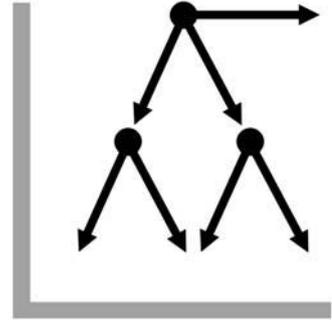


**DISCUSSION PAPER  
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**Trust, Competence Ties and Partner Selection  
in Venture Capitalists Networks**

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# Trust, Competence Ties and Partner Selection in Venture Capitalists Networks

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## Abstract:

This paper analyses the factors impacting partnering decisions in Venture Capital syndicates using a unique dataset of 2,373 VC transactions in Germany. By including time varying information about industry experience and cooperation patterns we explicitly take into account not only the changing social context for partner selection but also the dynamic nature of financial and managerial resources of VCs. The data suggests strong evidence that lead investors try to access additional industry experience that allows the provision of higher quality managerial advice to the funded entrepreneur. Moreover, we find strong evidence that information sharing and goodwill as well as competence trust can create a foundation for future cooperation. The data indicates that the chances to participate in a newly formed syndicate rise significantly for a potential partner VC when previous direct ties are present with the current lead investor.

*JEL classification:* G24; G31

**Keywords:** Venture Capital, Syndication, Social Network Theory

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# **Trust, Competence Ties and Partner Selection in Venture Capitalists Networks**

## **1. Introduction**

The syndication of Venture Capital (VC) involves a social exchange between partner venture capitalists (VCs) that engage jointly in the financing of promising growth companies. While recent research has analyzed the syndication of VC along several dimensions, the literature has abstained from answering which factors impact partner selection in VC syndicates. The decision whom to invite to participate in VC transactions lies at the heart of understanding why syndication might add value to the funded firm. As VCs are mutually dependent on each other when investing jointly it is of importance to select the “right” partner in order to benefit not only from a second opinion in the selection process but also from the value added of additional expertise in guiding the management of the funded firm.

The social relationship between the VCs is characterized by uncertainty over the prospects of the funded venture and considerable time and effort put in by the VCs to guide and advice the funded entrepreneur. However, actions of partner VCs are hard and costly to observe for the lead investor so that monitoring might increase the costs of cooperation in a syndicate. Hence, there are considerable ways in which VCs can benefit from each other (in terms of sharing financial and managerial resources) or might be tempted to engage in self-interest to appropriate knowledge that could lead to mutual harm. While protection from opportunism could be achieved through monitoring the partner, these formal control mechanisms make collaboration costly. Nevertheless, previously established relationships can help to overcome information asymmetries and the embeddedness in the overall VC network can assist in conveying information about potential partners in terms of their behavioural opportunities and constraints (Granovetter (1994); Hanneman (2005)). VCs therefore rely on social exchanges characterized by mutual trust and cooperative behavior. In order to overcome the “shadow of the future” (Axelrod (1984)) using information about likely partners and their corresponding behavior facilitates the choice of “deal mates”.

We analyze the partnering decision in VC syndicates using a unique sample of 2,373 Venture Capital transactions in Germany. The underlying units of analysis are the syndicates of VCs formed during the period of 1995 – 2005. We address the questions which partner VC(s) the lead investor chooses and which characteristics of the potential partner influence the

likelihood of collaboration. We find strong evidence that lead investors try to access new managerial resources (investment experience within the transaction-relevant industry) and knowledge through inter-firm collaboration to develop competitive capabilities (the ability to better screen business proposals and offer a higher quality of advice to the funded entrepreneur). By including time varying information about experience gained within industries and financial resources we explicitly take into account not only the changing social context of partner selection but also the dynamic nature of VC resources and capabilities. The results indicate that existing resources and partner capabilities guide cooperation patterns in the quest for future competencies. We find that lead investors team up with partners that accumulated more experience of investing within the industry the current funded firm is active in, thereby profiting from combining investment expertise. Combining experience through syndication can present an enhanced opportunity for learning and developing new capabilities (for example expertise in the underlying technology can be combined with valuable knowledge in selling and marketing products for commercialization, and can thus present an opportunity to offer better advice to the entrepreneur) and could eventually explain the higher long-run performance observed empirically (see among others Brander et al. (2002) and Hochberg et al. (2007)).

Moreover, we find that previous relationships affect the likelihood of collaboration positively. VCs that worked together over the past years are more likely to enter a new relationship for a given transaction. The results suggest that previous information sharing and established trust can create a foundation for future cooperation. When parties find it very costly to evaluate accurately the quality of resources that partners can bring to the table, signaling of goodwill trust can be valuable to overcome the problem of asymmetric information. Having a previous relationship with a potential partner transfers expectations from earlier collaborations and reduces the costs of asymmetric information. Previous joint investment experience can create effective work and decision routines and built up trust among the involved parties. As the behavior of VCs operating in a syndicate is hardly contractible, goodwill trust plays an important role to signal non-opportunistic behavior. This way, trustworthiness creates value by substituting for more costly governance of the interpersonal exchange. The results indicate that the chances of being invited to participate in a newly formed syndicate for a given transaction rise significantly when previous direct ties are present between the current lead investor and the potential partner VC. Being able to team up with partners repeatedly over time grants access not only to valuable intangible resources such as investment skills and

management capabilities but also allows for sourcing of a constant deal flow and could eventually result in higher returns for better connected VCs as documented in Hochberg et al. (2006). The results therefore find support for the view of Barney and Hansen (1994) who argue that trustworthiness can be a source of competitive advantage if it allows firms to implement valuable strategies that other firms cannot conceive.

In this vein, our results also stress the importance of considering network resources in determining the potential for sustainable competitive advantages. Our findings document that existing ties are idiosyncratic in nature and akin to specific VCs that can call upon future resources based on previous relationships. In fact, we can infer that the quest for resources guides future cooperation patterns and existing ties influence the formation of syndicates in VC financing positively. Hence, the existing repository of proprietary resources (the knowledge and expertise exclusively available to a corresponding VC) and partnerships, lays the ground for future cooperation and simultaneously poses constraints on whom to invite (Lavie (2006)). Given the high returns for well-networked VCs enhancing one's network position could present a vital strategic consideration for an incumbent VC (Hochberg et al. (2006)). As our results indicate, being able to syndicate with a larger number of new partners improves the position of a VC substantially, raising the probability to be invited to other profitable deals in the future. VCs therefore can benefit from having a wide range of relationships within the industry, especially if the relationship involves other VCs with a central network position. Accordingly, better networked VCs have more margins to maneuver when in need for additional resources to manage future challenges. Network resources (the skills and expertise of previous partner VCs) conveyed through embedded ties could be an important source for variation in competitiveness. The idiosyncrasy of embedded ties aggravates the level of VC heterogeneity and - given the fact that the ties develop over time and are relatively immobile - can make the strategic position of a VC inimitable and could eventually represent a sustainable source of competitive advantage if VCs can call upon partner skills to more effectively manage future transactions.

The remainder of the paper is structured as follows. Chapter 2 introduces the theoretical background and develops the hypotheses. In chapter 3 we introduce the data set, the variables used and the methodology. Chapter 4 presents the regression results and Chapter 5 concludes.

## **2. Theoretical Background and Hypotheses**

According to Gompers and Lerner (2002) VCs invest in high-technology firms with uncertain growth prospects and a distinct reliance on intangible assets. Consequently, VCs employ specialized knowledge to overcome information asymmetries and employ sophisticated checks and balances to deal with opportunities of self-interested behavior of the funded entrepreneur. Among the multitude of business proposals received only a few transactions are chosen to be funded. In addition, VCs strive actively to add value to the financed firms and use their expertise to provide valuable advice and to even interfere with business operations, at a stretch even replacing the founder entrepreneurs (Cumming and Johan (2007)). Accordingly, the advice offered might be as important as the capital contributed.

As current and desired competencies form the basis of value creation in the VC market, strategic actions of the VCs are characterized by new opportunities and the corresponding competencies to master them. Related work on resource dependency argues that VCs are likely to lack (at least to some extent) potential resources (technological or investment expertise) that are needed to achieve long-term competitive advantages. Accordingly, inter-organizational relationships (syndicates) can create value by allowing VCs to combine resources and to share knowledge. While internal VC resources are key to acquiring and sustaining competitive advantages, the lack thereof leads to alternative routes of generating and accessing knowledge to prosper (Pfeffer and Salancik (1978); Barney (1991)). Despite their own effort to create competitive advantages (the ability to earn above normal economic rents through the exploitation of capabilities) VCs can do so via participation in ongoing networks of partnerships and exchanges, thereby gaining access to valuable resources of partners that might aid in the management of financed transactions (Harrison et al. (2001); Rumelt (1984); McEvily and Marcus (2005); Larson (1992)).

Unfortunately, the syndication of VC might come at a cost. Despite its popularity and the acclaimed benefits, many inter-firm alliances fail to meet expectations. Inter-firm relationships appear to be a fragile construct. The joint financing of transactions might give incentives for VCs to free ride on the information acquisition and effort of the partner. Similarly to the information asymmetry that VCs face when choosing promising ventures they likewise face problems when deciding on partners with whom they might work on potential deals. Moreover, appropriation concerns might play a significant role when deciding with

which partner to collaborate. Hence, despite the possible lack of resources many firms might not enter into inter-firm relationships, as the potential risks associated with partner selection do not outweigh the benefits of getting access to new knowledge (Barringer and Harrison (2000)).

In general, “syndicate contracts” remain incomplete; it is either not possible or prohibitively expensive to include all possibly relevant aspects into the contract. Accordingly, the remaining unforeseeable contingencies together with residual uncertainty about a partner’s behaviour leave room for trust (cf. Noteboom (2002), p. 41) as means to facilitate mutually beneficial VC syndicates. Trusting a partner reduces transaction costs associated with screening potential partners and eventually creating a foundation for future cooperation (Podolny (1994); Uzzi and Gillespie (1999)).<sup>3</sup>

Concerning the genesis and evolution of trust between partners Boersma et al. (2003) suggest a process model of inter-firm trust development. They apply the distinction between three dimensions of trust by Sako (1992). Following Sako (1992), trust may arise from formal agreements (promissory trust), from other party’s expected competence (competence trust), and from the expectations that the other party will not behave opportunistically (goodwill trust). Based on this distinction we define trust in VC relationships as follows: Trust is the expectation of a lead VC that a (potential) VC partner will meet contractual obligations, will be competent enough to perform adequately, and will not behave opportunistically.<sup>4</sup> The process of trust development runs through three distinct stages:<sup>5</sup>

- *Stage 1*: Previous history generates promissory (P), goodwill (G) and competence (C) trust and influences negotiation stance.
- *Stage 2*: Negotiations and commitment generate P- and G-trust and lead to agreement.
- *Stage 3*: Execution stage generates G- and C-trust, entails know-how transfer and leads to output.

In all stages trust can or will be generated. A notable difference though to the process model by Boersma et al. (2003) is in stage 3 (stage 4 in their model). We argue that a transfer of

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<sup>3</sup> Such a cooperation based on mutual trust may gain competitive advantage over others because implementation of valuable strategies can well depend on trust (Barney and Hansen (1994)).

<sup>4</sup> The definition is similar to Boersma et al. (2003, p. 1032) and stresses the link between trust and complexity reduction or predictability (Luhmann (1979)).

<sup>5</sup> Cf. Boersma et al. (2003, p.1032)

know-how from one partner to the other(s) occurs during execution stage because of close and intense interaction between partners.<sup>6</sup> On the benefit side it may lead to a faster development of trust (in all stages). However, the flip side could be risking its own competitive advantage because the partner(s) might learn enough to renounce co-operation in the future. Therefore, instead of searching for a partner in the relational network, a lead VC would search for a more distant partner in the structural network.

Evidence for the validity of the trust formation process is provided by the study of Boersma et al. (2003). Therefore we take this as given and focus on the impact of trust formation on partner selection. Here we concentrate on goodwill trust and competence trust. Although arbitrarily sophisticated “syndicate contracts” may be devised and promissory trust could become a far from negligible aspect<sup>7</sup>, our concern relates more to unforeseeable contingencies involved in (jointly) funding high-technology firms. Due to the pronounced uncertainty in the VC business, unanticipated situations or circumstances are likely to occur frequently. Then goodwill trust and competence trust will be decisive to overcome possible difficulties. From each partner’s perspective these unforeseeable circumstances bear inherent risks: relational risk and performance risks. Following Das and Teng (1996; 2001), relational risk describes the jeopardy of opportunistic behavior while performance risk is identified as the probability that partnership objectives cannot be realized despite absence of opportunistic behavior. Performance risk derives from, among others, the uncertainty of the partner’s ability to perform satisfactorily. When selecting partners, the lead VC takes both types of risk into account. As Das and Teng (2001) argue, goodwill trust reduces the perceived relational risk and competence trust reduces the perceived performance risk. Lower perceived risks related to a potential partner increase the expected gains to be generated in a syndicate with that partner.<sup>8</sup> Hence the likelihood increases that this particular partner is selected. The arguments highlight the crucial role trust plays in the partner selection process. Our model of trust and its impact on partner selection is summarized in figure 1.

[Insert figure 1 about here.]

In light of the above considerations the right partnering decision is vital for the success of a VC syndicate. A lead VC might consider the following properties of potential partners:

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<sup>6</sup> Boersma et al. (2003) model a trust development process for international joint venture relationships. Here the interaction is likely to be not as close and intense as between VC firms and the former joint ventures do not occur as often as VC syndications.

<sup>7</sup> Even simple contracts in that respect would not void the default risk.

<sup>8</sup> Since trust does not affect objective risks, risk refers to perceived risk. (Das and Teng (2001), p. 254)

- Competence levels in different areas (industries) / available resources
- History of syndicating activity
- Network position (if a member)

*Competence Level:*

The competency to guide managerial actions is vital in achieving and sustaining competitive advantages in VC financing. The inherent resources and investment experience of VCs form the basis for strategic value creation and address corresponding demands of entrepreneurs. In fact, better resources allow VCs to provide better advice and/or better screen business proposals to generate superior long-term returns for fund shareholders (Brander et al., 2002, Lerner, 1994). Investment experience within a particular industry yields valuable insights into structuring deals and advising the funded entrepreneur and henceforth lies at the heart of understanding how resources shape the competitive advantage in entrepreneurial financing.

As a matter of fact, the expectation of prospective competencies that could enhance value creation when jointly advising entrepreneurs or making investment decisions, creates competence trust. This trust decreases the perceived performance risk of a deal (Das and Teng (2001)) and thereby it increases the chances for cooperation among a lead VC and potential partners. Hence, we argue that the experience potential partners have gained within a transaction-relevant industry (possibly in excess of the lead investors existing knowledge) should be positively related to the likelihood of being chosen as a syndicate member. We therefore formulate the following hypothesis:

*Hypothesis 1:* More investment experience of the potential partner (within the given transaction-relevant industry) generates competence trust and increases the likelihood of collaboration with the given lead VC.

*History of syndicating activity:*

The history of syndicating activity consists of the number of VC syndicates joined, partners in these syndicates and the industry of the funded entrepreneur; and basically determines the network position of a VC. Previously established relationships can help to overcome information asymmetries and the embeddedness in the overall VC network can assist in conveying information about potential partners in terms of their behavioral opportunities and

constraints (Hanneman (2005); Granovetter (1994)). (Social) ties between VCs can either be of a direct nature when firms know each other from past joint investment activity or through indirect relationships when they share common partner VCs.

Previous syndication behavior determines whether direct ties among VCs exist which could be benefitted from when jointly financing a new venture. If they exist, a lead VC searches for partners within the relational network. After the partner selection decision, negotiation and commitment generate both promissory and goodwill trust while the execution stage leads to goodwill trust and competence trust. The outcome will then feed back into the network. The same occurs if no direct ties exist, the search strategy would, however, be broader. In case an additional exchange would bring the know-how transfer to a critical level, potential partners will be searched for in the structural network, e.g. VCs that worked with one's direct ties in the past. Again, expectations of goodwill and competence trust would determine whether cooperation actually materializes.

#### *The Influence of Direct Ties and Competence Ties on Partner Selection*

Direct ties result from previous exchanges between partners. They went through the process of trust development described above at least once and hence – in case of a successful exchange – they have built trust (beyond initial levels). In this vein, Gulati (1995) argues that previous relationships among firms create trust that might affect future actions. He finds that trust affects governance structures chosen and alleviates the fear of opportunistic behavior. Given the repeated nature of firm relationships trust can be built up in that process incrementally and can substitute for formal governance mechanisms to the benefit of all partners.

Following Podolny (1994), direct ties can resolve uncertainty over future exchange partners and attenuate information asymmetries. Direct ties turn a transaction from purely economic behavior to a social relationship governed by fairness and equity (Uzzi (1996); Granovetter (1985)). Moreover, repeated relationships likely transfer expectations about the partner's behavior from a prior deal to the new transaction. In this way, a social relationship can motivate both parties to behave in a fair and trusting manner toward each other (Gulati (1995b)). Partners might regard a transaction as a situation of mutual gain rather than of self-interest. Accordingly, we formulate the following hypothesis:

*Hypothesis 2a:* Direct ties between the lead VC and a potential partner generate goodwill trust and increase the likelihood of collaboration with the given lead VC.

In light of hypothesis 1, a lead VC clearly faces a trade-off when selecting partners. Assume there are more prior exchanges with partner A than with B, but B possesses a competency needed for a venture which A does not. Then the lead VC trades-off higher goodwill trust in A with higher competence trust in B; or, following Das and Teng (2001), between reduced relational risk when cooperating with A and reduced performance risk when cooperating with B. As a matter of fact, lead VCs might have to compromise over direct ties and relevant industry experience.

Given that the partnering decision by the lead VC should take into account which resources are needed for a venture proposal, *competence ties* may be better predictors of collaboration and could bridge the aforementioned trade-off. We define a competence tie as a (direct) tie from previous exchanges such that the potential partner contributes a transaction-relevant competency which the lead VC lacks (a direct with tie with industry experience); and simple direct ties are those where no such complementarity in competency exists (a previous contact with industry experience in a different domain). Accordingly, the existence of both, goodwill and competence trust should alleviate concerns about the expected partner behavior and cooperation could be more easily achieved. Hence we hypothesize:

*Hypothesis 2b:* Competence ties between the lead VC and a potential partner generate competence trust and goodwill trust and increase the likelihood of collaboration with the given lead VC.

#### *The Influence of Indirect Ties and Competence Ties on Partner Selection*

Networks of relationships can convey valuable access to timely and reliable information about the trustworthiness and quality of a potential partner through indirect social ties. The network provides not only information about expected behavior but also allows VCs to obtain non-public information through their partners more easily. Uzzi (1996) suggests that expectations about the behavior of potential partners are simply transferred from past relationships with other partners. Referrals from other direct partners could therefore reduce potential hesitation to choose a new VC to work with. Hence, the constituency of inter-firm relationships can yield insights into future patterns of transactions and the corresponding partner involvement.

Shane and Cable (2002) point out the role that indirect ties might play in reducing the costs of information acquisition, as established social relationships can constitute valuable information channels. The social structure that firms are embedded in allows for meaningful inferences about specific capabilities and reliability of potential partners (Gulati (1995b)). In this way, information conveyed by the status of a VC within the social network might substitute for previous direct ties by generating goodwill trust as well as competence trust in potential partners. The relational network (direct ties) provides knowledge about current and prior syndication partners, while the structural network that VCs are embedded in provides information about potential partners based on experience of prior partners, their partners, etc. It reduces uncertainty over their expected capabilities and behaviour and therefore incorporates higher order effects of cooperation within the network. This leads to the following hypothesis:

*Hypothesis 3a:* A more central position in the VC network of the potential partner generates goodwill trust and increases the likelihood of collaboration with the given lead VC.

Again taking up arguments on resource dependency we conjecture that, as for the case of direct ties, indirect competence ties (direct ties of previous partners with transaction-relevant industry experience) may be a predictor of collaboration and lead VCs can bridge the trade-off between goodwill and competence trust. We formulate the following hypothesis:

*Hypothesis 3b:* Indirect competence ties to potential partners generate competence trust and goodwill trust and increase the likelihood of collaboration with the given lead VC.

### **3. Data and Methodology**

#### **a. Dataset and Summary Statistics**

The sample consists of 2,373 Venture Capital transactions in Germany within the period 1995 - 2005. The number of total financing events (2,373) comprises capital injections of 447 VCs that are subsequently made over different stages (Start Up, Early Stage and Late Stage) into 964 firms. On average a funded firm thus goes through 2.2 rounds of financing. The transactions were compiled by using public sources and the Thomson Venture Economics (TVE) Database. We identified the involved parties in each transaction and the corresponding

information on the VCs along with the funded firms. The result is a deal survey exhibiting who funded a new company and was joined by which partner. Moreover, we collected information about each financing round. As such, we identify which VC made an investment into a target firm at which point in time. In addition we supplemented the database with information regarding the VCs and the funded firms, along with information specific on the actual deal. The analysis is made on the basis of investment rounds as indicated through Thomson Venture Economics. A distinction between milestone and round financing cannot be observed.<sup>9</sup>

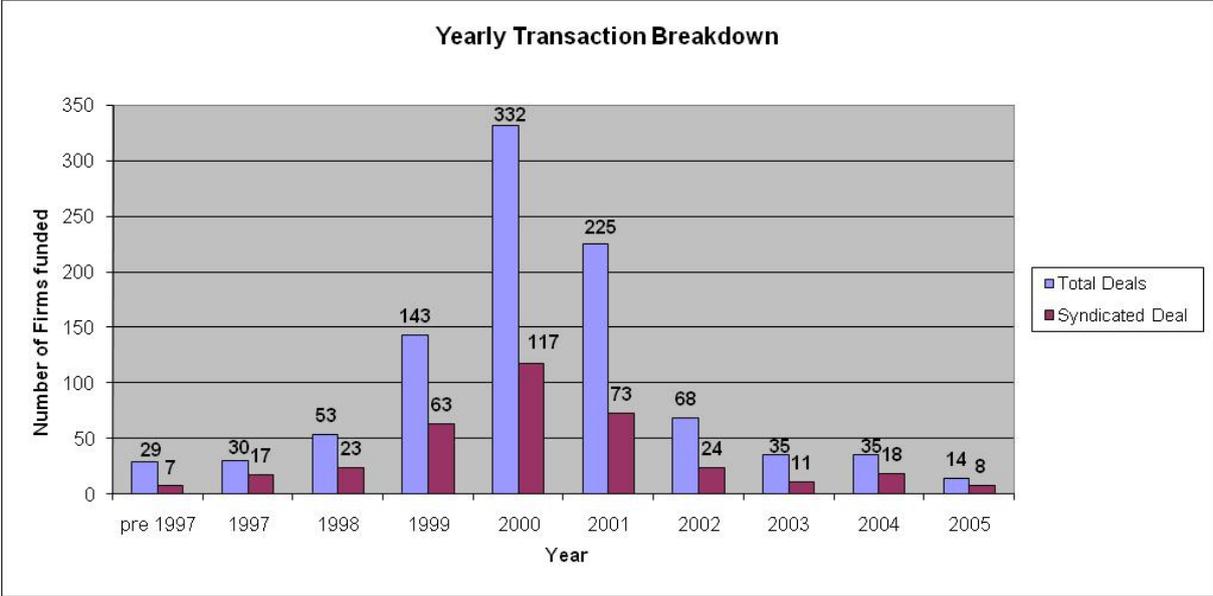


Figure 2: Yearly transaction breakdown by number of total and syndicated transactions

Figure 2 shows the yearly breakdown of transactions that took place during the period of investigation. One can infer from the figure that the years 1998 until 2000 have seen an increasing amount of transactions with the peak in 2000 (a total of 332 transactions, thereof 117 financed by a syndicate), with a steady decline thereafter. The year 2001 saw the second highest number of transactions with a total of 225. With respect to the patterns of syndication one can infer that (on a relative scale) syndication seems to be higher in years with fewer deals. During the years 1999 and 2000 about a third of all transactions was financed by a group of VCs; the percentage is around 40% and 50% in most of the years prior and following that period. Inferences made in this paper about the partner selection behavior focus on the syndicated deals as the underlying unit of analysis. However, in order to account for

<sup>9</sup> Gompers and Lerner (2002) study the completeness of the TVE database and argue that most VC investments are contained and that those missing are among the less significant ones. The studied sample therefore is unlikely to suffer from a sample selection bias by focusing on TVE data.

experience gathered by VCs on independently financed transactions some of the measures introduced later on will also take into consideration the transactions that were financed by a single VC.

To calculate measures of investment experience acquired by the VCs we included information on the industries that funded firms are active in. This also allows for an analysis of the acquisition of resources motive by considering the industry of the underlying transaction and the knowledge acquired by the VCs in previous transactions. Figure 3 gives an overview on the various industries included in the sample and the corresponding distribution of total and syndicated transactions.

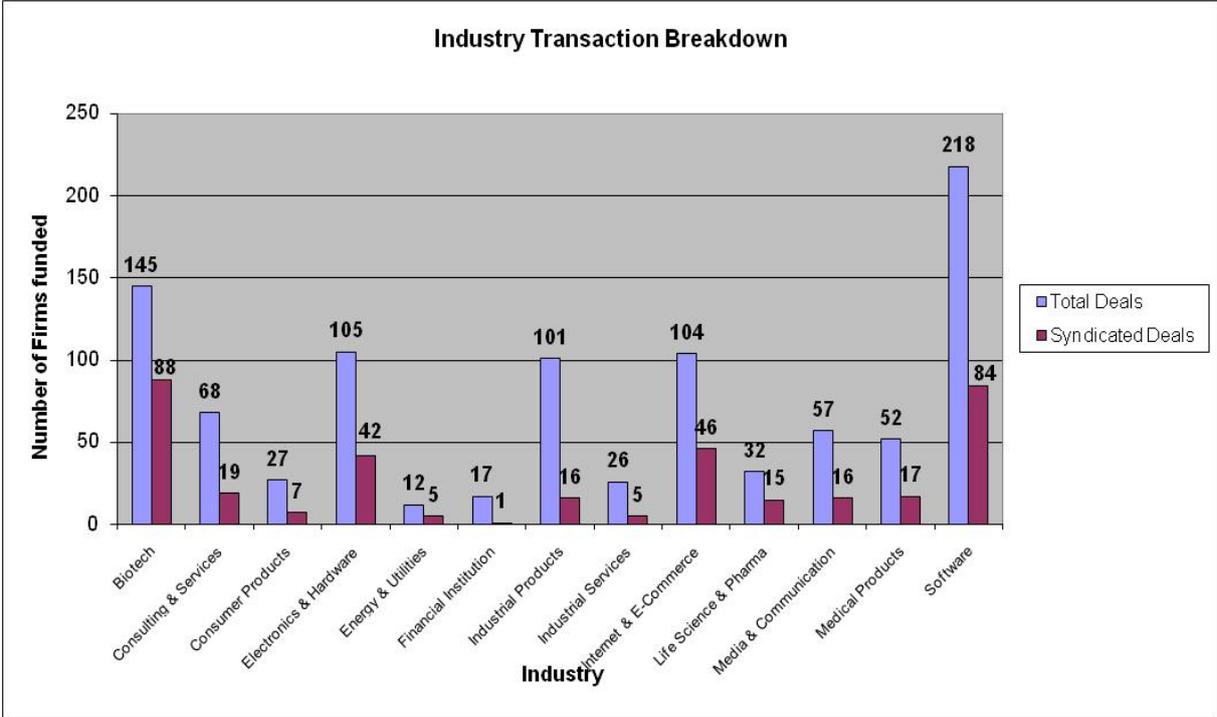


Figure 3: Industry breakdown of transactions by number of total and syndicated transactions

We used the information from TVE to identify the industry of a particular venture; we make use of the Venture Economics Industry Classification (VEIC) - a Venture Economics proprietary industry classification scheme. Moreover, we reviewed relevant information about the company business description from the TVE database and from the Bureau van Dijk balance sheet databases (Markus and Amadeus). In order to draw more distinct conclusions we further split the industries, which results in finer industry clusters. We divided the Medical/Health classification into two separate categories. Moreover, we split the Industrial Sector into Industrial Products (such as Chemicals and Industrial Equipment) and Industrial

Services (such as Transportation, Logistics and Manufacturing Services). We created a category for Internet Firms to cope with the particularities of investments into "New Economy" Firms over the period.<sup>10</sup> Figure 3 reveals that a substantial number of transactions took place in the software industry with a total number of 219 transactions, of which a syndicate has financed 85. Moreover, one can infer that Biotech, Electronics, and Internet and E-Commerce investments present the next largest groups with 144 (thereof 88 syndicated), 107 (thereof 44 syndicated), and 105 (thereof 47 syndicated), respectively. Figure 3 also reveals that among Biotech, Electronics, Internet and Software firms the syndication activity seems to be more pronounced than in other categories (say for example Industrial Products/Services or Consumer Products).

#### **b. Partner selection into the syndicate as the unit of analysis**

A syndicate is defined to be a group of VCs that jointly invest in a certain firm. We will look at VCs that invested in the same company simultaneously (within the same round) and in different rounds, thus employing a wider definition of a syndicate. We are less concerned whether VCs invested in the same round, as VC relationships are built by formal interaction (such as board meetings) as well as informal interaction (Gompers and Lerner (2002)). These experiences of knowing each other might transfer to the future and can yield insights into the decision patterns. Accordingly, a VC who invested in the first round might interact with an investor that joined the syndicate in a subsequent round. The unit of analysis is each accepted invitation of a partner to form a new syndicate or expand an existing syndicate further. Rather than focusing on the dyad level alone we analyze which partner VC was chosen by the lead investor at which point in time. In this sense, we have also included reverse-order dyads (i has chosen j and j has chosen i when both act as lead investors).

In order to cover the dynamics of partner selection in the most comprehensive way we placed no restrictions on the size of the VCs in the sample, thus including both large and small VCs. However, for the list of VCs from which a potential partner is chosen from we restricted the analysis to the most active VCs. Here we chose a cut-off point of at least 10 deals over the time period 1995-2005. This reduces the list of partners to 35 among which the lead investor can choose from. In explaining the dynamics of partner selection we therefore make inferences about the major players within the market rather than analyzing marginal ones. This also

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<sup>10</sup> Groupings have been made based on VEIC level 1 codes. Firms that were solely focusing on the Internet to sell and market products were included in the separate Internet/E-Commerce category.

circumvents the difficulty of handling large adjacency matrices with too many entries of zero. Moreover, less variation in activity over time also leads to problems with auto-correlation. To ensure a minimum of variation in the explanatory variables over time we restricted the number of VCs from which the given lead VC can choose to the most active ones. We do, however, include syndicates formed between major and peripheral VCs. In this case, the dependent variable for the smaller VC chosen is equal to one and the entries for the other 35 (more active) VCs is equal to zero. If one of the more active VCs from the list of likely candidates is chosen, they will receive an entry of one and all non-chosen VCs will receive an entry of zero for the dependent variable. The upcoming analysis therefore aims at explaining which factors impact the zero/one collaboration variable. We measure experience and contacts on the basis of the VC-level rather than for specific funds separately. Underlying this assumption is the argumentation that ties and experience acquired carry over to a VC's next fund [Hochberg et al. (2007)].

### **c. The Role of the Lead Investor**

The role in managing (and monitoring) the underlying investment differs substantially between lead and non-lead investors. Gorman and Sahlman (1990) find that the lead investor spends about ten times more effort (time) on monitoring and managing the investment. In a network where one VC has invited partners to assist on the transaction it is possible to account for the direction of the relationship. We have included a measure of a "Leading Role" of VCs for each transaction. Hochberg et al. (2006) define the lead investor as the investor who acquires the largest stake in a portfolio company. Megginson and Weiss (1991) and Sorensen (2007) use a similar argument. As TVE does only report the total amount invested per round and does not distinguish between the sum invested by each VC involved on a stand-alone basis, we proxy for the lead investor(s) using two criteria that have to be fulfilled simultaneously: The maximum number of rounds and the involvement in the initial financing round. The lead investor is defined as the VC that has participated in the maximum number of rounds among all investing VCs and was also involved in the first round of financing. Underlying this assumption is the same argument as in Megginson and Weiss (1991) or Sorensen (2007) that the lead investor has usually the largest amount of money at stake and therefore an incentive to take a more active role in managing the syndicate and advising the portfolio company. Hence, we can account for the direction of ties established. A VC that has

a leading role within a syndicate thus invites new investor(s) (those who do not have a leading role) to participate in the deal. Correspondingly, the partnering decision by the lead investor forms the basis of analysis.

#### **d. Transaction example**

In order to clarify the approach taken in this paper, consider the following example:

On March 1<sup>st</sup> in 1998 Munich based Apax Partners invested capital into the early stage Biotech firm Willex Biotechnology, that develops novel cancer therapies. On April 1<sup>st</sup> 1999 Apax and Earlybird Venture Capital provided additional expansion financing. On the 20<sup>th</sup> of October 2000 (Apax, Earlybird, Julius Bär, and Merlin Bioscience) and 10<sup>th</sup> of May 2005 (Apax, Earlybird, Karolinska Invest, and Quest Mgmt.) two additional rounds of financing were provided.

Based on the previous elucidations we can infer that Apax Partners acted as the lead investor being involved in the first round of financing and having financed the maximum number of rounds (this would still be the case, even if Apax would not have been involved in the last round of financing). Consequently, the underlying partner selection modelled includes the decision which co-investors were chosen by the lead investor. The first entry in the dataset therefore includes the decision made in 1999 to collaborate with Earlybird Venture Capital. Given that Earlybird is included in the list of top 35 investors (with at least 10 deals, equal to an average of one deal per year), Earlybird receives an entry of one and all other VCs (among others 3i, tbg, and Deutsche Bank Investor) receive an entry of zero. As the explanatory variables we would only include all information on the VCs until the end of the year 1998 to avoid causal dependencies between the transactions made in 1999 and the decisions made in the same year. As a matter of fact, we calculate differences in investment experience between the lead investor, the chosen partner and the non-chosen candidates based on all transactions cumulated until the end of the year 1998. For the next decision (to invite Julius Bär and Merlin Bioscience) we expand the list of the top 35 (minus Earlybird that has been chosen previously) with the two chosen firms (that receive an entry of one) and enter zeros for all non-chosen candidate firms. To cope with the changed investment context, we now include all information on the VCs cumulated until the end of the year 1999. This exercise is repeated for the last invitations made in 2005 including all information on the VCs cumulated until the end

of 2004. As the lead investors appear as often as they invited new partners in the dataset, we adjusted the standard errors for clustering on the lead investor level.

#### **e. Methodology**

Each invitation record for a specific transaction includes various VC attributes for the lead investor, as well as for the VCs from which the partner is chosen. The VC attributes are based on the cumulative cooperation behavior until the end of the year prior to the given year. The resulting structure is a cross-section of transactions over time, with varying covariates (such as network status, number of deals, funds managed) over the years. In order to account for the fact that the sample includes a larger number of non-events for the dependent variable (indicating all the VCs that have not been chosen to participate in the syndicate) we estimated the coefficients using the rare events logistic adjustments suggested by King and Zeng (2001a). Rare events are sharply underestimated by the standard procedures like logistic regressions. As the selection of partners is made from the list of the 35 most active investors, it could well be that the relative frequency of events modeled does not correspond to the actual proportions in the whole population. In fact, due to local search among partners with whom a lead VC does not have direct ties (or which are too far away in the network) some of the likely partners might by nature be excluded from the selection. While linear regressions are invariant to (unconditional) means of the dependent variable, this does not hold true for binary dependent variables. As the mean of a binary dependent variable is the relative frequency of events in the data, a very small number of events relative to non-events biases the probability and correspondingly, the estimated probabilities of events are too small. King and Zeng (2001a) suggest a weighted least squares expression to correct the parameter estimation and estimation uncertainty in the standard errors. In fact, changing the unbiased logit coefficients and improving the method of calculating probabilities leads to an increase in the estimated probabilities compared to traditional logistic regressions. When the sample size and/or the number of rare events increase(s), the adjustment factor is diminished and the model converges to the classical logistic estimates.

Moreover, the sample reflects the total number of transactions that have been subject to partnership behavior and are to some extent driven by the behavior of a distinct number of VCs that were involved in multiple transactions over the years. In order to account for those serial VCs we control for clustering in the error terms and adjust the standard errors for

the rare events logistic regressions. Additionally, we include dummies for every year to account for time effects. All dummies are measured against the year 2000 dummy, which is dropped (to avoid perfect collinearity) from all regressions.

#### **f. Explanatory Variables**

In order to test the hypotheses laid out in chapter 3 we calculated various VC characteristics that are likely to have an impact on the chances of being invited.

*Industry Experience:* Concerning hypothesis 1 (arguing that investment experience of the potential partner VC creates competence trust and thus affects the likelihood of collaboration positively) we calculated the total number of transactions within the industry (in which the funded firms operates in) that the lead investors as well as the potential partners have invested in (in the year prior to the given year in which the deal takes place). We then calculate the difference between the number of transactions the lead investor and the potential partner engaged in to proxy for additional experience that could be expected from a potential partner.<sup>11</sup>

*Direct Relationships:* With respect to hypothesis 2 and the impact of direct previous relationships between the lead investor and the potential partner we included a measure indicating whether the lead investor previously invited the potential partners (Lead invited VC) and the total number of times the lead was working with the potential partner regardless of the roles both had (Joint Deals). These measures again are calculated cumulatively over the past years and over the previous year solely. Following Gulati (1995a) we therefore proxy trust by the total number of repeated relationships between VCs. Two VCs that have prior interaction are likely to trust each other more than other VCs with whom they have no past interaction. Moreover, search costs are limited when VCs identify potential partners more easily among the set of previously established relationships.

Concerning hypothesis 3 and the role of social embeddedness we calculated various measures of network centrality. Knoke and Burt (1983) argue that access to information and control over resources can be measured by concepts developed for the analysis of networks such as centrality. Social network analysis deals with the characteristics of relational data that aims at

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<sup>11</sup> A negative number would therefore indicate that the partner possesses more experience within the given industry than the lead investor.

analysing contacts, ties and connections among a group of actors. All of these relations connect the actors in a wider context with each other. Hence, it enables us to make inferences about the emergence and the driving factors of linkages among a group of actors.<sup>12</sup>

From the analysis of the transactions that took place over the years 1995 till 2005 we construct adjacency matrices that reveal which VC has ties to another VC. The adjacency matrices reflect who was able to establish a relationship with another VC by investing into the same firm. The cells in the matrix represent the existence of ties within the VC network. From the corresponding adjacency matrices we then calculate several measures of centrality and prominence for the actors in the network. As in Hochberg et al. (2007) a more central position is equivalent to a more favored position within the network granting access to information, deal flow, capital or contacts. Scott (2000) describes an actor as being locally central if he has a large number of contacts in his immediate environment. Moreover, he considers an actor as globally central if he has a position of strategic significance in the overall network. Local centrality is of importance for a focal point of relative prominence in its neighbourhood, whereas global centrality concerns prominence within the entire network. Hochberg et al. (2007) point out that VCs with many contacts may be in a more advantageous position. VCs that have more ties have also greater opportunities because they have more choices, which gives them a certain degree of autonomy and make them less dependent on others. Moreover, they have access to more resources and can thus call on more resources when needed.

We use several measures of centrality, which are normalized to account for the network size. To compute the social network measures we have created adjacency matrices representing the relationships between the VCs. Matrices are computed over all years and allow for inferences based on the cumulative number of relationships. We entered all matrices into the Ucinet 6.0 Software (Borgatti et al. (2005)) that allows for the computation of various network measures. All adjacency matrices are based on contacts established until the end of the year prior to a given in which a transaction takes place and hence reflect the cumulated cooperation behavior of all VCs until this point in time. The measures are summarized in the following

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<sup>12</sup> Wasserman and Faust provide deeper insights into the idea of representing groups as a collection of point and lines resulting in a graph of the network (or a so-called adjacency matrix) indicating the interpersonal relationships of members of the underlying group. Social network analysis uses several measures to capture the prominence of actors in a network. Graph theory is used as a formal language to transform a corresponding relational matrix into formal concepts that can help to further describe networks and the relational positions the actors occupy. The number of ties that an actor in the network receives or sends determines the embeddedness in the overall network and also describes their behavioural opportunities and constraints (Hanneman (2005)).

*Out-Degree (Influence):* Summing across the row entries for each VC in the adjacency matrix gives an impression how many different partners a VC has invited to participate in transactions where he is taking a leading role. The out-degree gives an intuition about how influential an investor might be. Investors inviting others are able to make them aware of their deals and seem to have better access to deal flow but need to depend on partners to bring in additional resources (money, expertise etc.). The out-degree measures all nodes incident from a node in the network, i.e. lead VCs  $i$  inviting partners  $j$ .

*In-Degree (Prestige):* Simultaneously we use the direction of the relationship to account for the invitations received for VCs by investors in a leading role. Here we sum over the column entries in the adjacency matrix to account for the number of ties received. The In-degree can also be regarded as a measure of prestige for the actors as it indicates how often a VC has been chosen to participate in a syndicate by others. Thus, it also measures the extent to which other actors turn towards the skill set, valuable resources, information etc. that the invited party can contribute to the management of the funded firm (Wasserman and Faust (1994)). A VC that receives a lot of ties is therefore more prestigious as other VCs want to work with him more closely on a larger scale. Here only those relationships are accounted for in which a node  $i$  has been invited by a node  $j$ .

For both measures we use a standardization to account for the group size  $g$  with a maximum (in- or out-) degree value of  $g-1$ .

*Eigenvector:* As the measures laid out above suffer from the problem of not taking into account global structures of the network one can use the eigenvector approach. The eigenvector centrality looks at the directed geodesic distances (shortest path for received and sent ties) and acknowledges the fact that not all connections among actors are equal. Hence, having relationships with more central actors would make an actor also more central. The eigenvector will then be normalized by the highest possible eigenvector to account for the network size (Hochberg et al. (2007)). Thus, the eigenvector  $C$  accounts for the number and quality of relationships.

*Competence Ties:* In order to measure the interplay between goodwill and competence trust, we interact the variables for the direct relationships between VCs and the industry experience. Accordingly, without a tie being present and previous relevant industry

experience the variable would take on the value of zero. Only when a previous tie is present and the potential partner possess some more transaction-relevant industry experience than the current lead VC, we will define a tie as “competence tie”. Hence, it is the combination of previous relationships and industry experience that creates goodwill as well as competence trust and decreases potential performance and relational risks in the envisaged relationship. We will measure competence ties based on the contacts during the prior year only and using the cumulative information on partnering behaviour. So long-term and more immediate effects can be disentangled.

*Indirect Competence Ties:* Following the argumentation we operationalize an indirect tie by combining transaction-relevant industry experience of the potential partner with information conveyed through the relational network. Based on the previous contacts of VCs we mirror the contact network through the adjacency matrices over time and calculate how far away potential parties are in the network. Being two steps away from each other, having a shared tie with a third party, would embed a higher level of goodwill trust. When VCs are further apart in the network we would conjecture that the level of goodwill trust present will decrease. Hence, by combining the distance of actors with the relevant transaction experience reflects the trade-off between goodwill and competence trust. When both are present, we would argue that this would be an ideal candidate for a prospective partnership as both, performance and relational risk can be attenuated.

#### **g. Control Variables**

*Funds and Capital Managed:* In order to proxy for experience acquired through the management of funds and capital we include two variables indicating the difference in capital and the number of funds managed between the lead investor and the potential partner.<sup>13</sup> These measures are calculated using VC fund information from Thomson Venture Economics.

*Total Deals Last Year:* In order to control for the activity (and possibly investment overload) of VCs over the last year we summed over all transactions a VC was

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<sup>13</sup> All measures are either calculated as the cumulative number until the end of the year prior to the given year in which the deal takes place or by just using the relevant information from events happening in the year prior to the given year. This way, issues of causality between the dependent and independent variables are circumvented. For example, the total number of transactions that a VC has made in (or until the end of the year) 2004 is used to explain his partnering decisions in 2005. Hence, partnering decision in 2005 cannot influence the independent variables in 2004.

involved during the previous year. Here we include the number of total transactions (financed alone and as a member of a syndicate). VCs that were involved in a larger number of transactions previously might be less inclined to join on an upcoming transaction due to limitations in management capacity. To control for this effect we include the number of total transactions in all regressions.

*Direct Relationships (VC invited Lead):* Shane and Cable (2002) show the important role that reciprocity plays for the decision to invite new partners for work relationships. Given that VCs are likely to accumulate “social debt” over the multitude of relationships, the norm of reciprocity might explain why partner VCs are chosen to participate in the management of new ventures.<sup>14</sup> Reciprocating actions are driven by responding to perceived kindness with kindness and retaliation otherwise. This creates an environment of cooperation among the involved players and enhances the possibility of collective actions. Punishing free-riding attempts can achieve a high level of cooperation (Fehr and Gächter (2005); Dufwenberg and Kirchsteiger (2004)). Bolton and Ockenfels (2006) argue that the desire to maintain equity among the involved parties drives their cooperation behavior. By syndicating deals with others, VCs anticipate to receive the same gesture in the future, thereby increasing deal flow (Lockett and Wright (1999)). We proxy for the inherent tendency for reciprocity using the number of times the potential partner has invited the lead investor previously in order to capture the extent to which the lead investor might make a decision based on “social debt” stemming from previous interactions. We calculate this number again as the cumulative number of invitations sent from the potential partner to the lead investor over the entire past period and for the last year prior to the given year.

#### **4. Analysis and Results**

Table 1 reports the summary statistics and the correlation matrix for the independent variables. With respect to the experience within the given industry one can infer that on average the lead investors financed about 0.5 and 0.15 more deals, cumulatively and during the last year respectively, than the potential partners. In terms of the cumulative capital and funds managed by the lead investor and the potential partner one can see that the lead investor on average has more experience in managing capital and funds. The measures of previous directed relationships (Leader invited VC; VC invited leader and the number of joint deals)

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<sup>14</sup> There is a considerable debate in the literature over the notion of reciprocity. The one adopted in this paper comes closer to that of “reciprocal altruism” in Trivers (1971) where the player is only willing to reciprocate when there are future rewards to his reciprocal action. Nonetheless we will refer to the term reciprocity in the remainder of the paper.

report that over the years various relationships were formed at differing levels of intensity. Some of the relationships formed seem to be much more intense with a maximum of 9 invitations sent to a potential partner and 17 joint transactions overall.

[Insert table 1 about here]

The average number of times that the lead investor previously invited one of the potential partners is 0.116 (0.043 for the previous year) indicating that on average around 4 ties are present (35 potential partners times the average number of directed ties) between the lead investor and the potential partners. Moreover, the total number of previous deals is equal to 0.23 indicating about 8 ties being present on average. The correlations among the variables show a few problems of multicollinearity. Notably, the number of joint deals and the invitation variables are highly correlated. This high correlation does not come as a surprise as the directed relationships are a nested subset of all previous relationships among the partners. In order to cope with collinear variables we included them separately into the regressions.

Table 2 presents the regression output. With respect to hypothesis 1 the results suggest that getting access to new knowledge and resources (as measured by the excess industry experience of potential partners) plays a significant role in explaining the partnering decision in VC syndicates. The coefficient associated with the difference between the number of transactions of the lead investor (within the industry of the given funded firm) and the potential partner is negative and highly significant across all specifications estimated. Keeping in mind that the difference becomes negative once the potential partner has more transactions than the lead investor, the results suggest that more experience of the partner in comparison with the lead investor increases the chances of collaboration.<sup>15</sup>

Turning towards hypothesis 2, table 2 reports that past relationships affect the likelihood of participation in a syndicate positively. The coefficient associated with the number of times the lead investor chose a potential candidate previously is positive and significant (at the 5% level) for the number of invitations in the prior year (and for the cumulative number of invitations. The number of prior year (but not cumulative) joint deals also shows the expected positive sign and is significant at the 10% level for the regression estimates, respectively. Hence, there is evidence that lead investors rely on information generated through direct contacts when choosing syndication partners.

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<sup>15</sup> We also test the absolute experience rather than the relative experience and find the same effects as for the relative measures.

Moreover, the results show that competence ties are a driver of collaboration patterns. The coefficient associated with both variables (for the cumulative number of ties and the past year only) is negative and highly significant in all regressions. Hence, when previous ties are present and the potential partner has more investment experience than the lead VC to bring to the table, both goodwill and competence trust are present and chances of collaboration increase subsequently.

When it comes to differing impacts during the stages of development, table 3-5 reveal that during the start-up stage, only the total number of deals that a potential partner undertook during the last year has a significant and positive impact on the chances of collaboration. None of other variables is significant at conventional levels. During the early stage we can see, that industry experience matters more for selecting the “right” partner. Potential partners are chosen based on competence trust and the coefficient associated with the industry experience of a potential partner is highly significant throughout all specifications. Moreover, competence ties based on contacts during the previous year have a positive impact on collaboration. At the later stage, both industry experience and more importantly competence ties (for the cumulative ties and the last year) increase the chances for collaboration when deciding on future partners.

Concerning the argumentation that partner selection might be driven by reciprocity between partners, table 2 shows no impact of previous invitations by the potential partner on the chances of collaboration. While the coefficient associated with the number of times a potential partner has invited the current lead investor has the expected positive sign the coefficient is not significant at conventional levels throughout all regression specifications estimated. However, the higher the amount by which the Out-degree measure surpasses the In-degree measure the higher are the chances of being selected. This suggests that lead investors prefer to work with partners that are themselves open for a lead role and might invite partners themselves at some point in the future.

[Insert table 2 about here]

We also included yearly dummies in all regressions that are, for reasons of brevity, not reported in table 2. The dummies for all the years 1996 and 2003 are significantly different

from the omitted 2000 dummy and exhibit a negative sign. This indicates weak evidence that in the years where fewer transactions take place, the chances of being invited are lower. Additionally, the control variable measuring the total number of deals financed in the last year is significant throughout all regression specifications at the 1% level. The coefficient for the total number of deals is negative, indicating that potential partners that financed a large number of deals recently tend to establish collaborations with a given lead VC to a lesser extent. VCs that already spend too much time managing and advising a large number of firms do not find the time to participate in additional deals. This supports the results found in Bernile et al. (2005) that a larger portfolio of investments dilutes the quantity as well as quality of managerial advice as the number of experts that provides this advice is limited.

## **5. Discussion and Conclusion**

In this paper we analyze which VC characteristics influence the partnering decision within the German VC market using a unique sample of 2,373 VC transactions over the period 1995-2005. The data reveals strong evidence that partnering decisions are driven by the lead investor's quest for accessing resources to develop competitive capabilities. Existing resources and partner capabilities guide cooperation patterns in the quest for future competencies. We find that lead investors team up with partners that accumulated more experience of investing within the industry the current funded firm is active in. In addition to engaging in their own experimentation of developing capabilities VCs can learn about new capabilities through their embedded ties. Experiences made can be combined with the tacit knowledge of the partners for mutual gain. Having invested in the given industries previously yields valuable insights into structuring deals and advising the funded entrepreneur. Hence, by combining the existing knowledge from previous investments a lead VC can create a strong position using the market specific knowledge that the partnering VC has. In this vein, inter-organizational relationships could also be a source of a sustained competitive advantage given that the joint use of knowledge creates a rare and inimitable resource that is only induced through the unique contribution of the partners involved.

Moreover, we find that previous relationships affect the likelihood of collaboration positively. VCs that have been working jointly over the past years are more likely to enter a new collaboration for a given transaction. The results present strong evidence that information sharing and trust can create a foundation for future cooperation. Repeated relationships might transfer expectations about the partner's behavior from a prior deal to the new transaction and

reduce the costs of asymmetric information. Gulati (1995b) argues that in this way, a social relationship can motivate both parties to behave in a fair and trusting manner towards each other. Hence, partners might regard a transaction as a situation of mutual gain rather than of self-interest. Previous joint investment experience can create effective work and decision routines and built up trust among the involved parties. The results indicate that the chances for a potential partner to participate in a newly formed syndicate rise significantly when previous direct ties are present with the current lead investor.

Although we provide preliminary evidence on the role of direct ties in explaining cooperation patterns in VC financing, the conditions under which VC networks are reinforced or expanded are far from being clear. With respect to the evolution of networks and social ties, Beckman et al. (2004) compare the selection of new partners to the strategic choice between exploration and exploitation in organizational learning. Where reinforcing relationships with existing partners corresponds to a form of exploitation and expanding the network of partners corresponds to exploration. They argue that the choice between these two options is driven by uncertainty and set forth that the greater the uncertainty is that a firm faces alone, the more likely will he broaden the set of ties by establishing contacts with a new partner. For the case of VCs one could therefore argue, that when a VC tends to invest in industries where he possesses less knowledge, he might be willing to expand his radius of partners and might be more inclined to work with unfamiliar partners. Testing for the impact of uncertainty on partner choice by controlling for the underlying transaction can supplement the results shown in this paper and further enlighten our understanding of partner selection in VC syndicates by analysing which ties matter under which conditions and how networks develop over time.

While, we have emphasized the role that varying factors such as trust and additional resources play when deciding on syndicate partners, more research could also be devoted to the consequences of partner selection on investment success. It would be interesting to analyze what the impact of more intense collaboration on the profitability of investments is. Established routines with respect to decision-making and interaction with the funded firm could in general lead to higher performance due to lower costs of cooperation. By analyzing the performance consequence of collaboration one could determine under which circumstances value is created in VC syndicates and how this value creation can be attributed to either a better sourcing of deals or a value-added from combining complimentary resources among the involved VCs.

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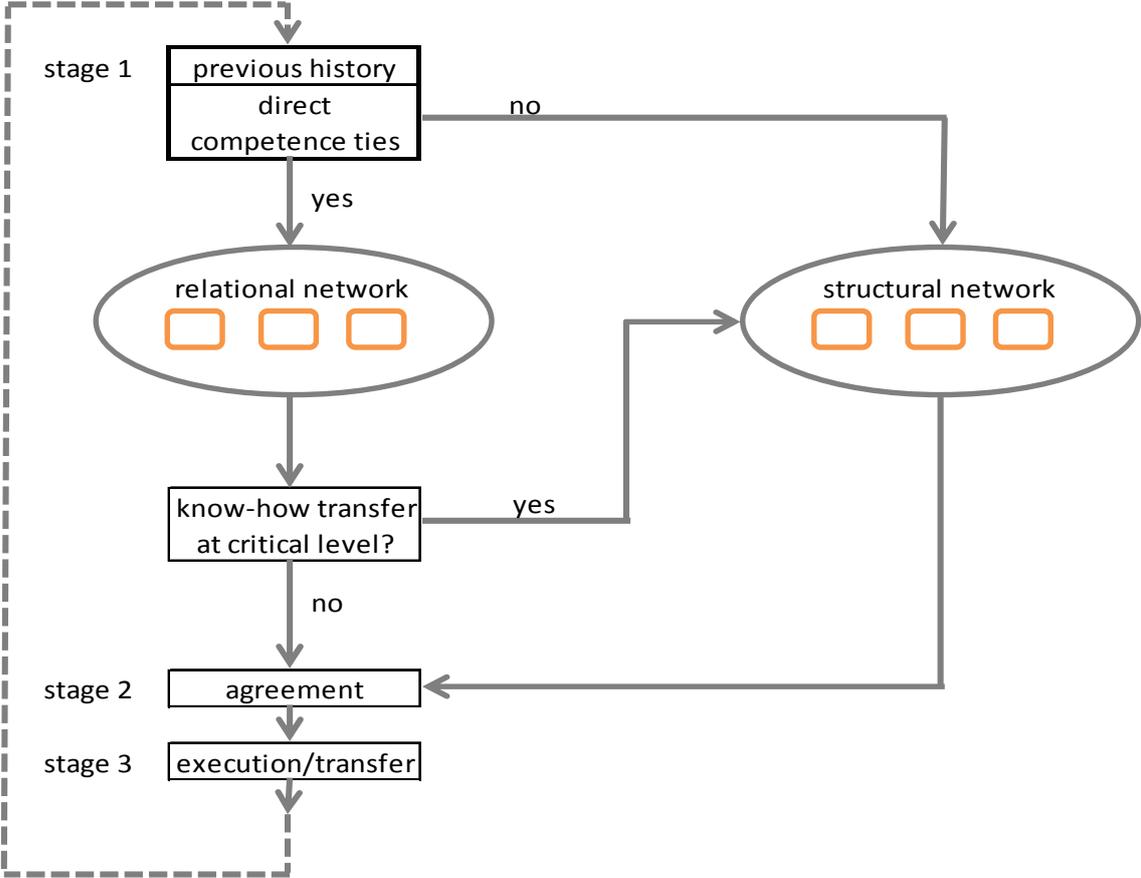
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**Figure 1: Trust development and partner selection**



## Table 1: Descriptive Statistics and Correlation Matrix

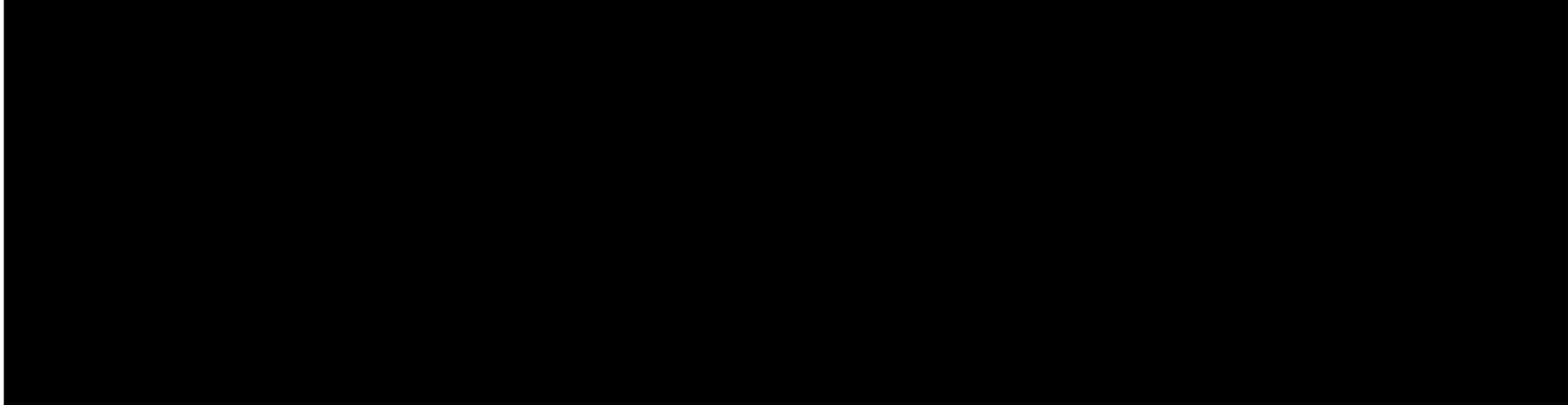


Table 1 shows the descriptive statistics for all explanatory variables. The experience within the industry is calculated relative to the corresponding lead investor (calculated as experience of the lead minus experience of the likely partner). For the industry experience a mean of 0.458 indicates that on average, the lead VCs have been involved in 0.458 more deals than the potential partner. The variables in rows 2 to 7 measure how often the lead investor has invited the likely partner previously, how often the likely partners has invited the current lead previously, and how often the VCs have been working together in the past (regardless of the role). All of these measures are calculated as the cumulative number until the end of the year prior to the given year (in which the transaction takes place) and as the total number over the year prior to the given year. Row 8 presents the total number of transactions the potential partner has financed during the course of the previous year. Rows 9 and 10 indicate the difference between the (cumulative) capital and funds managed by the lead and the likely partner. These measures are again calculated as the capital (or funds) managed by the lead minus the capital (or funds) managed by the potential partner. A higher number indicates that the lead investor managed more capital (or funds) until the end of the previous year than the potential partner. Rows 11 - 14 indicate the descriptive statistics for various measures of network centrality. These measures are calculated on the basis of network adjacency matrices for all years until the end of the year prior to the given year. These measures are not calculated relative to the lead investor and reflect solely the standing of the potential partner in the VC network. Row 15 indicates the difference between the Outdegree and Indegree measure for the potential partner. A higher positive number indicates that the partner VC tends to send more ties than he receives. A higher negative number indicates that he receives more ties than he sends.

**Table 2: Rare Events Logistic Regression with clustering on the lead investor level (all transactions)**

Dependent Variable: Invited (1/0)	1	2	3	4	5	6	7	8	9
Industry Experience (Last Year)	-0.047	-0.056	-0.058	-0.053	-0.057	-0.053	-0.059		
	0.020**	0.022***	0.023**	0.023**	0.025**	0.023**	0.024**		
Total Deals Last Year	-0.021	-0.027	-0.028	-0.024	-0.026	-0.024	-0.028	-0.016	-0.016
	0.012*	0.012**	0.013**	0.012*	0.012**	0.013*	0.013**	0.012	0.012
Lead Invited VC		0.179							
		0.081**							
Lead Invited VC Last Year			0.425						
			0.211**						
VC Invited Leader				0.11					
				0.092					
VC Invited Leader Last Year					0.356				
					0.258				
Joint Deals						0.064			
						0.051			
Joint Deals Last Year							0.232		
							0.147		
Competence Tie								-0.081	
								0.028***	
Competence Tie (Last Year)									-0.048
									0.019**
Observations	23968	23968	23968	23968	23968	23968	23968	23968	23968

\*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 2 present the results for the regressions using the rare events logistic methodology suggested in King and Zeng (2001a) to account for the fact that the sample includes a larger number of non-events for the dependent variable (indicating all the VCs that have not been chosen to participate in the syndicate). The first line for each independent variable indicates the coefficient and the second line shows the corresponding level of significance (p-value). Standard errors have been adjusted for clustering at the lead investor level.

**Table 3: Rare Events Logistic Regression with clustering on the lead investor level (only Start-Up Stage transactions)**

Dependent Variable: Invited (1/0)	1	2	3	4	5	6	7	8	9
Industry Experience (Last Year)	0.003	-0.008	0.005	-0.002	0.001	-0.008	0.008		
	0.032	0.037	0.034	0.036	0.032	0.037	0.031		
Total Deals Last Year	0.055	0.049	0.055	0.052	0.054	0.049	0.057	0.05	0.054
	0.019***	0.020**	0.020***	0.020***	0.019***	0.020**	0.019***	0.020**	0.018***
Lead Invited VC		0.162							
		0.122							
Lead Invited VC Last Year			0.004						
			0.363						
VC Invited Leader				0.09					
				0.151					
VC Invited Leader Last Year					0.138				
					0.247				
Joint Deals						0.089			
						0.077			
Joint Deals Last Year							-0.044		
							0.253		
Competence Tie								-0.13	
								0.11	
Competence Tie (Last Year)									-0.013
									0.055
Observations	3750	3750	3750	3750	3750	3750	3750	3750	3750

\*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 3 present the results for the regressions using the rare events logistic methodology suggested in King and Zeng (2001a) to account for the fact that the sample includes a larger number of non-events for the dependent variable (indicating all the VCs that have not been chosen to participate in the syndicate). The sample only includes partner selection events that occur in the Start-Up Stage category as indicated through TVE. The first line for each independent variable indicates the coefficient and the second line shows the corresponding level of significance (p-value). Standard errors have been adjusted for clustering at the lead investor level.

**Table 4: Rare Events Logistic Regression with clustering on the lead investor level (only Early Stage transactions)**

Dependent Variable: Invited (1/0)	1	2	3	4	5	6	7	8	9
Industry Experience (Last Year)	-0.103	-0.106	-0.11	-0.105	-0.117	-0.105	-0.114		
	0.038***	0.038***	0.038***	0.039***	0.038***	0.040***	0.040***		
Total Deals Last Year	-0.044	-0.046	-0.049	-0.045	-0.05	-0.045	-0.05	-0.028	-0.03
	0.023*	0.023*	0.024**	0.023*	0.024**	0.024*	0.024**	0.023	0.022
Lead Invited VC		0.091							
		0.084							
Lead Invited VC Last Year			0.459						
			0.299						
VC Invited Leader				0.062					
				0.09					
VC Invited Leader Last Year					0.626				
					0.259**				
Joint Deals						0.03			
						0.055			
Joint Deals Last Year							0.29		
							0.192		
Competence Tie								-0.046	
								0.071	
Competence Tie (Last Year)									-0.061
									0.029**
Observations	7107	7107	7107	7107	7107	7107	7107	7107	7107

\*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 4 present the results for the regressions using the rare events logistic methodology suggested in King and Zeng (2001a) to account for the fact that the sample includes a larger number of non-events for the dependent variable (indicating all the VCs that have not been chosen to participate in the syndicate). The sample only includes partner selection events that occur in the Early Stage category as indicated through TVE. The first line for each independent variable indicates the coefficient and the second line shows the corresponding level of significance (p-value). Standard errors have been adjusted for clustering at the lead investor level.

**Table 5: Rare Events Logistic Regression with clustering on the lead investor level (only Late Stage transactions)**

Dependent Variable: Invited (1/0)	1	2	3	4	5	6	7	8	9
Industry Experience (Last Year)	-0.042	-0.055	-0.057	-0.051	-0.052	-0.05	-0.059		
	0.025*	0.027**	0.027**	0.028*	0.032*	0.028*	0.029**		
Total Deals Last Year	-0.035	-0.045	-0.048	-0.041	-0.041	-0.041	-0.047	-0.032	-0.033
	0.020*	0.021**	0.022**	0.021*	0.022*	0.021*	0.022**	0.02	0.020*
Lead Invited VC		0.25							
		0.102**							
Lead Invited VC Last Year			0.541						
			0.212**						
VC Invited Leader				0.163					
				0.105					
VC Invited Leader Last Year					0.362				
					0.294				
Joint Deals						0.085			
						0.058			
Joint Deals Last Year							0.299		
							0.145**		
Competence Tie								-0.098	
								0.044**	
Competence Tie (Last Year)									-0.06
									0.024**
Observations	13111	13111	13111	13111	13111	13111	13111	13111	13111

\*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 5 present the results for the regressions using the rare events logistic methodology suggested in King and Zeng (2001a) to account for the fact that the sample includes a larger number of non-events for the dependent variable (indicating all the VCs that have not been chosen to participate in the syndicate). The sample only includes partner selection events that occur in the Late Stage category as indicated through TVE. The first line for each independent variable indicates the coefficient and the second line shows the corresponding level of significance (p-value). Standard errors have been adjusted for clustering at the lead investor level.