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The Use and Effect of Social Capital in New Venture Creation – Solo Entrepreneurs vs. New Venture Teams

by

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Abstract

This paper examines the use of social capital in the venture creation process. We compare solo entrepreneurs (n=182) and new venture teams (n=274) from a random sample of start-ups in innovative industries and test social capital use and its effects on firm performance. Our results reveal that solo entrepreneurs and new venture teams do not differ in their degree of use of social capital. However, there are differences in the determinants of social capital use in both groups. We find that weak ties assist solo entrepreneurs and have positive significant effects on new venture performance. For team start-ups, we find no direct effect of social capital. However, further tests indicate for teams that human capital variety positively moderates the effect of social capital on performance.

Key words: Entrepreneurship; Nascent entrepreneurship; Social capital; Start-up teams; Entrepreneurial learning

JEL classification: M13, L25, L26, D83

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1. Executive Summary

Social capital theory argues that the social embeddedness of entrepreneurs plays a pivotal role in the venture creation process and the further fate of a start-up (e.g. Burt, 2000; Nahapiet & Goshal, 1998). It is known that nascent entrepreneurs draw on advice, support and help from their social networks in the venture creation process (Davidsson & Honig, 2003; Samuelsson & Davidsson, 2009; Elfring & Hulsink, 2003). This use of social capital enables the entrepreneurs to access resources, novel information and trusted feedback – the latter two being a necessary component of entrepreneurial learning (Politis, 2005).

This paper focuses on the actual use of social capital by solo-entrepreneurs and entrepreneurial teams in the venture creation phase. Do teams have more social capital than solo-entrepreneurs? This argument has been sometimes explicitly (Davidsson & Honig, 2003) but more often implicitly (e.g. Colombo & Grilli, 2005; van Gelderen et al., 2005) made in a considerable number of studies, suggesting that belonging to a start-up team is an indicator for social capital. Based on a literature review, this essay argues that there are two mechanisms by which the decision to launch a start-up in a team format as opposed to a solo format influences the actual use of social capital. On the one hand, a team has more contacts to exploit, which increases the probability to actually use social capital. On the other hand, in a team, the members combine often different skills and abilities,

enabling them to complete more venture creation activities in house. The actual use of social capital may thus decrease.

Our second objective is to investigate the impact of social capital use in the venture creation process on subsequent new venture performance, measured by the number of employees in the third business year. Thereby, we specifically examine the moderating role of human capital variety on the link between social capital use and performance.

This essay tests these hypotheses by using a dataset of start-ups in innovative industries (182 solo entrepreneurs and 274 new venture teams). To generate this dataset, face-to-face interviews with the solo-entrepreneur or the leading entrepreneur of the start-up team[1] were conducted. To measure social capital use, we apply a new method – the resource generator (van der Gaag & Snijders, 2004). We study the comparative importance of different types of social capital, such as "weak ties" (assistance from the circle of the entrepreneurs' acquaintances), "strong ties" (assistance from the circle of closest friends and family members) and overall social capital use.

Our results suggest that entrepreneurial teams and solo entrepreneurs do not differ significantly in their degree of use of social capital. However, there are pronounced differences in how they employ social capital in the venture creation process. In particular, we find a substitutive relationship between overall social capital use and human capital in solo start-ups, while no such clear relationship was found for team start-ups. We find that, for these firms, team size increases the probability of social capital use, whereas the human capital variety of the team decreases the probability of using social capital.

Differences also exist in the effect of social capital use on venture performance. For solo start-ups, weak ties is a strong predictor of employment. However, the use of strong ties has no effect on employment. No moderating effect of human capital variety on the link between social capital use and performance was found.

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[1] We use the terms new venture teams, entrepreneurial teams, and start-up teams interchangeable throughout the essay.

For team start-ups, we determine no direct effect of social capital use. Further tests indicate that, for teams, human capital variety positively moderates the effect of social capital use (overall and for weak ties) on new venture performance. Teams with pronounced variety of their knowledge base profited from the use of social capital. One plausible interpretation of this result is that teams with a diverse knowledge base have advantages in comparison to less equipped teams. They can better evaluate information from outside concerning their usefulness and integrate this information into their knowledge base, thereby facilitating the entrepreneurial learning process.

The results of our research further suggest that solo start-ups and team start-ups differ beyond the pure number of entrepreneurs. Although the difference in the results of the interaction term between human capital and social capital variables is only through indirect evidence, we argue that one of the key characteristics which differentiate solo entrepreneurs from entrepreneurial teams is the learning process (Politis, 2005). This process seems to be more complex for teams, emphasizing the role of collective work and information sharing in the learning process.

2. Introduction

A central development within the management literature has been the growth of nascent entrepreneur research analyzing on-going venture start-up efforts and/or firms in gestation over time (Davidsson, 2006). New ventures have an important effect on economic development. They are credited for the transfer of innovations into the market (Schumpeter, 1934) and thereby with creating regional employment (Fritsch & Mueller, 2004).

Central questions in nascent entrepreneurship research concern the characteristics of the venture creation process and the factors affecting performance of these firms (see for an overview, Davidsson, 2006). Among other factors considered in the literature, the social embeddedness of the entrepreneur has been found to play a pivotal role (Davidsson & Honig, 2003). Social capital enables entrepreneurs to access resources (Florin et al., 2003) or novel information (Uzzi, 1997) in order to create opportunities (Baker & Nelson, 2005). During the venture creation process, most

firms suffer from substantial resource constraints (Shepherd et al., 2000) and use their personal networks as a means to access resources and information far below market price (Elfring & Hulsink, 2003).

However, a sizeable gap exists in the burgeoning social capital literature on the subject of team start-ups. A most prominent result is that team start-ups are more successful than solo start-ups (e.g. Lechler, 2001). One of the offered explanations is that entrepreneurs can combine their abilities and financial capital in a team, giving them an advantage above solo entrepreneurs (e.g. Gartner, 1985; Stam & Schutjens, 2006). Sometimes explicitly (e.g. Colombo & Grilli, 2005; Stam & Schutjens, 2006) but more often implicitly (e.g. Davidsson & Honig, 2003; van Gelderen et al., 2005), the same argument is applied to the usage of social capital, i.e. that the social capital from individual team members is combined to provide an advantage for teams over solo entrepreneurs. As yet, to our knowledge, no study has explicitly analyzed whether, compared to solo-entrepreneurs, more social capital is found within teams and whether this leads to their better performance.

In this paper, we approach these two questions and empirically explore the use of social capital of solo entrepreneurs and entrepreneurial teams during the venture creation process. In doing so, we refine the empirical concept of social capital in that we do not look at its mere existence but focus on its use in terms of concrete support (e.g. advice on the business plan, marketing, or research and development (R&D)) for the entrepreneurs. We address two major research questions. The first concerns the differential use of social capital. Do solo entrepreneurs rely more often on social capital than new venture teams, or is it the other way around? How do both types of start-ups use social capital? More precisely, we investigate the relationship between social capital and other characteristics of the new venture and its founders (e.g. human capital). Our second research question then turns to the effect of social capital on subsequent new venture performance. Appropriate hypotheses in this study are tested using a dataset of 456 start-ups in innovative industries in the German state Thuringia.

The reminder of the paper is organized as follows: in section 3, we review the theory and previous research on social capital in order to generate six testable hypotheses. In section 4, we describe the dataset and the methods employed to measure the use of social capital. We then present (section 5) the results of our analysis. The paper concludes in section 6, where we interpret and discuss our results and draw some conclusions.

3. Theoretical Background

3.1. New Firm Creation and Social Capital

Creating a new firm, in comparison to being employed, involves high levels of risk and uncertainty (Lumpkin & Dess, 2001). Entrepreneurs may consider alleviating the effects of risk and uncertainty by approaching others for help and advice, broadly captured by the concept of social capital. On the individual level, social capital is defined "as the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or a social unit" (Nahapiet & Goshal, 1998). According to this definition, social capital includes a *structural dimension* taking into account the people an entrepreneur knows. One of the most important facets of the structural dimension of networks "is the presence or absence of network ties between actors" (Liao & Welsch, 2005, p. 349). Only if an entrepreneur has ties to other individuals or institutions may he receive tangible resources via such relationships, e.g. a first loan, or intangible resources such as information about potential customers. Furthermore, the definition emphasizes the *relational dimension* of social capital, by highlighting the ability and willingness of the entrepreneur to receive network support.

Using this definition as a starting point, different implications arise for solo and team-started ventures. We return to that point immediately after the introduction of the concept of new venture teams. We define a venture as a team start-up when more than one person is actively involved in the venture creation process and when these persons own or had owned a part of the venture (Kamm et al., 1990). As to mastering the venture creation process, the superiority of team start-ups compared

to solo start-ups is one result readily acknowledged in entrepreneurship research (e.g. Cooper & Bruno, 1977; Lechler, 2001). In particular, for high technology firms (our sample of interest), there is a higher requirement of skills, making team start-up a necessity. Gartner (1985, p.703) argues that "individuals combine their abilities in teams in order to start an organization successfully." Hence, the advantage of a team lies in the bundling of human and financial capital (Stam & Schutjens, 2007).

Upon initial investigation, the argument of bundling of human and financial capital can as well be applied to a solo entrepreneur's use of social capital, considered as the ability of an actor to mobilize useful resources from his social network (Bourdieu, 1986; Burt, 1992; Coleman, 1988). Teams combine and integrate the social capital of their members, possibly providing them with an advantage above solo-entrepreneurs (Davidsson & Honig, 2003). As yet, to our knowledge, no study has explicitly analyzed whether, compared to solo-entrepreneurs, more social capital is found within teams and whether this leads to their superior performance.

Comparing venture teams and solo entrepreneurs with respect to the structural dimension of social capital, the former may have an advantage through broader access to critical resources through their larger number of contacts within their social network. The decision to create a venture team or to add an additional team member has the potential to increase the social capital base of the start-up and, as a result, may improve the resource profile of the new venture leading to increased new venture persistence and success. Implicitly, this argument is made in a considerable number of studies, as belonging to a start-up team is considered to be an indicator of social capital (e.g. Colombo & Grilli, 2005; Davidsson & Honig, 2003; van Gelderen et al., 2005).

Looking at the relational dimension of social capital, a contrary argument can be put forward. While a positive correlation may exist between team size and the possible access to resources via entrepreneurs' contacts, the actual use of those contacts may not be correlated with team size. Compared to a solo entrepreneur, a new venture team can complete more venture creation activities

in house through combining (often different) skills from its members (Gartner, 1985, p.703). The actual use of social capital may thus decrease.

In our empirical analysis, we explore whether the mere use of social capitals differs between solo and team start-ups. With respect to the team start-ups, the two counteracting arguments are to be considered: First, the strengthening and broadening of the social network in a team, on the one hand, increases (ceteris paribus) the likelihood of using social capital. Second, the ability of a team to perform more tasks on its own decreases the likelihood of using social capital. Both effects work in opposite directions concerning the use of social capital. With due care, we therefore test whether the use of social capital differs at all between the two types of venture founding by the following hypothesis:

H1: Solo Entrepreneurs and entrepreneurial teams differ regarding their respective use of social capital in the venture creation process.

3.2. The Effects of Social Capital

A further focus of our analysis is on the way in which social capital use differently affects the venture performance for solo entrepreneurs and new venture teams. Given the nature of our dataset consisting of start-ups in innovative industries, we assess the literature concerning social capital of tech-based as well as knowledge-based start-ups. The review of that literature reveals that social capital influences the venture creation process via three different channels. It 1) assists (nascent) entrepreneurs in accessing resources, 2) provides trusted feedback to the entrepreneurs and 3) provides access to novel information.

Access to resources is of critical importance to small and young companies in innovative industries which traditionally suffer from a range of resource constraints including financial capital, a skilled work-force, or equipment necessary for R&D and production (Aldrich & Martinez, 2001), which are critical for growth. Anderson et al. (2007) analyze ten technology companies in Aberdeen

and find evidence for the use of the contacts of the entrepreneurs to former business partners supported them to recruit their work-force. Much more work has been done in studying the relationship between social capital and the financing of start-ups. Shane & Cable (2002) argue that via network ties potential investors were able to screen and to evaluate the entrepreneurs and their business ideas, which was the basis of the investment decision. Florin et al. (2003) reports for a sample of US-firms seeking to float on the stock exchange, that the level of social capital is positively and significantly related to the level of attracted funds and return on sales. However, this result could only be partially confirmed by Honig et al. (2006), who find some evidence for a relationship between social capital and the amount of sales, but no links between social capital and financial capital.

Furthermore, social capital affects growth aspirations among nascent entrepreneurs (Liao & Welsch, 2003), which is considered a precursor of subsequent venture growth (Baum et al., 2001). Using a sample of Swedish tech-nascent entrepreneurs, Samuelsson & Davidsson, (2009) find that projects which extensively use social capital significantly make progress in the venture creation process. Taken together, we propose the hypothesis:

H2: Social capital in the venture creation process has a positive impact on later new venture performance.

Trusted feedback is the second transfer channel of social capital. Its theoretical foundations lie in the relational dimension of social capital (Nahapiet & Goshal, 1998) which deals with the quality or the kind of ties an actor possesses (Granovetter, 1990). Within the relational aspect of social capital, tie strength has attracted great interest in the research community. Although it is a simplification of Granovetter's (1973) original argument that tie strength is a continuum, ties are typically categorized as being either weak or strong. Thereby, Granovetter characterizes strong ties

in contrast to weak ties by a combination of high emotional intensity and intimacy, much time spent with the network contact, and high reciprocity of services.

The strength of strong ties lies in the high level of trust between the network members. It is well known that networks with a high proportion of strong ties are "dense" networks (Burt, 2000), which indicates that many network members are directly connected to each other. Scholars highlight the importance of trusted feedback and the transfer of tacit knowledge (Aldrich & Martinez, 2001) for entrepreneurs stemming from such networks as necessary components of entrepreneurial learning (Zahra et al., 2006). Thereby we understand learning as the process of accumulating knowledge required for being effective in starting up and managing new ventures (Politis, 2005).

Learning takes place throughout the venture creation process. Bhave (1994) was one of the first researchers to recognize the complex nature of the venture creation process, which he described as nonlinear and iterative. Key features of his model are feedback loops between the different stages of venture creation, allowing for changes in the business concept after receiving corresponding feedback and information from, e.g., customers and financiers. Other scholars also emphasize the importance of learning and adapting in the venture creation process (Aldrich & Ruef, 2006; Ronstadt, 1988; Shane & Venkataraman, 2000) for the development of routines and capabilities (Zahra et al., 2006) to run a business successfully (Teece et al., 1997).

A well known example of the benefits of learning from strong ties is the study from Elfring and Hulsink (2003). They report that high-tech start-ups benefit from trusted feedback of their strong ties to better recognize opportunities. Studying 23 cases in New York's apparel industry, Uzzi (1997) finds that companies profit from information transfer on strategies, prices and products from a dense network which enables them to take advantage on fast changing market opportunities. However, Uzzi (1997) acknowledges serious drawbacks of relying solely on strong ties and high density networks. It is argued that information and ideas coming from too densely connected networks lack newness. Entrepreneurs, who receive information only from inside such insulated networks, may experience below average performance. This disadvantage is of particular

importance for high-tech start-up projects with innovative products (as shown by Presutti et al., 2007), as they operate within global markets, and require greater diversity in ideas, information and feedback concerning the business idea in line with greater complexity and requirements of their numerous international markets. In evaluating these mixed findings on the effects of strong ties and dense networks on entrepreneurial performance, we still postulate the following hypothesis:

H3: Strong ties in the venture creation process have a positive impact on later new venture performance.

Access to novel information – the third transfer channel – is beneficial for entrepreneurs because ventures in gestation often do not possess information about relevant facets of business, e.g. prices, production processes, inputs, and competition (Aldrich & Ruef, 2006) being critical requirements of the above described entrepreneurial learning (Zahra et al., 2006). This information is widely dispersed among individual actors within the market (customers and suppliers), as well as among people seemingly unrelated to the market (engineers, technicians, or financiers).

In general, to access this dispersed information weak ties are considered important, because through them it is possible to reach distant subgroups of the network via a rather close network partner. Contrary to strong ties, which have a tendency for closure (Coleman, 1988), weak ties can serve as bridges to indirect ties (Granovetter, 1973). Therefore, weak ties enlarge the network of an entrepreneur and provide the nascent entrepreneur access to novel information which may assist in the discovery of more profitable business opportunities (e.g. Elfring & Hulsink, 2003), to the development of products (Lechner & Dowling, 2003), to the reduction of the cost of production (Yli-Renko et al., 2001), and to contacting potential investors (Shane & Cable, 2002). Therefore we suggest:

H4: Weak ties in the venture creation process have a positive impact on later new venture performance.

To access social capital in general and strong and weak ties in particular requires that the entrepreneur or the new venture team show an appropriate ability to do so. This leads us to the concept of human capital. A number of empirical studies report that human capital variables (e.g. entrepreneurial experience, leadership experience or business experience) have positive significant effects on the progress of nascent entrepreneurs and subsequent venture success (e.g. Honig et al., 2006; Samuelsson & Davidsson, 2009). Being more specific in our discussion of the effects of social capital on venture performance, we argue that an entrepreneur or a new venture team learns more successfully if human capital aligns with social capital. More precisely, entrepreneurs with a pronounced human capital variety should have a higher level of "absorptive capacity" to tap a broad array of relevant information (Cohen & Levinthal, 1990). With human capital variety, we refer mainly to an entrepreneur's or a venture teams' breadth of experience over different functional activities. Following Hayton and Zahra (2005), we argue that, because of their broader experience, these entrepreneurs should be more able to rate new information on their usefulness, and incorporate this new information more easily into their existing knowledge stock.[2] Furthermore, we suggest that entrepreneurs with higher human capital variety should have a larger social network to draw on, giving them broader choices and opportunities to select the most appropriate helpers within their networks. This latter argument is considered within the context of weak ties, because the strong tie network of an entrepreneur only consists of a very limited number of persons (Lechner & Dowling, 2003).

To the best of our knowledge, only the study of Batjargal (2007) on internet start-ups in China has yet examined the moderating effect of human capital on the linkage between social capital and

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[2] Principally, one could think of different human capital variables affecting the learning process. However, the approximation of human capital by the heterogeneity of the functional background of top management teams in high-tech ventures is suggested by Hayton & Zahra (2005), who argue that the absorptive capacity of a new venture team is better measured with the breadth of the knowledge base instead of the depth of the knowledge base (e.g. heterogeneity of functional background vs. the average number of years of leadership experience of the entrepreneurial team)

venture success. Although the econometric findings are mixed, Batjargal (2007) concludes that the combined effect of human capital and social capital enhances the survival chances of newly founded businesses. We, therefore, propose the following hypotheses:

H5: The relationship between social capital in the venture creation process and subsequent venture performance is stronger for solo entrepreneurs and entrepreneurial teams with a higher level of human capital variety, and

H6: The relationship between weak ties in the venture creation process and subsequent venture performance is stronger for solo entrepreneurs and entrepreneurial teams with a higher level of human capital variety.

4. Dataset and Methods

4.1. Dataset and Interview Strategy

For our empirical analysis, we use data from the "Thuringian Founder Study". This study is an interdisciplinary research project on success and failure of innovative start-ups and contains both venture creation data and psychological data. The unique dataset comprises the entries of private and commercial companies in the commercial register (Handelsregister) between the years 1994-2006 in the German state Thuringia. This design made it possible to interview not only founders of active companies but also founders of ventures that had failed. The data base is restricted to entries in innovative industries (Grupp & Legler, 2000)[3]. The first registered owner-managers for each new entry form the survey-population. From this population, a random sample of 2,604 start-ups was generated. From January to October 2008, we conducted 639 face-to-face interviews with the solo entrepreneur or the leading entrepreneur of a start-up team (response rate 25%). As some companies were not genuinely new but rather were subsidiaries or the result of a diversification of an existing company into a new business field, we removed 76 companies from our sample. Thirteen companies were removed from the sample due to interview quality concerns. For this paper, we

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[3] Grupp and Legler (2000) define innovativeness at the level of the industry. On average, companies in innovative industries spend more than 3.5% of their turnover for research and development.

restrict our analysis to observations within the complete dataset and therefore drop 78 observations with missing values in one or more used variables. Furthermore, to avoid censoring, we dropped 16 observations which started later than 2005.[4] Our empirical analysis evaluates the effect of social capital use in the venture creation process on subsequent venture performance in the third business year. The final sample consists of 456 companies, which can be further classified as 182 solo entrepreneurs and 274 new venture teams.

The structured interviews were conducted by members of the research project and student research assistants who were trained in various sessions in December 2007. We use a retrospective design to collect the data. To overcome the bias of hindsight as well as memory decay (Davidsson 2006), we adapt the tool 'life-history-calendar' from psychology in order to receive the information for the venture creation process. The life-history-calendar is a useful tool to reconstruct individual processes and developments (Caspi et al. 1996; Freedman et al. 1988). One gains more reliable and valid retrospective information compared to traditional questionnaires (Belli et al., 2001). When the interview commenced, the participants together with the interviewer filled in major life events and sequences in the life-history-calendar (family life, working sequences, historical events, and important dates of the business history). During the interview, the life-history-calendar was visible to the participants. Before each retrospective item (e.g. team composition, human and social capital questions) was started, we asked the interviewee to look at the specific time point in the life-history-calendar and recalled verbally special events taking place during that time in order better to remember that time. The interview strategy and the life-history-calendar are in line with the recommendation by Belli et al. (2004). The procedure used for this study enables us to make first arguments about causality.

The restriction of this study to the German state of Thuringia has the major advantage of reducing sample heterogeneity stemming from e.g. regional differences. This is of particular

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[4] Firms founded in 2006 cannot answer any question on their third year of business activity.

importance in Germany where there are still pronounced differences in the determinants of new venture success between Eastern and Western Germany (Fritsch, 2004).

4.2. Dependent Variables

Our dependent variable attempts to measure the performance of start-up firms. We approximate this by the absolute number of employees in the third year of operation of the firm. The solo-entrepreneur, members of the new venture team, as well a potential board of directors were in no case counted as employees. As our sample consists only of new firms and does not include franchise or corporate ventures, the vast majority of firms have zero employment in the venture creation phase. For that reason, employment growth rates could not be computed (see for a similar approach Baum et al., 2000). If a new venture did not survive the third business year, the number of employees remained coded as zero.

Traditional outcome variables such as firm value, profitability, and turnover are not applied in this study for two reasons. First, the self-reported measure of sales turned out to be unreliable. While respondents could assess the amount of sales generated in the first three business years, monetary reform in Germany replacing the D-Mark with the Euro in several steps between 1999 and 2001 made it difficult for the entrepreneurs to attribute correctly the sales to either currency. Second, secondary data from business information providers could not be used, because such databases tend to focus on larger and surviving firms, reducing substantially the overlap with our dataset.

Nevertheless we undertook an effort to check the validity of our dependent variable. Two business information providers (Creditreform and Bureau van Dijk) made available to us data regarding employment growth in the first three business years for 66 start-ups in our data set. We found that our measure of number of employees and the corresponding information provided by Creditreform and Bureau van Dijk (2009) highly correlated ($r = .78$, $p < .001$).

4.3. Independent Variables

Our independent variables attempt to measure the actual use of social capital in the venture creation process, which comprises the time from the first concrete steps into the venture creation process until the start of the of the first business year.[5]

Typically, researchers use the name generator or the position generator in social capital measurement. The name generator (McCallister & Fischer, 1978) maps the ego-centered social network of an entrepreneur comprising persons who were most helpful in establishing and running an entrepreneur's new venture. However, the name generator has a tendency to focus on strong ties (van der Gaag & Snijders, 2004). Therefore, we opted against this method.

The position generator (Lin & Dumin, 1986) uses the occupations of network members as an indicator of the access to valuable resources and information. The usefulness of this instrument hinges on the relative importance and relatedness of the individuals role to the type of start up being created. For a biotech start-up, knowing bankers or a professor in biology may be more useful then knowing a poet; but this may be the opposite if an entrepreneur opens up a book store. Hence, this approach has limited value for studies not focusing on a single industry with a clear hierarchy of useful contacts.

Therefore, we attempt to improve the measurement of social capital in the field of entrepreneurship by applying a more recently used measurement procedure, the resource generator, as developed by van der Gaag and Snijders (2005). This approach focuses on *potential* helpful flows of resources and asks typically a battery of questions such as: Do you know any people who can lend you 5.000 €? The main advantage of this measurement concept is that it measures social capital at a 'general' base (van der Gaag & Snijders, 2004), which refers to the possibility to access different, concrete and restricted sub domains of social capital. For our analysis, we adapt the methodology of the resource generator to *concrete* resource flows instead of potential resource flows, because our approach is based on the "use" of social capital rather than its mere existence.

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[5] We define the first business year as the time when accounting started either because of obligations from the commercial register or because of first revenues. This does not necessarily correspond to the date of registration in the Handelsregister.

To quantify social capital use, we ask the entrepreneurs if they received advice, support or help from a third party, free or for less than the usual charge, during the venture creation process in nine different fields. These fields are derived from the nascent entrepreneurship literature (see Davidsson, 2006 for an overview), where important activities in the venture creation process are addressed, such as R&D, market exchange, financing and management. We chose the items to cover the activities that are important to enable the business to get up and running, primarily focusing on the recognition and the exploitation of the business opportunity (Shane & Venkataraman, 2000).

Table 1 displays our measures of social capital use. For solo entrepreneurs and the interviewee of a start-up team, we have at hand information on whether the advice, support or help came from the circle of the closest friends and family (*strong ties*) or from acquaintances (*weak ties*). Following the suggestions of Marsden and Campbell (1984), closeness or, in other words, emotional intensity, serves as an indicator for the tie strength.[6] Note that, in case of a new venture team, the interviewee was briefed not to report the help which he received from the other members of the team. We count only help from outside the new venture team. Consequently, the interviewee was asked whether his team members received advice and support at all from outside, regardless whether the helpers belonged to family, friends or acquaintances.[7]

[Table 1 about here]

To verify the information of the interviewee, for a random sample of 55 cases we conducted an additional face-to-face interview with another member of the start-up team and received 42 matchable and usable responses. We performed dependent t-tests for paired samples on the equality of means concerning our main social capital variables, the *overall social capital* use (indicated by

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[6] In their seminal work, Marsden and Campbell (1984) identify educational differences, kinship and the fact that two persons work together as important predictors of tie strength. They suggest closeness or emotional intensity as the best available indicator for evaluating the strength of a tie. The majority of the empirical studies apply this concept (see for an overview Kim & Aldrich, 2005), either intentional or unintentional due to practical reasons, since this measurement procedure is easy to administer and straightforward.

[7] In case of team founders, the distinction between weak and strong ties cannot be made, as the interviewee usually was not able to classify his cofounders' contacts as weak or strong. Therefore, we only have information about tie strength concerning the interviewee of the new venture team.

the number of fields with received advises) for the complete team ($t = -.48$; $p = .63$) and the propensity to use *any social capital* in at least one field ($t = -.37$; $p = .71$). The tests reveal no statistical differences in both cases, giving evidence for the reliability of our social capital variables.

As suggested in the literature (e.g. Delmar & Gunnarson, 2000; Vivarelli, 2004), we also collected data on whether the entrepreneurs' networks contained *other managers and business owners* (whether they provided support or not), whether the entrepreneur received *public advice* from public consulting agencies, and whether people provided *encouragement or social support* to start a business. These social capital variables serve as a standard of comparison to our measures of social capital use and are measured at the venture level (table 1), with the exception of *encouragement and social support*. This variable is based on the interviewee only because the respective question for the other team members can hardly answered by the interviewee in a reliable way.

[Table 2 about here]

As indicator for human capital variety, we use the *variety of functional background* of the entrepreneur(s), which is measured by the number of functional areas in which the founder (team) has prior work experience (table 2).[8] In case of a new venture team, we count as team members all persons who were actively involved in the venture creation process and owned or had owned a part of the venture. Persons entering to and exiting from the team were also counted as team members. As additional indicators for human capital, we include at the venture level the *number of team members*, years of *leadership experience*, and prior *entrepreneurial experience* since, in similar studies, they have been found to have a significant impact on the development and performance of new ventures (Colombo & Grilli, 2005; Cooper et al., 1994; Eisenhardt & Schoonhoven, 1990).

To control for the effect of financial capital, we include the *start-up capital* in the first year of operation. Final controls refer to industry, the start-up year, the possible differences between

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[8] We choose this simple measure of human capital variety for two reasons. First, Hayton & Zahra (2005) suggest that the absorptive capacity of the founder (team) in tech ventures is better accessed by variables focussing on the breadth of the knowledge base instead of the depth of the knowledge base (e.g. the average number of years of leadership experience of the entrepreneurial team). Second, more complex measures of human capital variety using diversity indices could not be computed for solo-entrepreneurs.

industrial and *service companies*, and the *innovativeness* of the start-up. The descriptive statistics and correlation matrices are displayed for solo entrepreneurs and entrepreneurial teams separately in appendices A and B.

5. Results

5.1. Do Solo Entrepreneurs and New Venture Teams Differ in the Use of Social Capital?

We start with a test of hypothesis H1: Do solo entrepreneurs and new venture teams differ in the use of social capital and, if so, in which fields? To answer this question, we distinguish two cases. In the first, we compare the interviewees of the different modes of firm founding (solo start-up vs. team start-up), henceforth called the interviewee level. In the second case, we compare the solo start-up with the aggregate of all members of a team start-up, henceforth called the venture level. On the one hand, these comparisons are accomplished by using our measure for *overall social capital use*, representing the number out of nine fields in which social capital can be used, and by the propensity to use *any social capital*. On the other hand, we compare both start-up modes on the basis of the traditional social capital variables. We apply Wilcoxon-Man-Whitney and Chi-square tests in order to find differences in those counts and probabilities.

With respect to the interviewee level, we find (table 3) that a solo entrepreneur uses, in general, more social capital than the interviewee of a team start-up. More precisely, the solo entrepreneur uses, with a probability of 76%, *any social capital* and at the mean *overall social capital* in 3.0 fields compared to 68% and 2.3 fields in the sub sample of the interviewees of a team start-up. These differences are significant at least at the 5% level. Looking at the traditional indicators of social capital, we find no statistical significant differences between the two modes of firm founding on the interviewee level.

[Table 3 about here]

Concerning the venture level (table 3), we find no statistically significant difference between solo start-ups (76%; 3.0 fields) and team start-ups using *any social capital* in 73% of the cases representing *overall social capital* use in 2.7 fields. Testing also for two of the three traditional indicators for social capital[9] does not deliver significant differences between the solo and team responses.

To summarize, we find no support for hypothesis H1 according to which solo entrepreneurs and new venture teams differ in their use of social capital.[10]

5.2. The Effects of Social Capital

Testing the effects of social capital on venture performance, we refer to hypotheses (H2) on overall social capital, (H3) on strong ties, and (H4) on weak ties. Each of them is supposed to have a positive impact on new venture performance, as expressed in the absolute number of employees in the third year of firm operation. We run regressions for a sample containing all start-ups, including both solo and team start-ups. We again distinguish two ways of representing team start-ups, the venture level and the interviewee level. These regression results are displayed in the models 1-3 in table 4. Looking at the venture level in model 1, *overall social capital* turns out to be insignificant. In model 2 and model 3, relying on variables at the interviewee level, we get significant coefficients for neither individual *overall social capital* nor for *weak ties* and *strong ties*. Furthermore, in all three models, the traditional social capital variables *knowing other managers and business owners*, *encouragement and social support*, and *public advice* show no significant effects. Concerning human capital, we only find significant positive effects for *variety of functional background* at the 1% level. Concerning the controls, we find significantly positive effects for *start-up capital* at the 1% level, as well as significant time and industry dummies.

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[9] Since we are operating at the venture level, we cannot perform a comparison with respect to the variable encouragement and social support, because we only posses these data for the interviewee member of the start-up team.

[10] Interestingly, this result holds for the traditional indicators of social capital. What empirically distinguishes these traditional indicators from the nine fields of used social capital is the fact that they occur with a much higher probability. Furthermore, the traditional indicators do not show the observed pattern with higher occurrence for a solo entrepreneur compared to the interviewee of a new venture team. This confirms our argument that traditional indicators can't disentangle social capital from team issues.

[Table 4 about here]

Based on these results, we are forced to reject our hypotheses H2 to H4. This is quite an unexpected outcome and, combined with the unexpected result of no difference in using social capital between solo start-ups and entrepreneurial teams, leaves us with a puzzle. A solution to this puzzle may be found in analyzing whether the two types of start-ups differ in their respective use of social capital. This may give some justification for the results found so far.

5.3. The Differential Use of Social Capital

Looking at the way in which the two types of start-ups use social capital, as a dependent variable we use various binary measures for the general use of *any social capital*. As independent variables, we include our controls as well as one of the traditional social capital measures, *knowing other managers and business owners*. We start by analyzing solo entrepreneurs.

Table 5 provides the results of the logistic regression. Model 1 refers to solo entrepreneurs. We find *knowing other managers and business owners* to have a positive significant effect on the use of social capital at a level of 1%. A significantly negative effect at the 1% level is found for *leadership experience*. In addition, service companies are significantly more likely to use social capital, whereas more innovative ventures use significantly (at 10% level) less social capital.

[Table 5 about here]

Performing the same analyses for entrepreneurial teams, we run two models distinguishing the venture level (model 2 in table 5) and the interviewee level (model 3 in table 5). For models 2 and 3, as for solo entrepreneurs, *knowing other managers and business owners* shows up significantly positive at the 1% level for entrepreneurial teams. At the venture level in model 2, higher *innovativeness* and *higher leadership experience* contribute significantly to the usage of social capital in the complete team at the 5% and 10% level, respectively. The effect of the *variety of*

functional background, however, is significantly negative at the 5% level. The level of the interviewee in model 3 reveals significantly positive effects from the number of team members (5%) and the leadership experience (1%).

Comparing these two sets of results, we find major differences in using social capital between the two types of start-ups. *Leadership experience* reduces the use of social capital for solo entrepreneurs, but increases the use of social capital in start-up teams. For new venture teams only, a higher *variety of functional background* significantly reduces the use of social capital. In addition, the *number of team members* is positively correlated with the use of social capital in entrepreneurial teams.

This difference in the way the use of social capital is determined between solo entrepreneur and entrepreneurial teams is remarkable and unexpected given the existing literature on social capital. One may ask whether this can already be explained by significant differences among the two groups in some major features such as *innovativeness* or their assignment to certain *industries* and start-up years. However, Chi-square test on equality and Wilcoxon-Mann-Whitney test could neither be rejected for *innovativeness* ($\chi^2 = 1.27$, $p = .26$), nor for *industry assignment* ($\chi^2 = .66$, $p = .88$), nor for *service company* ($\chi^2 = 0.94$, $p = 0.76$), nor for start-up year ($\chi^2 = 15.99$, $p = .45$). The only difference between both start-up modes we find concerning our independent and control variables is the *variety of functional background* ($z = -2.05$, $p = .04$). Hence, we can conclude that the purpose of accessing social capital differs between solo entrepreneurs and entrepreneurial teams. For the former, it is rather a matter of whether the entrepreneur is convinced of mastering the task successfully as expressed by *leadership experience*. In entrepreneurial teams, the focus is rather on getting the portfolio of competences right as expressed by the *variety of functional background*.

5.4. The Differential Effect of Social Capital

Based on these results, we now return to the first analysis of the effects of social capital on firm performance, as expressed in employment three years after foundation. We run regressions

separately for the two types of venture founding and integrate interaction terms accounting for the manner in which social capital is used in both groups.

Solo Entrepreneurs

Table 4 (middle section) displays the results of negative binomial regressions. We distinguish the case of social capital in general (model 4 and 5) and the case of disaggregated social capital in terms of weak and strong ties (model 6 and 7). Using identical controls in all four models, we find *start-up capital* and *leadership experience* to be significant predictors (at the 1% level) of venture performance. The regressions also show significantly negative effects of *entrepreneurial experience* on venture success. This result is very unusual and can only be understood in light of the transformation process of Eastern Germany from a planned to a market economy (Fritsch, 2004). During this process starting from 1990, a considerable number of western German entrepreneurs founded businesses in the eastern part of Germany. Our data suggest that these western entrepreneurs more often failed than eastern entrepreneurs if they did not team up with people from the eastern part of Germany. It could be argued that these entrepreneurs lacked relationships with suppliers and critical contacts to access customers and were vulnerable in the face of fast changing market conditions. Furthermore, western entrepreneurs often ran businesses in their home region to which they could easily return if the new businesses in Eastern Germany were about to fail.

Looking at our hypotheses stating that (H2) overall *social capital*, (H3) *weak ties*, and (H4) *strong ties* have a positive impact on new venture performance, we find only hypothesis H3 (model 6) to be supported at the 5% level. Insignificant coefficients for overall *social capital* (model 4) as well as *strong ties* (model 6) force us to reject the respecting hypotheses H2 and H4. In contrast, the traditional social capital indicator variables, *knowing other managers and business owners*, *encouragement and social support*, and *public advice* show no significant effects in all models.

For a test of our two hypotheses H5 and H6, suggesting moderating effects of the *variety of functional background* (H5) on the relationship between overall *social capital* and performance as

well as a (H6) on the relationship between *weak ties* and performance, we include respective interaction terms in models 5 and 7 in table 4. However, both hypotheses have to be rejected due to insignificant coefficients of the respective interaction terms.

Entrepreneurial Teams

Turning to entrepreneurial teams, table 5 (right section) delivers the results of the negative binomial regressions. We distinguish again between the venture level in models 8 and 9 and the level of the interviewee in model 10 and 11. As to the human capital variables, the results differ from those of section 5.4 on solo entrepreneurs: *leadership experience* and *entrepreneurial experience* are not essential for the success of entrepreneurial teams. Instead, team *variety of functional background* is highly significant at the 5% level. With respect to the traditional social capital indicators, all results of section 5.4.1 are confirmed: Neither *knowing other managers and business owners*, nor *encouragement and social support*, nor *public advice* shows significant effects.

Again, examining the hypotheses stating that (H2) overall *social capital*, (H3) *strong ties*, and (H4) *weak ties* will have a positive impact on new venture performance, we find all hypotheses rejected (models 8 and 10) due to insignificant coefficients. In contrast, the interaction term of *variety of functional background* × *social capital* in model 9 is positive and highly significant at least at the 1% level. Hence, the *variety of functional background* moderates the effect of team *social capital* on firm performance. This result is also found when looking at level of the interviewee (model 11). Here again, the interaction term of *variety of functional background* × *weak ties* is significantly positive at the 5% level. Hence, quite distinct from the evidence on solo entrepreneurs, we find here a moderating effect of the *variety of functional background*. Running an OLS regression instead of a negative binomial regression confirms these results although at a lower level of significance of 10%.

[Figure 1 about here]

We examine the impact of the *variety of the functional background* in more detail in figure 1.[11] As illustrated in the left part of the figure, entrepreneurial teams which had a greater variety in their functional background enjoyed a higher employment level when more often employed *social capital,* supporting hypothesis H5. This result holds if we focus on social capital in terms of *weak ties* (right part of figure 2), supporting the respective hypotheses H6.[12]

6. Discussion and Conclusion

6.1. Interpretation and Discussion of the Results

Our study empirically examined the use of social capital among solo-entrepreneurs and entrepreneurial teams in the venture creation process. Based on a sample of 456 start-ups in innovative industries, we tried to answer two research questions: First, do entrepreneurial teams more often use social capital than do solo entrepreneurs? Second, what are the effects of social capital use in the venture creation process on subsequent venture performance? Table 6 summarizes our results.

To answer the first question, we find that venture teams do not use more social capital than do solo entrepreneurs in the venture creation process. This unexpected result is due to the fact that the two links explained in the following have reverse but quantitatively coequal impacts on social capital use.

The standard proposition concerning the team-social capital issue is that a team start-up compared to a solo-entrepreneur, or a larger team compared to a smaller team, has more social capital. This proposition is sometimes more explicitly (e.g. Colombo & Grilli, 2005) made, but more often implicitly applied (e.g. Davidsson & Honig, 2003; van Gelderen et al., 2005). Its validity depends on how we define social capital. In case we define social capital as the *potential access* to resources and information, the standard proposition holds true, because the number of

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[11] These figures are computed using the regression coefficient of a respective OLS-regression.

[12] The results hold not true if we run a regression on the moderated effect of strong ties. There, the respective interaction term is insignificant. These regressions is not shown here, but available from the authors upon request.

team members will be positively correlated with the overall number of contacts and hence with the possible access to resources or information. When we, however, focus on the actual *use* of the network contacts, the proposition is at least questionable, if not unfounded. In a start-up team, its members combine their (often) different skills, abilities, information and resources, enabling them to perform more activities in the start-up process in house. Hence, the actual use of social capital will be negatively correlated with the corresponding heterogeneity of the start-up team.

Looking at our empirical results, we find evidence for both links affecting the use of social capital of new venture teams. First, team size is positively correlated with social capital use, suggesting that a new venture team compared to a solo entrepreneur as well as a larger team compared to smaller one has more contacts to use. Second, the variety of functional background in a team is negatively correlated with social capital use. This result suggests that the use of those contacts is interdependent of other characteristics of the entrepreneurs. Previous empirical literature has paid limited attention to that second link. The study of Renzulli and Aldrich (2005) is an exception and complements our results. They focus on the determinants of tie activation for business start-ups and find that heterogeneity within the social network of an entrepreneur significantly increases the probability of using those contacts for business purposes. In contrast to our study, they evaluate the characteristics of network ties and the resulting impact on social capital use, while we are concerned with the characteristics of the team or solo entrepreneur and its impact on social capital use. In both cases, heterogeneity among actors is positively correlated with the use of social capital.

Despite the evidence that new venture teams and solo-entrepreneurs do not differ in their use of social capital, there are pronounced differences in the way in which both start-up modes use social capital in the venture creation process. We find that the human capital characteristics influencing social capital use are different for both groups. For solo entrepreneurs, there are clear indications of a substitutive relationship between human capital in terms of the leadership experience of the founder and social capital use. Contrariwise for start-up teams, no such clear relationship was

found. Leadership experience positively correlates with social capital use. Team size and the variety of a team's knowledgebase have as described above reverse effects on social capital.

Concerning the second question, we find that social capital use affects new venture performance differently for both start-up modes. The results of section 5.4 lead to the conclusion that, for entrepreneurial teams, there are rather indirect effects of social capital use on firm performance moderated by the *human capital variety.*. The more teams are specialized in their functional background, the more team members do work with and learn from each other with less of a reliance on accessing social capital. A more diversified team complements the human capital available by increasingly relying on social capital. In contrast, for solo entrepreneurs, there appears to be a direct relationship of social capital on performance. The solo entrepreneurs profit from information provided by their weak ties. However, their human capital variety (*variety of functional background*) does not significantly contribute to any employment effects.

The results of our research lead us to the conclusion that solo start-ups and team start-ups differ beyond the pure number of entrepreneurs. Although the difference in the significance level of the interaction term between human capital and social capital variables is only indirect evidence, we argue that one of the key characteristics which differentiate solo entrepreneurs from entrepreneurial teams is the learning process. Thereby we understand the need for the development of necessary knowledge as effective in starting up and managing new ventures (Politis, 2005). This process is more complex for teams, because, as they work together in the start-up project, they also learn together. Consider the case of a solo entrepreneur. He can directly evaluate information stemming from his personal contacts and integrate them into his knowledge base. By way of contrast, a member of a new venture team may not use directly such contacts. The entrepreneur will probably first ask his team members if he should approach his personal contact for help or information. Thereafter, the team members together probably consult this outside help and then evaluate together the usefulness of the information and their further actions.

This supposed model fits well to the data and to the description the nascent entrepreneurs gave us during the interviews. We suppose that, for a team which has a broad knowledge base, it is more likely that they opt against help from the outside. However, if such a team indeed uses social capital, it profits considerably from the information transfer due to two mechanisms. First, their learning and evaluation procedure enables them to detect more valuable information. Second, because of the breadth of their knowledge base, they can more efficiently integrate and exploit the new knowledge. This view of organizational learning and the importance of diverse knowledge base are in line with recent studies (e.g. Hayton & Zahra, 2005) on venture teams.

6.2. Implications for Practice

Our study has several implications for practice. For those who have chosen to start up alone, access to novel information about markets, prices, competitors is of critical importance. This information is best accessed via weak ties, which includes (former) colleagues, friends, and former employers, as well as people at conferences and trade fairs. We find that help, advice or support from those weak ties has positive effects on venture performance. In contrast, help from the circle of the closest friends and family members does not appear to have measurable effects on performance. Entrepreneurs may value trusted feedback from such sources highly, but the information lacks breadth and scope.

For those who have chosen to team up with other people to start a venture, our implications are somewhat counterintuitive. We observe a high level of human capital in the new venture teams. On average, in four out of six predefined categories the team as a whole benefits from the work experience of its members. Such teams with high variety tend not to use their contacts, instead relying heavily on the knowledge base within the start-up team. However, these teams would gain the most from really using their network contacts. It seems that these teams have several advantages compared to less equipped teams. First, they can better evaluate information from outside

concerning their usefulness. Second, they have probably a choice among different helpers, leading to better quality of the help.

6.3. Implications for Theory

Our study has one particular implication for entrepreneurship theory, by contributing to the discussion concerning the nature of an entrepreneurial team. What is an entrepreneurial team? Is it just the leading entrepreneur dominating? Is it the sum of its parts? Is it more or rather something different than the sum of its parts? This question is of crucial importance for our understanding of entrepreneurship, since a substantial share of new venture projects are started by teams. The answer to that question given by the research community has changed over the past decades.

The trait approach treated the entrepreneur as a lonely hero and mainly paid attention to psychological characteristics of the single actor (see for an overview Gartner, 1988). The entrepreneurial team was not part of the research agenda. Over the past few years, the majority of the research uses the venture as level of analysis (Davidsson & Wiklund, 2001). Often team related variables are treated by summing the individual responses of the entrepreneurs. In our view, this is a progress because it at least accepts the existence of the new venture team. However, studies focusing on team issues in entrepreneurship are scarce – with some notable exceptions (e.g. Chandler et al., 2005; Chowdhurry, 2005). These studies find evidence that the internal team processes such as communication, co-laboring and common decision making are important predictors for team success. This contradicts the view that teams are purely the sum of their parts, but does not answer the question whether the team is more than the sum of its parts or different from them.

We find for team start-ups but not for solo start-ups interaction effects between human and social capital variables, suggesting that the team start-ups are something different than the sum of their parts. We argue that this interaction effect stems from collective work and information sharing between the team members in the venture creation process, fostering learning at the individual and

collective level. Our view is supported by research on teams operating in a range of contexts, such as primary care teams (Bunniss & Kelly, 2008), new product development teams (Bourgeon, 2007), and multidisciplinary working teams in the oil and gas industry (van der Vegt & Bunderson, 2005). All these studies emphasize the roles of collective work and information sharing in the learning process of a team.

In the field of entrepreneurship, some work has already been done concerning collective cognition (West, 2007; Shepherd & Krueger, 2002; Ensley & Pearce, 2001). For example, West (2007, p.83) argues that in team start-ups "decisions are not left up to the individual". Instead, often the team makes the decision. For West, it is important to understand how the individual perspectives of the entrepreneurs about strategy translate into a collective understanding triggering collective decision and action. His model of collective cognition contains the individual cognition of the team members, as well as team internal processes and the environment external to the team.

As Weick and Roberts (1993) suggest, we want to emphasize that we use the word collective instead of group, because we do not think that the team members merge into one group and we neither deny the existence and importance of the individuals nor the collective. Both levels, the individual as well as the collective, are present in an entrepreneurial team. In our view, research combining the individual and the collective level should yield valuable results for entrepreneurship. Future research may address in more detail how individual skills and individual social network contacts translate into the knowledge base of the emerging venture and which factors, such as communication and trust, influence this process. Process research techniques could shed light on these transfer mechanism.

6.4. Strength and Limitations of our Study

We believe that the strengths of our study mainly lie in the methods applied. First, we apply a new method to measure social capital in emerging and young organizations. The resource generator from van der Gaag and Snijders (2005) is a useful tool to access social capital in various concrete

and restricted sub domains. Furthermore, it is easy to administer and does not consume much time in an interview. Second, we apply for the first time in entrepreneurship research the established method of the life-history-calendar (Freedman et al., 1988). This method is of particular usefulness for studies using a retrospective design, because it helps to reduce the well known memory decay and hindsight bias. Third, we conducted face-to-face interviews with the entrepreneurs and tried to verify independent variables as well as dependent variables.

However, our study also has its limitations. First and most important, our study is retrospective in nature. Although we use the above describe techniques to gain reliable information about the venture creation process from the entrepreneur, we cannot completely rule out memory decay and hindsight bias. In one extreme case, there was a time span of 20 years from the first steps into the venture creation process until our interview. Second, we use self-reported measure of the number of employees as dependent variable. Thus we suffer from the self-report bias. However, we checked for reliability of the data using secondary information of a business information provider. Market value of the start-up or turnover would be more appropriate dependent variables, which unfortunately are inaccessible for our dataset consisting of very young and small enterprises. Third, concerning the independent variables, we also relied on information of only one member of a start-up team. We checked the reliability of the respondent information by interviewing an additional member of the entrepreneurial team. Regardless whether these efforts confirm the overall reliability of our social capital use variables, we still miss disaggregated information on the use of weak and strong ties for the other team members.

Table 1: Independent social capital variables for predicting venture success

Independent variable	Operationalization
Social capital use	
Strong ties (Interviewee)	We asked the solo-entrepreneur or the interviewee of a start-up team if he received advice, support, or help from a third party free or for less than the usual charge during the venture creation process. More precisely we asked: How many people from the circle of the closest friends and family members ...
	1) ... have helped to write the business plan? 2) ... have supported the project with experience in the specific industry? 3) ... have conveyed contacts to potential customers? 4) ... brought knowledge and experience needed for the development of products and services? 5) ... brought knowledge and experience needed for producing products / delivering services? 6) ... have helped the project with contacts to potential investors and lenders? 7) ... have helped in marketing and promotion? 8) ... have helped the project with their contacts to the administration and policy or their reputation? 9) ... have helped by the refinement of the business idea?
	However, we do not use the mere number of received advises. Instead, dummy variables for each field were created, indicating whether the entrepreneurs use social capital at all. The measure of help from strong ties is then the count of fields with received help, support or advice.
Weak ties (Interviewee)	Count of fields with received help support or advice (same procedure as with strong ties) from the circle of acquaintances. Acquaintances were defined as people the entrepreneur knew and could have talk when meeting on the street.
Overall social capital (Interviewee)	Count of fields with received help support or advice (same procedure as with strong ties) from either the circle of acquaintances or the circle of the closest friends and family members.
Overall social capital (Team)	In case of a start-up team, we additionally asked the interviewee if the other team members received advice, support or help from a third party in the nine respective fields. To ensure answerability of the questions, these are only binary items whether the other members used social capital. The measure of overall social capital is an aggregation of the help received by the interviewee and the other team members. We compute for overall social capital the count of fields with received help, support or advice across all members of the start-up team.
Any social capital (Interviewee)	Dummy: 1=Use of social capital in any of the nine different categories; otherwise=0; data at the interviewee level.
Any social capital (Team)	Dummy: 1=Use of social capital across all members of the start-up team in any of the nine different categories; otherwise=0.
Social capital traditional	
Knowing other managers and business owners	Dummy: 1=Knowing other managers and business owners from the first steps into the venture creation process until the start of the first business year; otherwise=0; data at the venture level.
Encouragement and social support	Dummy: 1=Received encouragement and social support in the venture creation process until the start of the first business year; otherwise=0, data at the interviewee level.
Public advice	Dummy: 1=Received advise from public institutions for different activities in the venture creation process until the start of the first business year; otherwise=0; data at the venture level.

Table 2: Control variables

Independent variable	Operationalization
Human capital	
Number of team members	Count of all team members who were actively involved in the venture creation process until the start of the first business year + ownership of a part of the venture.
Variety of functional background	Count of categories with working experience prior the first steps into the venture creation process across all team members (Six categories: 1=Management, 2=Marketing/Sales/Promotion, 3=Accounting/Controlling/Financing, 4=Engineering/R&D, 5=Production, 6=Personnel); data at the venture level.
Leadership experience	Count of years with experience in executive positions prior the first steps into the venture creation process across all team members; data at the venture level.
Entrepreneurial experience	Count of companies (registered in the commercial register) prior to the first steps into the venture creation process across all team members; data at the venture level.
Others	
Service company	Dummy: 1=Company offers mainly services; otherwise=0.
Innovativeness	Dummy: 1=Conducting R&D in the venture creation phase and the first three years of business was a major activity for the start-up; otherwise=0.
Start-up capital	Financial capital (equity + debt) at the start of the first business year, Categorical variable: 1= 1.000 Euro or less, 2=more than 1.000 Euro till 10.000 Euro, 2=more than 1,000 Euro till 10,000 Euro, 2=more than 1,000 Euro till 10,000 Euro, 3=more than 10,000 Euro till 50,000 Euro, 4=more than 50,000 Euro till 100,000 Euro, 5=more than 100,000 Euro till 250,000 Euro, 6=more than 250,000 Euro till 500,000 Euro, 7=more than 500,000 Euro.
Time dummies	Start-up year, 4 dummy variables: 1) start-up prior to 1994, 2) start-up between 1994 and 1997, 3) start-up between 1998 and 2000, 4) start-up between 2000 and 2006.
Industry dummies	NACE, 1-digit: 1) Chemical industry, metalworking industry, engineering, 2) Electrical engineering, fine mechanics, optics, 3) Information and communication technology, R&D, services, 4) Miscellaneous.

Table 3: Use of social capital between solo entrepreneurs and entrepreneurial teams

		Solo entrepreneurs (mean values)	Entrepreneurial teams (mean values)	Wilcoxon-Mann-Whitney test [a] Chi-square test [b]
Social capital use				
Overall social capital	IL [c]	3.0	2.3	2.920 (0.004) ***
	VL	3.0	2.7	1.244 (0.210)
Any social capital	IL	0.76	0.68	4.167 (0.041) **
	VL	0.76	0.73	0.800 (0.371)
Social capital traditional				
Knowing other managers	IL	0.58	0.53	1.165 (0.281)
and business owners	VL	0.58	0.61	0.482 (0.488)
Encouragement and social	IL	0.52	0.52	0.001 (0.971)
support [d]	VL	0.52		
Public advice	IL	0.42	0.42	0.015 (0.903)
	VL	0.42	0.44	0.185 (0.667)
Number of observations		182	274	

Note: [a] Wilcoxon-Mann-Whithney test on overall social capital use with prob > |t| in parentheses; [b] Chi-square test any social capital use and on social capital traditional with prob > |z| in parentheses; [c] data in first row on interviewee level (IL), data in second row on the venture level (VL), for solo entrepreneurs both levels are identical; [d] encouragement and social support is based on the interviewees response only; *** (**,*) denote a significance level of 1% (5%, 10%);

Table 5: The differential use of social capital

	Dependent variable: Any social capital use [a]		
	Solo entrepreneurs	Entrepreneurial teams	
		Venture level	Interviewee level
	(1)	(2)	(3)
Social capital traditional			
Knowing other managers and business	0.601 ***	0.841 ***	0.861 ***
Human capital and controls			
Number of team members	-----	-0.088	0.325 **
Variety of functional background	0.221	-0.360 **	-0.054
Leadership experience	-0.592 ***	0.330 *	0.322 *
Entrepreneurial experience	0.211	-0.125	-0.334
Service company	0.496 **	-0.135	0.244
Innovativeness	-0.379 *	0.428 **	0.172
Start-up capital	0.144	-0.067	0.115
Time dummies / Industry dummies	No/No	No/No	No/No
Constant	1.453 ***	1.234 ***	-1.537 ***
Chi^2	35.701	47.673	41.487
Pseudo R^2	0.182	0.148	0.142
Number of observations	182	274	274

[a] Logistic regressions; *** (**,*) denote a significance level of 1% (5%, 10%)

Table 4: The effect of social capital use

	All Start-up projects			Solo entrepreneurs				Entrepreneurial teams			
	Venture level	Interviewee level						Venture level		Interviewee level	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Social capital use											
Social capital (Team)	0.01	-----	-----	-----	-----	-----	-----	0.03	-0.02	-----	-----
Social capital (Interviewee)	-----	0.03	-----	0.10	0.10	-----	-----	-----	-----	-----	-----
Weak ties (Interviewee)	-----	-----	0.03	-----	-----	0.18**	0.16**	-----	-----	0.01	-0.02
Strong ties (Interviewee)	-----	-----	-0.06	-----	-----	-0.12	-0.11	-----	-----	0.02	0.02
Social capital traditional											
Knowing other managers and business owners	0.02	0.01	0.02	-0.05	-0.05	-0.05	-0.05	0.04	0.04	0.04	0.05
Encouragement and social support	0.07	0.06	0.08	0.04	0.04	0.05	0.05	0.05	0.08	0.05	0.70
Public advice	0.01	0.01	0.01	0.09	0.09	0.05	0.05	-0.09	-0.10	-0.09	-0.10
Human capital and controls											
Number of team members	0.03	0.04	0.02	-----	-----	-----	-----	-0.01	-0.02	-0.01	-0.02
Variety of functional background	0.18***	0.18***	0.18***	0.04	0.05	0.01	0.02	0.18***	0.17**	0.17**	0.16**
Leadership experience	0.04	0.04	0.03	0.27***	0.27***	0.24***	0.24***	-0.09	-0.08	-0.08	-0.06
Entrepreneurial experience	-0.07	-0.07	-0.07	-0.15**	-0.15**	-0.17**	-0.17**	-0.07	-0.06	-0.07	-0.06
Service company	0.01	0.01	0.01	-0.02	-0.02	-0.01	0.01	0.05	0.05	0.05	0.07
Innovativeness	-0.04	-0.04	-0.04	-0.08	-0.07	-0.06	-0.05	-0.02	-0.03	-0.02	-0.03
Start-up capital	0.32***	0.32***	0.33***	0.24***	0.25***	0.25***	0.26***	0.38***	0.39***	0.38***	0.38***
Time dummies / Industry dummies	Yes/Yes	Yes/Yes	Yes/Yes	No/Yes	No/Yes	No/Yes	No/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Interaction terms											
Variety of functional background x Overall social capital	-----	-----	-----	-----	0.12	-----	-----	-----	0.15***	-----	-----
Variety of functional background x Weak ties (Interviewee)	-----	-----	-----	-----	-----	-----	0.08	-----	-----	-----	0.14**
Constant	1.97***	1.97***	1.97***	1.72***	1.72***	1.70***	1.70***	2.05***	2.03***	2.05***	2.05***
Alpha	0.91	0.91	0.91	0.68	0.67	0.64	0.64	0.91	0.89	0.91	0.89
Chi^2	108.8	109.0	110.9	67.60	69.63	74.27	75.18	74.56	81.12	74.57	80,13
Pseudo R^2	0.04	0.04	0.04	0.06	0.06	0.07	0.07	0.04	0.05	0.04	0.05
Number of observations	456	456	456	182	182	182	182	274	274	274	274

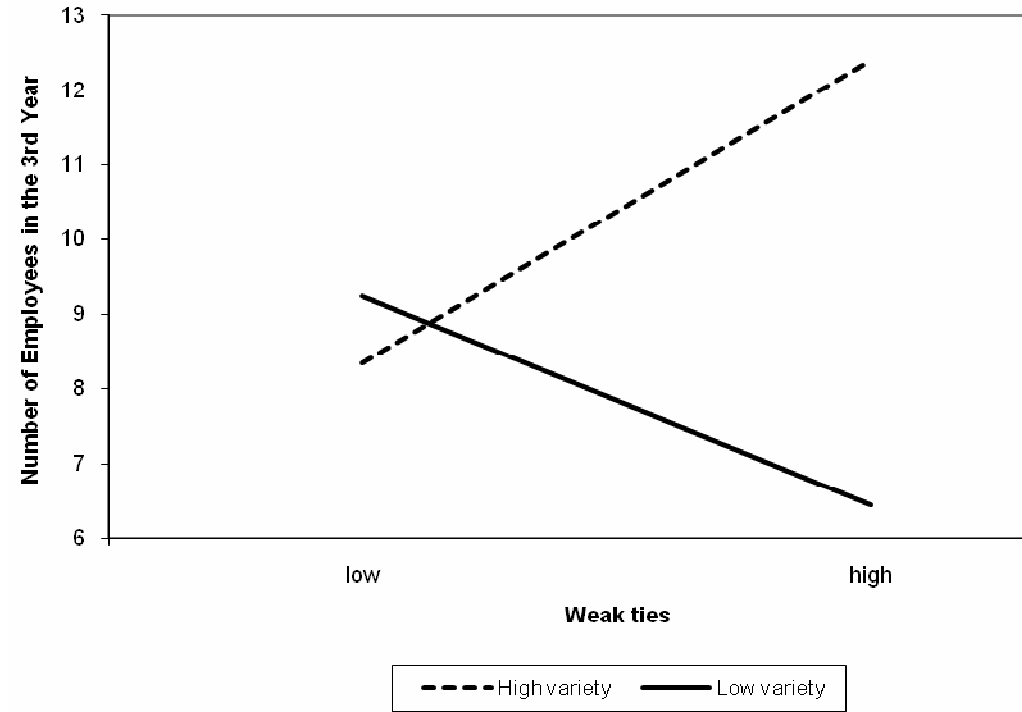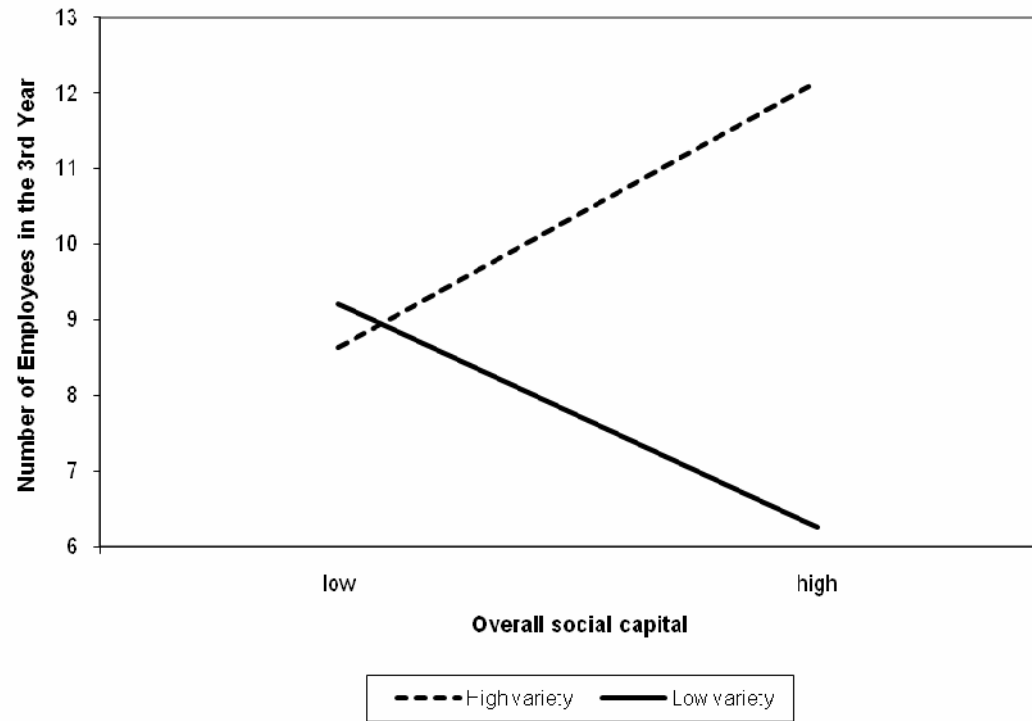[a] Negative binomial regression; *** (**,*) denote a significance level of 1% (5%, 10%)

Figure 1: The moderating effect of teams' variety of functional background

Appendix A: Descriptive Statistics and Intercorrelation Matrix for Solo entrepreneurs

Variable	Mean	Sd	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Number. of employees 3rd year	6.77	11.56	-	-	-	-	-	-	-	-	-	-	-	-	(-)
(2) Overall social capital (Interviewee)	2.98	2.45	0.00	-	-	-	-	-	-	-	-	-	-	-	-
(3) Any social capital (Interviewee)	0.76	0.43	0.05	0.67*	-	-	-	-	-	-	-	-	-	-	-
(4) Weak ties (Interviewee)	2.02	2.18	0.09	0.78*	0.51*	-	-	-	-	-	-	-	-	-	-
(5) Strong ties (Interviewee)	1.36	2.01	-0.09	0.59*	0.38*	0.04	-	-	-	-	-	-	-	-	-
(6) Knowing other managers and business owners	0.58	0.50	0.02	0.26*	0.26*	0.19*	0.16*	-	-	-	-	-	-	-	-
(7) Encouragement and social support	0.52	0.50	0.05	0.41*	0.34*	0.26*	0.33*	0.24*	-	-	-	-	-	-	-
(8) Public advice	0.42	0.50	0.12	0.21*	0.07	0.25*	0.03	-0.06	0.13	-	-	-	-	-	-
(9) Variety of functional background	3.02	1.74	0.04	-0.05	0.02	0.06	-0.15	0.07	-0.07	-0.00	-	-	-	-	-
(10) Leadership experience	6.73	7.67	0.28*	-0.11	-0.25*	0.04	-0.15*	-0.02	-0.13	0.03	0.28*	-	-	-	-
(11) Entrepreneurial experience	0.18	0.48	-0.07	0.07	0.04	0.11	-0.05	-0.03	-0.06	-0.10	0.11	0.15	-	-	-
(12) Service company	0.48	0.50	-0.14	0.19*	0.25*	0.12	0.12	0.20*	-0.04	0.02	-0.05	-0.21*	0.04	-	-
(13) Innovativeness	0.29	0.45	-0.01	-0.10	-0.20*	-0.07	-0.05	-0.07	-0.09	0.03	0.09	0.19*	0.12	-0.12	-
(14) Start-up capital	3.18	1.40	0.23*	-0.05	-0.01	-0.02	-0.04	-0.06	-0.10	0.12	0.17*	0.13	0.08	-0.22*	0.13

Note: * denote a significance level of 5%

Appendix B: Descriptive Statistics and Intercorrelation Matrix for Entrepreneurial Teams

Variable	Mean	Sd	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Number of employees 3rd year	9.12	14.84	-	-	-	-	-	-	-			-	-	-	-	-	-	-
(2) Overall social capital (Team)	2.71	2.51	0.04	-	-	-	-	-	-			-	-	-	-	-	-	-
(3) Overall social capital (Interviewee)	2.30	2.32	0.05	0.91*	-	-	-	-	-			-	-	-	-	-	-	-
(4) Any social capital (Team)	0.73	0.45	-0.10	0.66*	0.60*	-	-	-	-			-	-	-	-	-	-	-
(5) Any social capital (Interviewee)	0.68	0.47	-0.06	0.66*	0.69*	0.89*	-	-	-			-	-	-	-	-	-	-
(6) Weak ties (Interviewee)	1.74	2.12	0.04	0.78*	0.84	0.50*	0.57*	-	-			-	-	-	-	-	-	-
(7) Strong ties (Interviewee)	0.80	1.46	0.03	0.50*	0.61*	0.34	0.38*	0.08	-			-	-	-	-	-	-	-
(8) Knowing other managers and business owners	0.61	0.49	-0.01	0.41*	0.41*	0.33	0.36*	0.33*	0.26*	-		-	-	-	-	-	-	-
(9) Encouragement and social support	0.52	0.50	0.10	0.36*	0.35*	0.24*	0.24*	0.30*	0.20*	0.34*	-	-	-	-	-	-	-	-
(10) Public advice	0.44	0.50	-0.07	0.10	0.13*	0.13	0.14*	0.12	0.07	-0.00	-0.00	-	-	-	-	-	-	-
(11) Number of team members	2.77	0.90	-0.03	0.05	0.05	0.05	0.07	0.07	-0.02	0.07	0.05	0.05	-	-	-	-	-	-
(12) Variety of functional background	4.33	1.64	0.14*	0.04	0.04	-0.07	-0.04	0.01	0.07	0.04	-0.12	-0.12	0.11	-	-	-	-	-
(13) Leadership experience	16.81	17.74	0.07	0.08	0.12	0.06	0.08	0.14*	0.00	0.06	0.07	0.07	0.32*	0.32*	-	-	-	-
(14) Entrepreneurial experience	1.13	1.78	0.01	-0.01	-0.04	-0.04	-0.02	0.01	-0.08	-0.03	-0.14*	-0.14*	0.28*	0.28*	0.39*	-	-	-
(15) Service company	0.49	0.50	-0.05	-0.01	0.02	-0.03	-0.02	0.01	0.02	0.06	-0.05	-0.05	-0.15*	-0.09	-0.03	-0.05	-	-
(16) Innovativeness	0.34	0.47	0.00	0.09	0.05	0.04	0.05	0.02	0.06	-0.03	0.09	0.03	0.16*	0.10	0.03	0.80	-0.15*	-
(17) Start-up capital	3.31	1.34	0.32*	0.04	0.04	-0.02	0.01	0.05	0.00	0.01	0.07	0.07	0.06	0.23*	0.18*	0.17*	-0.13*	0.18*

Note: * denote a significance level of 5%

Table 6: Summary of results

Hypotheses	Results		
	All start-up projects	Solo entrepreneurs	Entrepreneurial team
H1: Solo entrepreneurs and entrepreneurial teams differ in social capital use		Supported	
H2: Overall social capital positive for performance	Not supported	Not supported	Not supported
H3: Strong ties positive for performance	Not supported	Not supported	Not supported
H4: Weak ties positive for performance	Not supported	Supported	Not supported
H5: Human capital variety moderating the effect of overall social capital on performance	Not tested	Not supported	Supported
H6: Human capital variety moderating the effect of weak ties on performance	Not tested	Not supported	Supported

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