that even in a small geographic radius, the journey time between the venture capitalist and the new venture has a significant influence on the probability to establish a venture capital relationship. Second, we are the first study to explicitly investigate whether certain characteristics of new ventures influence the relationship between journey times and the likelihood of venture capital investments. We analyze whether spatial proximity is more important for new ventures in certain development stages or industries. Furthermore, we examine whether the experience level of the entrepreneurial team and the investment sum have an impact on the relevance of spatial proximity. Thereby, we show for which type of new ventures a locally established venture capital community is particularly relevant. Third, we are able to extend theory and show non-linear relationships between characteristics of the investment target and the decision of venture capitalists as intermediaries. We show that for small investment sums, the transaction costs are relatively high making spatial proximity important. At the same time, large investment sums relative to the fund size lead to increasing diversification costs which makes monitoring of these deals more important. Therefore, short journey times are important both for particularly small and large investment sums.

Our results are of importance for entrepreneurs and policy makers alike. We provide insights on factors entrepreneurs should take into consideration when deciding on where to establish the new venture. For public policy, it is interesting to see for which types of ventures a locally established venture capital community is of high relevance. Policy makers with the aim to foster regional economic development should therefore find our

results valuable as they may help them to decide on policies to promote regional entrepreneurship and venture capital.

3. Theoretical background and hypotheses

3.1. Impact of journey time on the likelihood of investment

Explanations for the impact of spatial proximity between a venture and a venture capitalist on the likelihood of an investment fall into three main categories: (i) agency theory, (ii) transaction cost theory and (iii) social exchange theory.

The relationship between a new venture and a venture capitalist is often seen in the light of agency theory (e.g. Lerner, 1995; Sapienza and De Clercq, 2000; Sapienza and Gupta, 1994; Wright and Robbie, 1998). The venture capitalist is portrayed as principal investing in a new venture and leaving its management to the entrepreneur as agent. Furthermore, the entrepreneur can also be seen as principal engaging a venture capitalist as agent who is supposed to monitor and support the venture financially as well as non-financially. Due to informational asymmetries between the venture and the venture capitalist and conflicts of interest between the two parties, agency costs can emerge (Jensen and Meckling, 1976). Different mechanisms of monitoring and bonding can be applied to mitigate agency problems (Gompers, 1995; Kaplan and Strömberg, 2001) and the costs of many of these mechanisms are sensitive to the spatial proximity between the venture capitalist and the new venture. In case of short journey times, deal screening, due diligence and monitoring become easier and cheaper as it is less complicated to organize onsite meetings as well as personal contacts and it is less difficult to obtain reliable information e.g. through local networks. The observation of the other party's actions is facilitated and intervention becomes less demanding. Furthermore, the reputation of the other party can potentially be better acknowledged if the new venture and the venture capital firm are located close to each other. If they are embedded in the same regional network, the parties can have a higher visibility and can

be more affected by either positive or negative reputation effects from the behavior of the agent (Sorenson and Stuart, 2001). Therefore, based on agency theory it can be assumed that agency costs decrease with shorter journey times and that a venture capital investment becomes more likely.

The investment decision of venture capitalists can be explained based on the transaction cost theory by Williamson (1981). Limited analytical and information processing capabilities of the contracting parties is assumed which leads to bounded rationality. The sum of transaction costs can then be used to evaluate alternative transactions and the minimization of transaction costs leads to an efficient solution (Williamson, 1981). Inherent transaction costs of a venture capital deal are information costs, negotiation costs as well as monitoring costs (Benston and Smith, 1976). The journey time between the new venture and the venture capital firm influences these transaction costs as it is a relevant driver of travel expenses. Due to transportation costs and travel time, these transaction costs increase with increasing journey time.

Furthermore, as social networks tend to be regional (Blau, 1977) information costs as well as monitoring costs are likely to increase with increasing journey time due to decreasing familiarity with regional particularities, markets, service providers and other market players. Hence, it can be assumed that with increasing journey time, the sum of transaction costs is also going to increase and, therefore, the likelihood of a venture capital investment decreases.

Social exchange theory contributes to the understanding of interpersonal processes and relationships relevant in a venture capital deal. Interactions between actors are considered as an independent exchange of positive and negative stimuli which are referred to as rewards and costs (Homans, 1958) and neither opportunism of the actors nor hierarchical relationships are assumed. Stable social relationships develop in an

evolutionary process during which the parties interactively increase their commitment (Larson and Starr, 1993). The interactions are often not based on a contractual arrangement, but dependent on factors like trust, reciprocity and reputation (Blau, 1964). Social relationships between the venture capitalist and the entrepreneur can be important to create mutual trust (De Clercq and Sapienza, 2001; Sapienza and Korsgaard, 1996). They can reduce information asymmetries through more intense, free and potentially less formal ways of communication. In addition, trust can reduce concerns about the reliability of information (Nahapiet and Ghoshal, 1998; Shane and Cable, 2002) and hence, social relationships are likely to increase the likelihood of cooperative behavior between the venture capitalist and the entrepreneur and to reduce contracting as well as monitoring costs. Social relationships between the new venture and the venture capital firm are more likely to develop if they are located close to each other because it increases the chance of first encounter and lowers the necessary effort to get in contact with each other. In addition, the transfer of information and tacit knowledge is easier if the two parties are in close spatial proximity as it is easier to have personal meetings (Sorenson and Stuart, 2001). These effects may have become weaker because of an increase in the use of new communication technologies. However, they are still relevant because face-to-face interactions remain important to build up relationships (McPherson et al., 2001).

Even though agency theory, transaction cost theory and social exchange theory offer different angles to explain the impact of journey time on the likelihood of an investment, they share the same conclusion of an overall negative relationship. Therefore, we hypothesize:

Hypothesis 1: The likelihood of a venture capital investment will decrease with an increase in journey time between the new venture and the venture capitalist.

3.2. Influence of financing stage of the venture

The business risk of ventures in an early development stage are particularly high because of the high relevance of the liability of newness and smallness (Brüderl and Schüssler, 1990; Stinchcombe, 1965), the uncertainty of supply and demand (Sapienza and Gupta, 1994; Westhead and Storey, 1997), the competitive uncertainty (Barney et al., 1996) and the dependency on the entrepreneur (Gompers, 1995). Agency costs can be expected to be higher in the initial phases of venture growth because the venture requires a higher level of monitoring and support. Furthermore, the high risk associated with ventures in an early development stage is likely to impact transaction costs as the due diligence becomes more difficult (Barney et al., 1989). Informal monitoring through personal meetings with the entrepreneur and participation in key management meetings are particularly important (Sweeting and Wong, 1997) and easier as well as less expensive with short journey times.

In addition, new ventures which are located close to the venture capitalist may benefit more from the local network of the investor. As social relationships develop over time, young ventures in an early development stage are likely to not have access to a large network of contacts and their contacts are likely to be limited to a relatively small geographic radius. Therefore, the network of the venture capitalist may be particularly important for ventures in an early development stage. In addition, it may be difficult for young ventures to be visible to more distant venture capitalists (Sorenson and Stuart, 2001) which can decrease the likelihood of an initial contact between the two parties.

In sum, spatial proximity between the venture and the venture capitalist is likely to be particularly important for ventures in an early development stage. Therefore, we posit:

Hypothesis 2a: Early development stages of the portfolio company moderate the relationship between journey time and the likelihood of a venture capital investment: This relationship will be more negative in seed financing rounds compared to other rounds.

Hypothesis 2b: Later development stages of the portfolio company moderate the relationship between journey time and the likelihood of a venture capital investment: This relationship will be less negative in later financing rounds compared to other rounds.

3.3. Influence of prior experience of the entrepreneur

The importance of spatial proximity between the venture and the venture capitalist is likely to be affected by the level of experience of the entrepreneur. A serial entrepreneur is able to build on the know-how and contacts accumulated in prior entrepreneurial projects (Sapienza and Gupta, 1994). Therefore, entrepreneurial experience may act as a signal for the skills of the entrepreneur and may enhance his reputation. Furthermore, it is likely to reduce the level of required monitoring and support from the venture capitalist (Sapienza et al., 1994). For entrepreneurs without prior experience, it is more difficult to recognize and demand the needed support and, as a result, the uncertainty and informational asymmetries may be higher in case the new venture is started by a first time entrepreneur (Welpe and Dowling, 2005).

Furthermore, the network of an entrepreneur without prior start-up experience is likely to be smaller than that of serial entrepreneurs which makes the access to the network of the venture capitalist more valuable for inexperienced entrepreneurs. Hands-on monitoring and support by the venture capitalist is more important in new ventures with inexperienced entrepreneurs and short journey times make it easier for the venture capitalist to fulfill this role. Hence, the importance of short journey times between the entrepreneur and the venture capitalist is likely to be stronger for new ventures which are started by inexperienced entrepreneurs. Hence, we propose:

Hypothesis 3: The experience of the entrepreneur moderates the relationship between journey time and the likelihood of a venture capital investment: This relationship will be more negative for inexperienced entrepreneurs than for experienced entrepreneurs.

3.4. Influence of knowledge intensity

We expect that high knowledge intensity of the new venture influences the importance of journey time for a venture capital investment. Knowledge intensive ventures are characterized by high levels of risk and opaqueness as well as an increased need for management support compared to less knowledge intensive new ventures. We investigate three indicators for the level of knowledge intensity in new ventures: (i) asset intangibility, (ii) R&D intensity and (iii) relevance of future growth options.

It is more difficult to evaluate intangible assets than tangible assets and, in the case of default, the liquidation value of assets is positively influenced by their tangibility because tangible assets are easier to sell and are likely to generate a price closer to their book value (Williamson, 1988). Therefore, a business model which relies more on intangible assets may be related to higher risks as well as agency costs and an increase in the required information in the due diligence of the venture capitalist.

A high R&D intensity is usually accompanied with a high relevance of firm specific assets which are difficult to liquidate (Shleifer and Vishny, 1992). If the value of the new venture largely depends on future growth options, the entrepreneur may have a high informational advantage and, hence, the opportunity to pursue opportunistic investment strategies at the expense of the investor (Myers, 1977). Thus, a high asset intangibility, high R&D intensity and high relevance of future growth options may indicate higher risk, the need for up-front information in the due diligence process and higher need for monitoring and support in the investment phase. As informational asymmetries are easier to mitigate with shorter journey times between the venture and the venture capitalist, we assume that spatial proximity is particularly important for these types of new ventures. Therefore, we hypothesize:

Hypothesis 4a: Asset intangibility moderates the relationship between journey time and the likelihood of a venture capital investment: This relationship

will be more negative in new ventures with high asset intangibility than in other new ventures.

Hypothesis 4b: R&D intensity moderates the relationship between journey time and the likelihood of a venture capital investment: This relationship will be more negative in new ventures with high R&D intensity than in other new ventures.

Hypothesis 4c: The relevance of future growth options moderates the relationship between journey time and the likelihood of a venture capital investment: This relationship will be more negative in new ventures with high relevance of future growth options than in other new ventures.

3.5. Influence of the investment sum

Transaction costs are an important rational for the relevance of short journey times between the new venture and the venture capitalist. In case the two parties are located close to each other, the transaction costs will be lower as it is easier to have personal meetings and visits of the new venture. The travel and time expenses are not proportionally related to the investment sum as it is always necessary to have a number of personal meetings prior to the deal and during the investment period. Hence, transaction costs are relatively more important for venture capitalists if the investment sum is small rather than large (Elango et al., 1995). As a consequence, spatial proximity should be more important for transactions with smaller investment sums.

However, with a larger investment sum relative to the fund size one transaction has a higher relative impact on the portfolio's performance. With larger relative investment sums, the possibility to diversify the portfolio decreases which could lead to more frequent monitoring of the venture capitalist. This can lead to a more hands-on approach of the venture capitalist in deals with higher investment sums (Gifford, 1997) which would imply a higher importance of spatial proximity for larger deals.

It can be expected that the first effect, the importance of transaction costs becomes less important with an increasing investment sum. On the contrary, the second effect of a higher performance impact of larger deals and the costs of not being able to

appropriately diversify the portfolio is likely to increase with higher investment sums. Therefore, we expect that the influence of the investment sum on the importance of journey time follows an inverted u-shaped pattern and we propose:

Hypothesis 5: The investment sum moderates the relationship between journey time and the likelihood of a venture capital investment: This relationship will be less negative with increasing investment sums up to a certain threshold and more negative thereafter.

4. Data and methods

4.1. Sample

Our sample is based on data from VentureSource, a database from Dow Jones VentureOne. The dataset includes venture capital transactions in Germany between January 2002 and March 2007. In total, the data includes 498 portfolio companies which were financed by 309 venture capitalists in the course of 689 financing rounds. As our analysis is focused on journey times between the portfolio company and the venture capitalist, we require dyads of one venture and one investor. Hence, in case of syndicated financing rounds we include one dyad for the lead investor and one for each co-investor in our analysis. Furthermore, we include separate dyads for each financing round if a new venture received several financing rounds. Thereby, we treat the decision of every venture capitalist involved and the decision to finance multiple rounds as a separate decision.

The data collected includes the location of all branches of both the new ventures and venture capitalists, the ventures' stage of development, the investment sum as well as other characteristics of the new venture and the venture capitalists. In total, the dataset comprises 1402 dyads of venture capitalists and portfolio companies. However, due to missing values particularly on the investment sum, we were only able to use 1182 dyads in our analysis.

The VentureSource data contains mainly self-reported data from venture capitalists and, hence, there might be a selection bias because only certain venture capitalists report data or because they report only certain types of deals. Prior research has shown for the US that VentureSource data is largely unbiased in terms of the investment sum, the industry and performance of venture capital financed companies (Kaplan et al., 2002). However, as the coverage of the database might be different across countries we checked the representativeness of our data and compared it to data from the BVK, the German Venture Capital and Private Equity Association, which offers the most comprehensive aggregated data source on German venture capital deals. In terms of number of deals, we only cover 14% of the data reported by BVK, but in terms of volume our data represents 38% of the BVK data over that time period. We found that our data slightly under represents early stage investments and that it is not representative of investments by German MBGs (Mittelständische Beteiligungsgesellschaften). They are regional development agencies which are largely supported by the public sector. Typically, they invest relatively small volumes, mainly in the form of mezzanine capital and usually they do not offer hands-on support to their investees (Achleitner et al., 2009). In largely excluding MBGs, our data therefore better represents equity investments with financial as well as non-financial support and thus "pure venture capital". We did not find other selection biases based on our comparison with the BVK data.

4.2. Measures

Journey time We use the minimum journey time as measure for spatial proximity between the new venture and the venture capitalist. Thereby, we are able to take into account different means of transport such as travel by car or airplane. By including both travel options, we are able to adequately portray long distances and to realistically include international and intercontinental relationships. Prior studies are not able to achieve this as they are based on either the spherical air distance, car distance or car travel time (e.g. Fritsch and Schilder, 2006; Lerner, 1995; Sorenson and Stuart, 2001).

However, car distance and car travel time was also collected as additional measures of spatial proximity in order to check the robustness of our results.

In order to construct the minimum journey time of a dyad, we first used Google Maps in order to collect the average journey time by car between the ZIP codes of the new venture and of the venture capitalist. If the car travel time was greater than three hours, we investigated a flight option and assigned each party to an appropriate airport. For the flight option, the journey time was assumed to be the sum of the car travel times from each party to the airport, a check-in time of 60 minutes, the average flight time between the airports and a check-out time of 30 minutes. We then used the smaller value of the car travel time or the flight option as minimum travel time.

In case a venture capitalist has multiple offices, we assumed the office located closest to the new venture to be in charge of the transaction. Although this assumption might not be valid in some cases, in particular for large venture capitalists which might concentrate their activities according to industries in certain offices, it is a necessary assumption and also accepted by other authors (Butler and Goktan, 2007; Lerner, 1995).

It can be assumed that journey time is not evaluated in a linear way. It is likely that a one hour increase in travel time from one to two hours is not perceived equally to a one hour increase from five to six hours. Hence, we include journey time in the form of its natural logarithm.

Development stage of the venture The development stage of the venture is measured by the investment stage of the financing round as provided by VentureSource. We included three dummy variables for seed, first, and second to later stage rounds according to the VentureSource round class definition.

Experience of the entrepreneurial team Data on the background of the entrepreneurial team as given in VentureSource was used to create a dummy variable which has a value of one for experienced entrepreneurs. An entrepreneurial team was defined as experienced if at least one member of the team had a high executive position prior to joining the new venture. A high executive position is given if the person had a position as chief executive officer, chief financial officer, chief operating officer, managing director, director or president.

Knowledge intensity Similar to prior research, we constructed generic industry variables as measure for knowledge intensity of a new venture because individual accounting data was not available (Gompers, 1995). Annual generic knowledge intensity variables were calculated for asset intangibility (intangibles to total assets), R&D intensity (R&D expenses to total assets) and growth options (book to market ratio). Each new venture was assigned to an eight digit GICS code according to VentureSource's industry code. For each GICS code, the annual generic industry variables were calculated and assigned to the new venture. The annual generic industry variables were computed by using all German companies listed in the Thomson ONE Banker database under the eight digit GICS code. The six digit code was used in case the eight digit code had fewer than four companies. If there were still less than four companies in one group, the level was further reduced until each group consisted of at least four companies. Three dummy variables were constructed which had the value of one if the new venture was in an industry of the top percentile of asset intangibility, R&D intensity and substantial future growth options respectively.

Investment sum We use the investment sum per venture capitalist as measure and, thereby, we assume each venture capitalist to contribute equally to each financing round. We divided the total amount raised in a financing round as given by VentureSource by the number of participating venture capitalists in the round. Our

hypothesis suggests an inverted u-shape influence of the investment sum and, in order to test this shape, we include the investment sum per venture capitalist in its linear form in combination with a quadratic form.

Control variables We include a number of control variables to account for further effects which might influence the likelihood of a venture capital investment. We control for potential differences in the investment behavior between lead and co-investors. As lead investors usually monitor and support the new venture more closely than co-investors (Elango et al., 1995; Wright and Lockett, 2002; Wright and Lockett, 2003), spatial proximity may be particularly important for them. We therefore include an interaction term of the dummy variable for lead investors with the minimum journey time as control in our analysis. Furthermore, a syndicate may benefit from one venture capitalist being close to the new venture regardless whether that investor has the role of the lead investor. Recent studies have shown that syndication is used to overcome challenges of geographically dispersed investments (Cumming and Dai, 2009; Fritsch and Schilder, 2008; Tykvová and Schertler, 2008). Therefore, we expect spatial proximity to be less important for a venture capitalist as long as one member of the syndicate is located close to the new venture. Therefore, we include an interaction term of the syndication benefit with the journey time as control. The syndication benefit portrays the ratio of the journey time of the venture capitalist in relation to the shortest journey time in the syndicate. The numerical control variable for the syndication benefit is zero if the venture capitalist's journey time equals the shortest journey time in the syndicate and is greater than zero in case it is longer.

To control for changes in the venture capital market condition, we include the total German venture capital fundraising in the previous calendar year and the total German venture capital investments in the calendar year of the transaction date of the dyad. These variables were collected from EVCA and were included in the form of their

natural logarithm because we assume that relative rather than absolute changes have an impact on the likelihood of a venture capital investment. Furthermore, we include the economic environment for new ventures measured by the discrete return of the Morgan Stanley Capital International (MSCI) Germany Small Cap (SC) Index over the last twelve months prior to the transaction date of the dyad based on DataStream.

[Insert Table 1 about here]

Table 1 displays the means, standard deviations and correlations between the variables. The mean minimum journey time between new ventures and venture capitalists is 70 minutes across the total sample of dyads. The highest correlations are shown in the variables between the development stages of the new venture, the knowledge intensity variables and the control variables. Our analysis shows that the correlations among independent variables did not influence the robustness of our coefficient estimates.

4.3. Rare events logistic regression

Our primary aim is to investigate the impact of journey time on the likelihood of a venture capital investment. It is therefore necessary to analyze our sample against a control sample of unrealized, but comparable relationships. We follow a choice-based sampling to construct our control sample and include all realized dyads and a random selection of unrealized observations (King and Zeng, 2001). Most venture capitalists specialize in certain market segments and only invest in certain investment stages, investment volumes, industries and/or regions (Gupta and Sapienza, 1992). For the German market, a relatively high regional specialization can be expected due to the high share of government-backed venture capitalists which have to focus their investment in certain regions (Achleitner et al., 2009). Even though MBGs are underrepresented in our sample, we do have a share of other government-backed venture capitalists which usually have a local bias.

We match each venture capitalist in our sample that invested in a new venture with a realistically matched venture which also received venture capital, but from a different investor. The control dyad was matched based on investment year, development stage, investment sum per venture capitalist and industry. Furthermore, the matching took into account the regional focus of the venture capitalist and matched only ventures which were located in the target region of the investor. The target region of the venture capitalists was defined according to the BVK database or the website of the venture capitalist. Most venture capitalists, which are not government-backed, do not follow a specific geographic focus and, hence, we used Germany as their target region. For subsidiaries of institutions promoting economic development and subsidiaries of state banks, cooperative central institutes and MBGs, the federal German state was used as target region. For subsidiaries of savings and cooperative banks, the target region was defined according to their stated region on a district level.

The matching criteria were softened in case it was not possible to identify an alternative dyad. At first the restrictions based on the investment volume was relaxed, then the industry criteria, the closing date and the investment stage. For three dyads, it was not possible to find alternative dyads and they were therefore excluded from the analysis. For each dyad on average about nine alternative dyads existed which met all criteria. The match was chosen based on an equally distributed random number in case more than one match existed. Based on this choice-based matched sampling procedure, we were able to construct a control sample of unrealized but comparable relationships. Our controls received venture capital from a different investor and, hence, passed through a quality screening so there should not be severe quality differences between the realized dyads and the controls. Furthermore, our approach ensures that the spatial structure of the actual portfolio companies and potential investment targets, i.e. the matched sample,

are similar. Therefore, the effect of potentially omitted variables and thus endogeneity is eliminated.

[Insert Table 2 about here]

As an initial comparison between our sample of realized dyads and the control sample, we conducted two tailed Student t-tests for difference in means. We compared the means of the minimum journey time as well as other measures of spatial proximity such as car travel time and distance in kilometers. Furthermore, we analyzed differences in the syndication benefit and the minimum journey time for different subsamples. Across all variables, the difference between the two samples is significant on the 1% level (see Table 2). However, the variable minimum journey time is not normally distributed; it is left skewed because approx. 30% of dyads have a journey time under 30 minutes and, due to the flight option, it has multiple maxima. Therefore, one assumption of the Student t-test is violated and, hence, we also used Wilcoxon ranked sum test to compare the two samples. Again, the two samples are significantly different from each other across all variables.

We use logistic regressions to analyze the influence of journey time on the likelihood of a particular venture capital relationship. In our multivariate analyses, a dummy variable indicates whether a dyad was actually realized or not and it will be regressed against the journey time as well as interaction terms of the journey time with the development stage, the experience of the entrepreneur, industry factors and the investment sum. Our coefficient estimates are adjusted for rare events and choice-based sampling using a weighting procedure as proposed by King/Zeng (2001). Otherwise, the coefficients would be biased because of two reasons. First, the fraction of ones is substantially smaller than the fraction of zeros in our population as for each dyad about nine alternative relationships exist. Furthermore, the fraction of ones differs between the

sample and the population because in our sample each dyad is matched with only one other comparable dyad.

Each venture capitalist and new venture is included in our sample more than once due to multiple financing rounds and our matching approach which may lead to issues of non-independence across observations. Therefore, our analyses will be based on robust standard errors estimated without the assumption of independence across observations on the same venture capitalist because multiple inclusions are more severe for venture capitalists than for new ventures. We also adjust the coefficients for heteroskedasticity using the White method (White, 1980).

We use various interaction terms in order to test whether short journey times are particularly important for certain new ventures. In order to prevent unnecessary correlations and thus multicollinearity between the interaction terms and the original variables, the original variables were mean centered before calculating the product term. For the dummy variables seed stage, later stage and lead investor, we did not include the original variable because we already controlled for these variables in our matching procedure and, hence, the sample of realized dyads and the sample of controls do not differ in these variables.

We conducted an outlier analysis using Pregibon's Delta-Beta influence statistic and identified successively five outliers with a Delta-Beta higher than 0.5 and hence much greater than all other observations which had an average Delta-Beta of 0.015. These outliers as well as their corresponding matching dyads were excluded from the analysis in order to obtain more robust results.

5. Results

5.1. Main findings

In order to test our hypothesis, we conducted a hierarchical regression analysis and, as the first step, we only entered the minimum journey time as our main effect and the control variables in a first step (Model 1), then the moderating effects separately (Model 2, 3, 4 and 5) and finally all moderating effects (Model 6). As moderating effects, we included interaction terms of seed and later stage financing rounds, the experience of the entrepreneur, the knowledge intensity of the industry as well as the investment sum with the journey time. Table 3 shows the results and displays that we increased explanatory power through the inclusion of the moderating effects.

[Insert Table 3 about here]

The main effect, the negative relationship between journey time and the likelihood of an investment (Hypothesis 1) is supported by our analysis ($p < .01$). To illustrate the magnitude of the negative impact of journey time on the likelihood of an investment, the probability of a relationship was estimated for different types of dyads and varying distances. All independent variables in the interaction terms and all control variables were held constant at the mean of realized dyads. Based on this setting which we refer to as the mean dyad, Model 6 was used to estimate the development of the probability of a venture capital relationship with varying journey times. We define the relative likelihood of a venture capital relationship as the probability of a relationship with distance d divided by the probability of the same relationship with a distance zero (i.e. a location in the same ZIP code):

$$\text{Relative likelihood of a venture capital relationship} = \frac{\Pr(Y_0=1 \mid \beta, d)}{\Pr(Y_0=1 \mid \beta, d=0)}$$

Figure 1 illustrates the impact of journey time on the relative likelihood of a venture capital relationship and shows that the likelihood of a venture capital relationship decreases by about 33% with each triplication of the minimum travel time.

The coefficients of the interaction terms of seed and later stage with journey time are as expected with seed stage implying a stronger negative relationship and later stage a less negative relationship of journey time with the likelihood of an investment. However, in our final model both moderating effects are not significant. Hence, we can not support Hypothesis 2.a and Hypothesis 2.b. In order to show the magnitude of the identified moderating effects, Figure 2 compares the relative likelihood of a venture capital relationship for the mean dyad with dyads set as seed and later stage financing rounds. The decrease of the probability of a venture capital investment with increasing journey times is stronger for seed stage rounds and less strong for later stage rounds.

We find statistical evidence for Hypothesis 3 in our partial Model 3 ($p< .0.05$); the impact of journey time on the likelihood of a venture capital investment is less negative if the entrepreneurial team has profound prior experience. However, this relationship is not significant in our final model and we can therefore not support Hypothesis 3. Figure 3 illustrates the magnitude of the interaction effect. The relative likelihood of a venture capital investment with a three hour journey time compared to a zero journey time (both located in same ZIP code area) is 20% for the mean dyad and 34% for dyads with teams with profound prior experience.

Our results show that journey time reduces the likelihood of an investment more strongly if the new venture belongs to an industry with high asset intangibility. The interaction term of asset intangibility with journey time is, as expected, negative and in addition significant ($p < .05$), so we can support Hypothesis 4.a. The coefficients of high R&D expenses and low book to market ratio are negative and thereby indicate the

expected moderating effects also for these indicators of knowledge intensity. However, the relationships are not significant and we can therefore not support Hypothesis 4.b and Hypothesis 4.c. Ventures in industries with high R&D expenses may have other incentives to locate their business in clusters close to large cities, e.g. to be close to universities or to cooperate with each other. However, unreported regressions with split samples for different industries such as biotechnology and information technology did not reveal different results. For asset intangibility, Figure 4 illustrates the scale of the moderating effect. For ventures with high asset intangibility, the relative likelihood of a venture capital investment drops to 10% if it is located three hours away from the venture capitalist compared to being located in the same ZIP code whereas the relative likelihood of the mean dyad only drops to 20%.

The coefficients of the linear and quadratic interactions terms of the investment sum with the journey time are both significantly different from zero ($p < .01$ and $p < .05$ respectively) and point into the hypothesized direction. With an increase in the investment sum, the positive linear effect which reduces the negative impact of journey time is more and more offset by the negative quadratic effect. Hence, we find an inverted u-shaped moderating effect of the investment sum on the relationship between journey time and the likelihood of a venture capital investment and we can support Hypothesis 5. The negative impact of journey time decreases up to an investment sum of about 3.9m EUR and then becomes more negative thereafter.

5.2. Robustness checks

To confirm the robustness of our results, we conducted several additional tests. First, we tested alternative model specifications and alternative measurements of spatial proximity. We conducted rare event logistic regressions using different measures of spatial proximity such as distance in kilometers and car travel time in minutes. As the later is not available for venture capitalists on other continents, we restricted our sample

to European investors for these regressions to ensure the comparability of the models. The results remained unchanged with minor differences in the significance level of the coefficients. In addition, we conducted standard weighted logistic regressions and probit regressions as robustness check. Table 4 presents the results of probit regressions for similar models as in our rare events logistic regression analysis. Some of the coefficients in the probit regression show a higher significance level than in the rare events logistic regression (e.g. the seed stage dummy in the partial Model 2, the experience dummy in the partial Model 3 and the quadratic term in the complete Model 6), but otherwise the results remained the same.

[Insert Table 4 about here]

Furthermore, we tested our model for multicollinearity and only the control variable syndication benefit and the variable investment sum show moderately high variance inflation factors (VIFs) of 6.3 and 7.2 respectively. For the control variable syndication benefit, the moderately high VIF can be explained with the construction of the variable which includes the journey time. The VIF of the variable investment sum is due to the inclusion of both the linear as well as the quadratic term of the variable investment sum in order to portray the inverted u-shape effect. The maximum VIF of the variable investment sum drops to 1.3 and 1.4 respectively if only the linear or the quadratic term is introduced. We still conducted further regressions to validate the robustness of our results on this variable. In order to test the inverted u-shaped effect as implied by Hypothesis 5, we calculated separate regressions on two subsamples. The first subsample included all dyads with investment sums per venture capitalists lower than 3.9m EUR and the second subsample entails all other dyads. The regressions support an inverted u-shaped effect for the investment sum.

6. Discussion and conclusions

Our paper contributes to the understanding of the relevance of geographic distance between an investor and an investee in closing a financing relationship. We theorize and demonstrate empirically that spatial proximity between the new venture and the venture capitalist has an impact on the likelihood to close a venture capital financing round even in highly populated countries with a dense infrastructure like Germany. We found this impact to be severe and show that the relative likelihood to receive venture capital decreases by about one third with each triplication of the journey time. Thereby, we contradict prior interview based research on the importance of spatial proximity in the German venture capital market which argued that due to Germany's fairly small size and its well developed travel infrastructure, the geographic location of a new venture is irrelevant. In addition, venture capitalists mentioned an undersupply of attractive investment opportunities in Germany which prohibits a geographic pre-selection (Fritsch and Schilder, 2008). Two lines of arguments may explain the contradictory results. First, if venture capitalists do not intentionally focus their investment strategy on geographically close new ventures, informational problems may prevent an initial contact and the closing of a deal for more distant investments. For the initial contact, networks are important and these networks tend to be very regional. Hence, an investment within this local network is more likely than an investment in a venture which is further away. Second, the geographic location may in fact play a role in the investment decision of a venture capitalist without them being fully aware of it which would be in line with prior research showing unconscious behavior of venture capitalists in their decision making process (Shepherd and Zacharakis, 1999; Zacharakis and Meyer, 1998).

Another important finding of our study is that the investment sum per venture capitalist has a strong influence on the relationship between journey times and the likelihood of a

venture capital relationship in a curvilinear manner. The negative impact of journey time on the likelihood of an investment decreases up to a threshold of about 3.9m EUR and increases thereafter. Relative to the investment sum, the importance of transaction costs such as travel and time expenses decrease in larger deals. However, for very large investments relative to the fund size the need for closer monitoring outweighs the relatively lower transaction costs leading to investments with shorter journey times. It seems that not only informational problems lead to a geographical bias in the investment decision of venture capitalists.

Further significant influences on the relationship between spatial proximity and the likelihood of an investment were found in our study. First, long journey times reduce the likelihood of a venture capital transaction more for seed stage financing rounds and less for later stage financing rounds. Second, new ventures operating in industries with high asset intangibility are more likely to be financed by more proximate venture capitalists. These two effects are mainly caused by increased uncertainty and higher agency as well as transaction costs for very young or knowledge intensive ventures in order to evaluate, monitor and support them. Third, profound prior experience in the entrepreneurial team reduces the importance of spatial proximity for the probability of a venture capital relationship which is likely to be caused by larger networks of experienced entrepreneurs and reduced agency costs due to signaling.

Overall, our study highlights that regional aspects are still relevant despite the ongoing globalization of the economy and a nearly costless transfer of information over long distances through modern telecommunication. Furthermore, improvements in the travel infrastructure should foster investments in new ventures which are located further away. However, our results show that spatial proximity between new ventures and venture capitalists still has a strong impact on the likelihood of a venture capital investment and, thereby, we indicate that regional equity gaps may exist. Venture capitalists in Germany

are concentrated around five main clusters including Munich, Frankfurt am Main, Berlin, Hamburg and Düsseldorf. Regions which are located particularly far from these venture capital clusters include the east of Thuringia, the south of Saxony-Anhalt, the south-west of Saxony and the north-east of Mecklenburg Western-Pomerania. New ventures located in these areas could have a disadvantage in raising venture capital compared to new ventures located in regions closer to the venture capital clusters.

The following implications can be drawn from our study. First, entrepreneurs should make a conscious decision as to the location of the new venture. New ventures which are active in non-manufacturing industries are particularly flexible in selecting their location and for instance move into larger cities. Our study shows that entrepreneurs with the goal to rapidly grow their venture have an incentive to locate their venture close to venture capital clusters. This incentive should be particularly strong for new ventures in an earlier development stage, in a knowledge intensive industry, with an inexperienced entrepreneurial team or new ventures raising very small or very large investment sums.

Second, we show that the regional presence of venture capitalists is relevant in order to avoid regional equity gaps for young and innovative high potential companies. A strong local establishment of venture capitalists is likely to promote the growth of new ventures (Zook, 2002) as well as to spur innovation (Kortum and Lerner, 2000) and, hence, to enhance regional economic development (Sunley et al., 2005). The local venture capital community and the entrepreneurial ecosystem cross-fertilize each other (Samila and Sorenson, 2008). Therefore, it is not sufficient to only promote regional venture capital, but also to foster entrepreneurial activity and to establish a favorable general entrepreneurial environment including the presence of R&D institutes and universities and specialized service providers such as consultants, lawyers or deal brokers (Fogel, 2001; Venkataraman, 2004). In case of a weak local presence of venture

capitalists, a region may be trapped in a vicious circle of low supply and demand of venture capital (Martin et al., 2005). As entrepreneurs are not located in the region, motivators for other entrepreneurs are not present. So even though it is not by itself sufficient to promote the local establishment of venture capitalists, it remains a necessary factor for the development of regional high potential new ventures and, hence, economic growth. Therefore, our study further underlines that public policy should promote the presence of a local venture capital community.

Our analysis is focused on the impact of journey time on the likelihood that a venture capital relationship is formed. However, several questions still need to be further analyzed. It would be crucial to further investigate the influence of spatial proximity on the success of a venture capital relationship. It remains to be analyzed whether the survival and growth of new ventures and, thus, the performance of venture capitalists is positively related to short journey times. Potential measures of performance include employment growth, company survival or the likelihood and success of a trade sale or IPO. Further research in this area would reveal additional important implications for entrepreneurs, policy makers as well as for venture capitalists in regard to their portfolio strategies.

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Appendix

Table 1: Descriptive statistics and correlations

This table reports means, standard deviations and correlations for the variables used in our regression analysis. The sample consists of 1182 dyads of venture capitalists and German portfolio companies which have closed a financing round between January 2002 and March 2007. The correlation coefficients are based on Kendall's tau. *significant at the 5% level.

Variable	Mean	S. d.	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Journey time (ln[1+min. journey time])	4.304	1.385	1.000												
2 Dummy seed stage round	-0.023	0.358	-0.059 *	1.000											
3 Dummy later stage round	0.043	0.658	0.055 *	-0.272 *	1.000										
4 Dummy prior exec. exp.	0.444	0.497	0.007	-0.048	0.165 *	1.000									
5 Dummy high asset intang.	0.097	0.296	-0.090 *	0.066 *	-0.044	0.063 *	1.000								
6 Dummy high R&D intensity	0.141	0.348	0.050 *	-0.039	-0.018	0.107 *	-0.133 *	1.000							
7 Dummy low book/market	0.107	0.309	0.015	0.025	0.148 *	0.089 *	-0.067 *	-0.140 *	1.000						
8 Inv. sum per VC	1.661	1.459	0.149 *	-0.169 *	-0.003	0.246 *	-0.049 *	0.067 *	0.086 *	1.000					
9 Dummy lead investor	0.333	0.472	-0.021	0.044	-0.176 *	-0.101 *	0.040	-0.040	-0.047	0.014	1.000				
10 Syndication benefit	14.532	56.117	0.361 *	-0.037	0.118 *	0.153 *	-0.034	0.108 *	0.117 *	0.101 *	-0.238 *	1.000			
11 Ln(Ger. VC fundraising (t-1))	7.037	0.588	-0.024	0.063 *	-0.043	-0.066 *	0.126 *	0.040	-0.107 *	-0.038	0.043	-0.044	1.000		
12 Ln(Ger. VC investments)	6.961	0.239	-0.004	0.013	-0.035	-0.121 *	0.023	0.033	-0.145 *	-0.065 *	0.014	-0.020	0.376 *	1.000	
13 Return of MSCI SC Ger. (ltm)	0.089	0.329	0.034	-0.020	0.049 *	0.044	-0.108 *	-0.057 *	0.170 *	0.015	0.009	0.028	-0.500 *	-0.236 *	1.000

Table 2: Comparison of the sample of realized dyads and the control sample

This table reports means, standard deviations, sample sizes, t-statistics and z-statistics for the sample of 1182 realized dyads and control dyads of venture capitalists and German new ventures. The significance levels of the z-statistic are based on two-tailed Wilcoxon rank sum tests. The samples based on journey time by car exclude dyads with a venture capitalist located outside of Europe. *significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-sided).

	Mean		Standard deviation				
	Realized dyads	Control dyads	Realized dyads	Control dyads	N	T-statistic	Z-statistic
Minimum journey time in minutes	138	170	136	137	1182	5.794 ***	7.624 ***
Journey time by car in minutes	168	213	166	169	1156	6.452 ***	8.109 ***
Distance in kilometers	454	543	1162	1155	1182	1.878 *	7.883 ***
Syndication benefit	15	20	63	56	1182	2.152 **	9.715 ***
Minimum journey time in minutes subsamples:							
Seed round	90	178	71	86	33	4.541 ***	3.695 ***
First round	128	170	132	130	297	3.839 ***	4.978 ***
Later round	143	170	139	140	852	4.029 ***	5.272 ***
High asset intangibility	108	180	174	134	115	3.490 ***	4.499 ***
Moderate to low asset intangibility	141	169	131	137	1067	4.875 ***	6.551 ***
High R&D intensity	166	189	146	187	167	1.196	2.429 **
Moderate to low R&D intensity	133	168	134	126	1015	5.958 ***	7.196 ***
Low book/market ratio	154	189	159	167	126	1.672 *	2.760 ***
Moderate to high book/market ratio	136	168	133	132	1056	5.593 ***	7.114 ***
Non-experienced entrepreneurial team	130	171	130	110	657	6.248 ***	6.471 ***
Experienced entrepreneurial team	148	169	143	163	525	2.233 **	4.337 ***
Lead-investors	127	169	101	107	394	5.663 ***	5.727 ***
Co-investors	144	171	150	149	788	3.678 ***	5.297 ***

Table 3: Rare event logistic regressions

This table presents the results of rare event logistic regressions. The dependent variable is a dummy variable which is 1 for realized venture capital relationships and 0 for unrealized relationships. The sample consists of 1182 dyads of venture capitalists and German portfolio companies which have closed a financing round between January 2002 and March 2007 and a matched control sample of 1182 dyads. Five outliers were excluded pair wise. Coefficients and standard errors are adjusted for rare events, choice-based sampling, heteroskedasticity and non-independence across venture capitalists. *significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-sided).

Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Dep. var.: realized dyad (yes/no)						
Indep. variables						
Journey time (ln[1+min. journey time])	-0.2999 ***	-0.2986 ***	-0.3076 ***	-0.2976 ***	-0.3082 ***	-0.3139 ***
Dummy seed stage round × journ. time		-0.5600 *				-0.3637
Dummy later stage round × journ. time		0.0920				0.0919
Dummy prior exec. exp. × journ. time			0.1490 *			0.0978
Dummy prior exec. exp.			-0.0296			-0.1134
Dummy high asset intang. × journ. time				-0.2440 **		-0.2346 **
Dummy high asset intang.				-0.1194		-0.0817
Dummy high R&D intensity × journ. time				-0.1414		-0.1391
Dummy high R&D intensity				0.1155		0.1296
Dummy low book/market × journ. time				-0.1365		-0.1622
Dummy low book/market				0.1121		0.0744
Inv. sum per VC × journ. time					0.2373 ***	0.1949 ***
(Inv. sum per VC)² × journ. time					-0.0307 ***	-0.0263 **
Inv. sum per VC					0.0434	0.0616
(Inv. sum per VC)²					0.0052	0.0036
Control variables						
Dummy lead-investor × journ. time	-0.1714 **	-0.1386 *	-0.1460 **	-0.1738 **	-0.1536 **	-0.1175
Syndication benefit × journ. time	0.0013	0.0012	0.0014	0.0014	0.0011	0.0012
Syndication benefit	-0.0018	-0.0017	-0.0020	-0.0019	-0.0018	-0.0018
Ln(Ger. VC fundraising (t-1))	-0.0477	-0.0566	-0.0512	-0.0499	-0.0525	-0.0624
Ln(Ger. VC investments)	0.0455	0.0391	0.0322	0.0888	0.0318	0.0513
Return of MSCI SC Ger. (ltm)	-0.1672	-0.1742	-0.1602	-0.2021	-0.1914	-0.2055
Constant	-0.8263	-0.7243	-0.6569	-1.1369	-0.7661	-0.7871
N	2364	2364	2364	2364	2364	2364
Log. Likelihood	-733	-731	-732	-732	-729	-725
LR Chi²	33.86 ***	38.66 ***	35.77 ***	37.08 ***	42.62 ***	49.72 ***

Table 4: Probit regressions

This table presents the results of probit regressions. The dependent variable is a dummy variable which is 1 for realized venture capital relationships and 0 for unrealized relationships. The sample consists of 1182 dyads of venture capitalists and German portfolio companies which have closed a financing round between January 2002 and March 2007 and a matched control sample of 1182 dyads. Five outliers were excluded pair wise. Coefficients and standard errors are adjusted for heteroskedasticity and non-independence across venture capitalists. *significant at the 10% level; **significant at the 5% level; ***significant at the 1% level (two-sided).

Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Dep. var.: realized dyad (yes/no)						
Indep. variables						
Journey time (ln[1+min. journey time])	-0.1749 ***	-0.1781 ***	-0.1814 ***	-0.1729 ***	-0.1848 ***	-0.1929 ***
Dummy seed stage round × journ. time		-0.3971 **				-0.2768
Dummy later stage round × journ. time		0.0536				0.0652
Dummy prior exec. exp. × journ. time			0.0920 **			0.0547
Dummy prior exec. exp.			-0.0156			-0.0620
Dummy high asset intang. × journ. time				-0.1379 **		-0.1320 **
Dummy high asset intang.				-0.0612		-0.0487
Dummy high R&D intensity × journ. time				-0.0617		-0.0767
Dummy high R&D intensity				0.0704		0.0697
Dummy low book/market × journ. time				-0.0588		-0.0865
Dummy low book/market				0.0743		0.0513
Inv. sum per VC × journ. time					0.1534 ***	0.1331 ***
(Inv. sum per VC)² × journ. time					-0.0208 ***	-0.0186 ***
Inv. sum per VC					0.0214	0.0336
(Inv. sum per VC)²					0.0049	0.0033
Control variables						
Dummy lead-investor × journ. time	-0.1019 **	-0.0835 *	-0.0859 **	-0.1060 **	-0.0933 **	-0.0713
Syndication benefit × journ. time	0.0009	0.0008	0.0009	0.0009	0.0007	0.0007
Syndication benefit	-0.0013	-0.0012	-0.0014	-0.0014	-0.0012	-0.0011
Ln(Ger. VC fundraising (t-1))	-0.0354	-0.0384	-0.0357	-0.0367	-0.0358	-0.0393
Ln(Ger. VC investments)	0.0437	0.0407	0.0374	0.0652	0.0480	0.0525
Return of MSCI SC Ger. (ltm)	-0.0927	-0.0972	-0.0879	-0.1131	-0.1031	-0.1142
Constant	0.7580 *	0.8140 **	0.8425 **	0.5979	0.7108 *	0.7486 *
N	2364	2364	2364	2364	2364	2364
Log. Likelihood	-1600	-1600	-1600	-1600	-1600	-1600
Chi²	54.67	60.75	54.71	73.13	69.68	100.33

Figure 1: Impact of journey time on the likelihood of investment

The figure was produced by using the coefficients from Model 6 to calculate the relative likelihood of a venture capital relationship across the range of journey times on the x-axis. All other variables were held constant at mean values.

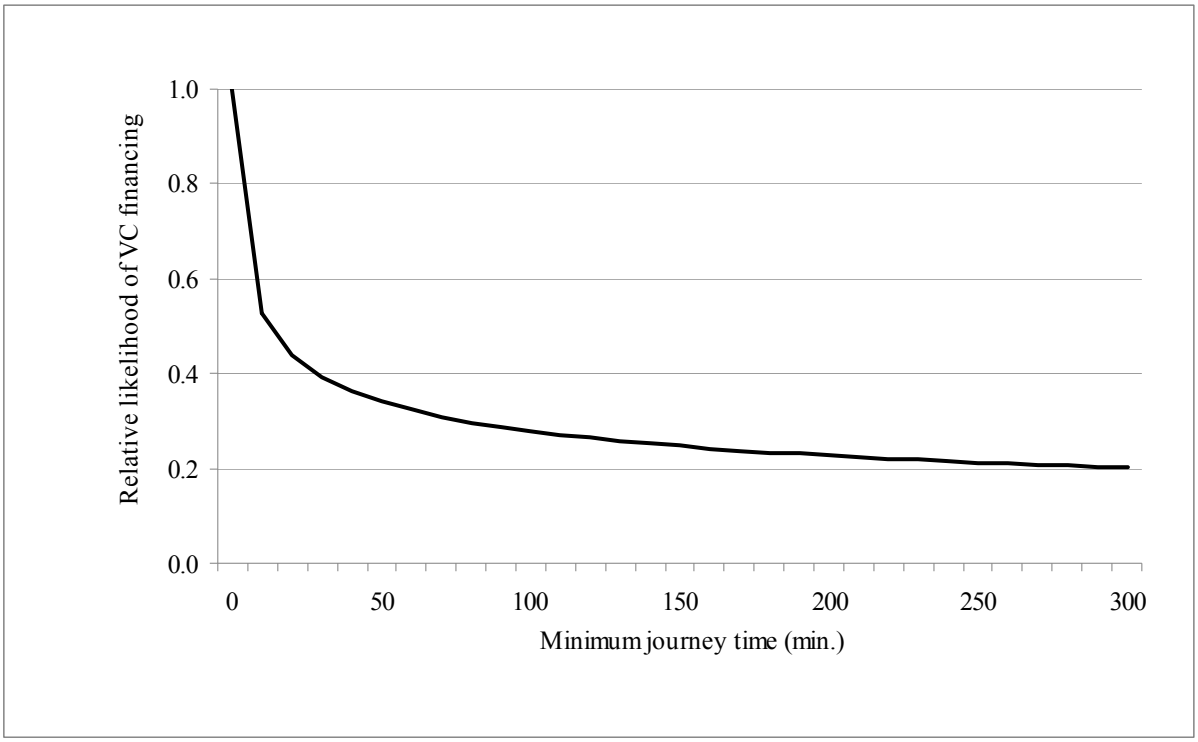

Figure 2: Moderating effect of the new venture's development stage

The figure was produced by using the coefficients from Model 6 to calculate the relative likelihood of a venture capital relationship across the range of journey times on the x-axis for the mean dyad and for seed as well as later stage financing rounds.

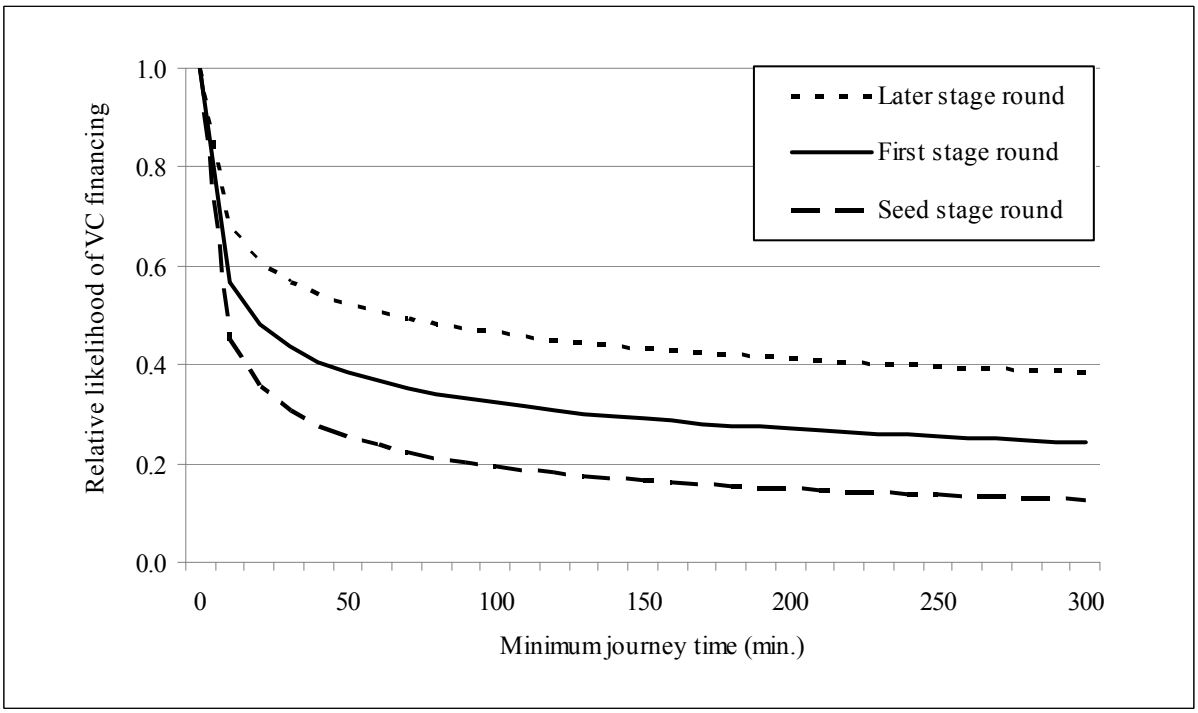

Figure 3: Moderating effect of the experience of the entrepreneurial team

The figure was produced by using the coefficients from Model 6 to calculate the relative likelihood of a venture capital relationship across the range of journey times on the x-axis for the mean dyad and for new ventures with an experienced entrepreneurial team (ET).

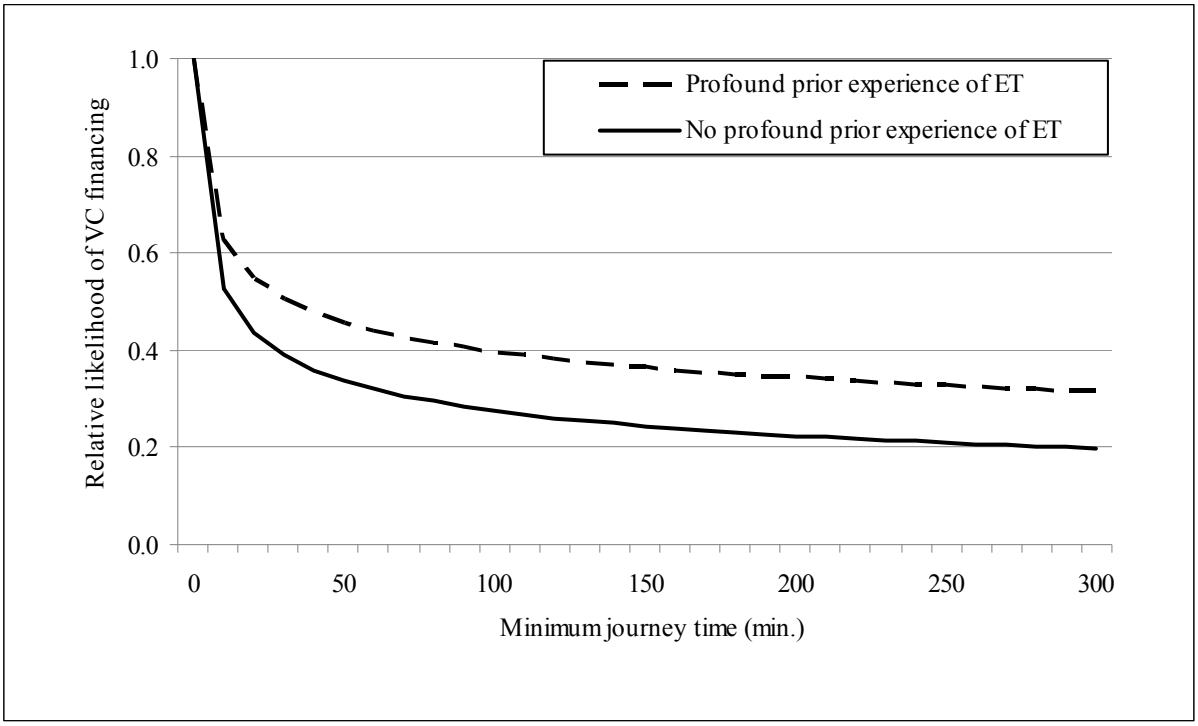

Figure 4: Moderating effect of high asset intangibility

The figure was produced by using the coefficients from Model 6 to calculate the relative likelihood of a venture capital relationship across the range of journey times on the x-axis for the mean dyad and for new ventures operating in an industry with high asset intangibility.

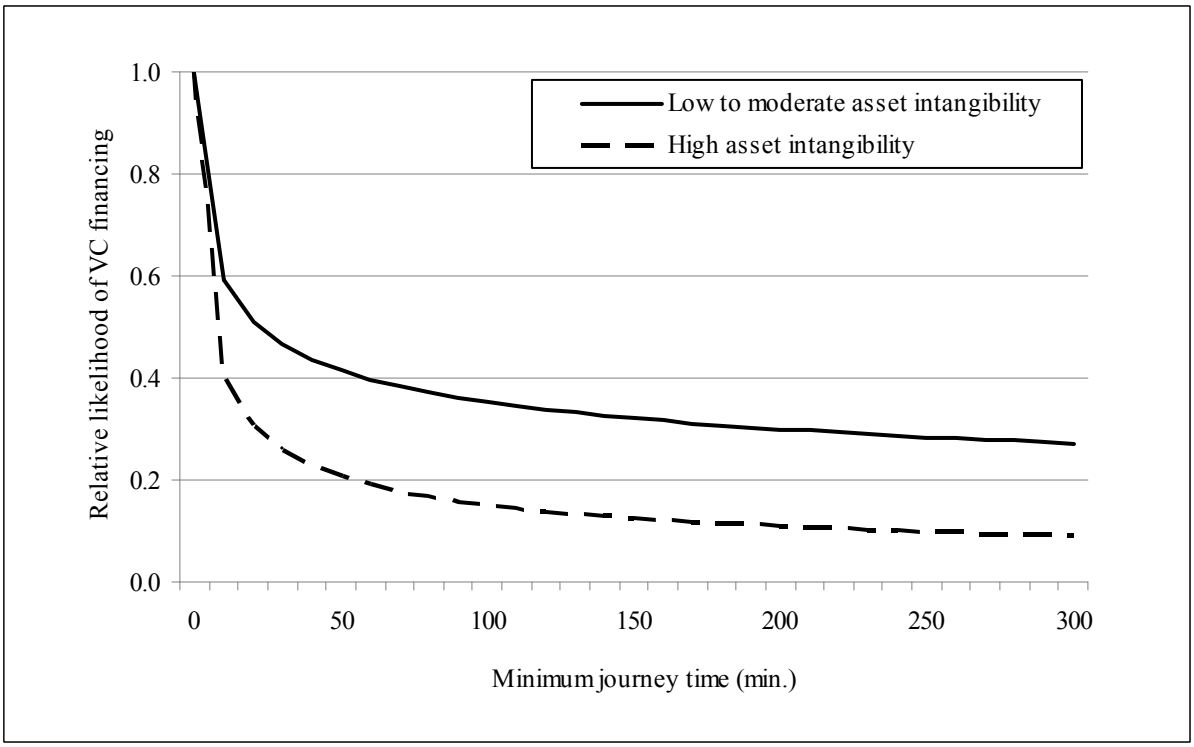

Figure 5: Moderating effect of investment sum per venture capitalist

The figure was produced by using the coefficients from Model 6 to calculate the relative likelihood of a venture capital relationship across the range of journey times on the x-axis for the mean dyad and for different investment sums per venture capitalist.