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WORKING PAPER

The Association between Venture Capitalists' Selection and Value Adding Behavior: Evidence from Early Stage High Tech Venture Capitalists

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ABSTRACT

Building upon self-efficacy and collective effort theories, we study the association between the selection behavior of venture capitalists and their involvement in value adding activities. We argue that investors, who prioritize different characteristics of a business proposal during selection, will be more or less confident of their own abilities and the abilities of entrepreneurial teams to effectively add value to portfolio companies and hence will be more or less involved in providing value adding activities. In order to test this claim, we use a stratified sample comprising 68 European early stage high tech venture capitalists. Results show that venture capitalists, who focus on entrepreneurial team characteristics or financial criteria during selection are less involved in value adding activities compared to their peers, who focus on technological criteria. We discuss these findings from a theoretical and practical perspective.

Keywords: venture capital, value adding behavior, selection behavior, self-efficacy theory, collective effort theory

JEL codes: G24, L26, O32, D81

1. Introduction

Venture capitalists (VCs) not only provide well-needed financial resources to young and innovative ventures they select on the basis of their high future potential, but also engage in important value adding activities (MacMillan et al. 1989; Sapienza 1992; Sapienza et al. 1996; Baum and Silverman 2004; De Clercq and Manigart 2007; Large and Muegge 2008). These value adding activities include the professionalization of ventures, for instance, by influencing the structure and experience of the entrepreneurial management team (Hellmann and Puri 2002; Beckman and Burton 2008) and by influencing the quality of their financial accounts (Beuselinck and Manigart 2007). VCs may further add value by providing their portfolio companies access to broad networks of contacts with suppliers, customers, financiers and other potential stakeholders (Hochberg et al. 2007). Finally, VCs may also bring their reputation, which is expected to improve the legitimacy of their portfolio companies in the eyes of potential resource providers, and as such ease future resource mobilization (Davila et al. 2003; Hsu 2004).

Over the last two decades a large number of studies have contributed to our understanding of the extent to which VCs are involved in value adding activities and the conditions under which they engage in these activities (see De Clercq and Manigart (2007) and Large and Muegge (2008) for excellent recent overviews of this literature). In sum, prior studies on the determinants of the involvement of VCs in the provision of value adding activities have focused on the role of company characteristics (e.g., Sapienza 1992; Sapienza et al. 1996; Fredriksen et al. 1997), entrepreneurial characteristics (e.g., Sapienza 1992; Sapienza et al. 1996), investment manager characteristics (e.g., Sapienza et al. 1996; Dimov and Shepherd 2005; Bottazzi et al. 2007), venture capital fund and firm characteristics (e.g., Bottazzi et al. 2007; Sorensen 2007; Hassan

and Leece 2008), external conditions (e.g., Bruton et al. 2005) and finally the role of syndication (e.g., Brander et al. 2002; Dimov and De Clercq 2006; De Clercq et al. 2008).

At least two important gaps remain in our understanding of these value adding activities and their drivers. First, most studies have a tendency to study either selection or value adding in isolation. On the one hand an extensive stream of research has focused on the selection behavior of VCs, thereby studying the criteria that VCs employ to identify high potential ventures (MacMillan et al. 1985; Hall and Hofer 1993; Muzyka et al. 1996; Kaplan and Strömberg 2004; Kaplan et al. 2009; Knockaert et al. 2010) and studying cognitive differences in how VCs make decisions (Zacharakis and Meyer 2000; Zacharakis and Shepherd 2001; Shepherd et al. 2003). On the other hand, a separate stream of studies has researched which value adding activities VCs engage in and under which conditions (see above), thereby largely ignoring one of the fundamental insights from the selection literature, namely that selection behavior is heterogeneous (e.g., Muzyka et al. 1996; Kaplan et al. 2009; Knockaert et al. 2010). Although some attention has been given to the distribution of attention between selection and value adding activities by VCs (Kanniainen and Keuschnigg 2003; Shepherd et al. 2005; Bertoni et al. 2011) and scholars have acknowledged that it is the combination of both activities that influences the successful development of portfolio companies (Baum and Silverman 2004; Sorensen 2007), little research has addressed the specific question of how the selection behavior of VCs affects their involvement in value adding activities. It is however likely that the engagement by VCs in value adding activities will be associated with their selection behavior given the significant time dilemmas VCs face related to locating and closing new investment deals and supporting their portfolio companies (Gifford 1997).

Second, researchers studying the value adding behavior of VCs have generally focused on a broad sample of venture capital investors. This has provided evidence that early stage VCs differ from late stage VCs (Elango et al. 1995), and that high tech VCs differ from non high tech VCs (Lockett et al. 2002; Murray and Lott 1995). VCs will on average be more involved in value adding activities when they invest in younger and more innovative ventures (Sapienza et al. 1996). This suggests that early stage high tech VCs as a group will on average be more involved in providing value adding services to their portfolio companies as opposed to their peers who focus on later stage companies active in low tech industries. There has however been much less focus on the drivers of involvement in value adding activities among this important group of early stage high tech investors. This is unfortunate given the findings of previous research, which indicate there is significant variation in the involvement of VCs in their portfolio companies even within this more homogenous group of investors (Knockaert et al. 2006).

Moreover, understanding the variation in value adding involvement within this group of early stage high tech VCs is particularly important, since their portfolio companies, typically young high tech ventures, are critical for economic development through innovation, new employment creation, export sales growth and regional development (Autio and Yli-Renko 1998; Autio and Parhankangas 1998). Yet establishing new high tech ventures is a process fraught with difficulties. New ventures often lack the commitment of important stakeholders, are short of stable exchange relationships and operate under the guidance of immature and unrefined routines (Stinchcombe 1965; Stuart et al 1999; Bingham et al. 2007). Furthermore, while the most successful founders of new high tech ventures are those that combine technological experience with business experience (Storey and Tether 1998), founding teams are largely homogeneous in education, expertise and skills (Lockett et al. 2005; Ensley and Hmieleski 2005) and typically

comprise pure scientists, who lack business experience (Maurer and Ebers 2006). It is because of their infusion of both financial and knowledge-based resources that investment ties with VCs often represent one of the earliest and most critical resource-providing ties for young high tech ventures (Hallen 2008). Colombo and Grilli (2010), for instance, show that for young high tech ventures the assistance provided by VCs is particularly valuable when entrepreneurs lack industry-specific experience. Vanaelst et al. (2006) even argue that, given the sometimes high degree of involvement of VCs in strategic decision making in early stage high tech ventures, they could be considered as part of the extended top management team. Nevertheless, despite the potential benefits for early stage high tech entrepreneurs of attracting venture capital and obtaining access to their value adding services, little research has focused on providing an understanding of the variation in the provision of value adding services by early stage high tech VCs.

Following the two gaps identified above, the purpose of this study is to examine the association between the selection behavior of early stage high tech VCs and their involvement in value adding activities. In order to do so, we use a stratified sample comprising 68 early stage high tech VCs covering seven European regions that are selected on the basis of high R&D intensity and venture capital presence. From these investors we obtained detailed information on their selection and value adding behavior by combining multiple data collection strategies. The remainder of the paper is organized as follows. We first describe the critical role of both selection and value adding activities for early stage high tech VCs and provide a motivation for why these activities are likely to be related. Building on self-efficacy and collective effort theories, we then develop specific hypotheses on the association between the selection behavior of VCs and their involvement in value adding activities. Next, we outline the methods, including

the sample, measures and method of analysis. Then, we present the main research findings. We conclude by discussing the results from both a theoretical and practical perspective.

2. Theory and Hypotheses Development

In what follows, we first provide a motivation for why selection and value adding activities of VCs are likely to be interrelated. We subsequently develop specific hypotheses on the association between heterogeneity in the selection behavior of VCs and their involvement in value adding activities.

2.1. The association between selection and value adding behavior

The main business of VCs is to finance ventures that are characterized by high informational asymmetries and as a consequence generally lack access to public securities markets or institutional lenders (Gupta and Sapienza 1992; Amit et al. 1998). The primary goal of VCs is to generate returns from their investments by realizing an "exit" some three to seven years after the investment thereby turning their illiquid stakes in private ventures into realized returns (Gompers and Lerner 2001). All other things equal, VCs can increase the return potential of their investments by (1) selecting ventures with the highest potential pre-investment and (2) engaging in value adding services post-investment (Baum and Silverman 2004; De Clercq and Manigart 2007).

First, selection activities are crucial since an important problem faced by VCs is that of adverse selection. Adverse selection pertains to the risk that VCs select low-quality projects,

which have been presented to them as high-quality projects (Akerlof 1970). Entrepreneurs, by virtue of being intimately involved in their ventures, are likely to possess superior information about the prospects of their ventures. Entrepreneurs generally have an incentive to misrepresent any superior information they possess to their advantage and overstate the return potential or quality of their projects to VCs (Amit et al. 1998). To decrease the risk of adverse selection VCs engage in extensive information collection before investing and develop abilities in selecting ventures (Kaplan and Strömberg 2001; Fried and Hisrich 1994). Well-performed screening and due diligence should lead VCs to select the most promising ventures (Zacharakis and Meyer 2000; Baum and Silverman 2004; Sorensen 2007). VCs however evaluate hundreds of business plans and hundreds of data points within each plan during the venture screening and due diligence process, which can easily lead to information overload (Zacharakis and Meyer 2000; Zacharakis and Shepherd 2001). Baron (1998) argues that people are likely to take cognitive shortcuts as a response to conditions, such as information overload, high uncertainty and high time pressure, which all characterize VC investing. If VCs were to scrutinize each and every element of a business proposal, they would probably never come to conduct an investment (Zacharakis and Shepherd 2001). Selection criteria represent the shortcuts that enable VCs to deal quickly with the large volumes of information that confront them in daily business (Zacharakis and Meyer 2000) and as such relate to what they believe will create the most successful businesses (Kaplan et al. 2009).

Second, VCs typically not only select ventures with high potential, but also help in building ventures through the provision of value adding services. VCs often demonstrate a high degree of strategic involvement in their portfolio companies by taking seats in the board of directors and acting as a sounding board amongst other activities (e.g., Sapienza 1992; Vanaelst

et al. 2006). VCs may further contribute to the development of their portfolio companies by contributing to the professionalization of their portfolio companies (Hellmann and Puri 2002) and by providing access to their network of business contacts (Hochberg et al. 2007). Gorman and Sahlman (1989) showed that on average VCs spend over half of their time on monitoring and assisting their portfolio companies. The main motivation why VCs engage in these value adding activities is to further increase the return potential of their portfolio companies after the investment (Baum and Silverman 2004; Sorensen 2007; De Clercq and Manigart 2007).

VCs are typically in short supply, however, both within a specific venture capital firm and the venture capital market as a whole (Kanniainen and Keuschnigg 2004). This implies that VCs and especially their available time is a scarce resource, rather than the amount of financial resources they have available to invest in their portfolio companies (Kanniainen and Keuschnigg 2004). Although both selection and value adding activities are expected to increase the performance and return potential of portfolio companies (Baum and Silverman 2004; Sorensen 2007), it is unlikely that VCs will be able to concentrate fully on both activities at the same time, given their labor-intensive and time-consuming nature (Gorman and Sahlman 1989; Fried and Hisrich 1994). As a result, VCs generally face significant time dilemmas related to locating and closing new investment deals, and supporting their existing portfolio companies (Gifford 1997).

Prior research indicates that time constraints may force VCs to focus more or less on either selection or value adding activities. Kanniainen and Keuschnigg (2003), for instance, show that VCs either follow an intensive investment strategy in which they invest in few companies, but try to add high value or either follow an extensive investment strategy in which they invest in a large number of companies, but are not much involved in their investments. Prior research further indicates that the pre-investment screening and contracting activities of VCs are

interrelated with their post-investment value adding activities. Kaplan and Strömberg (2001), for instance, argue that through pre-investment screening VCs identify where they can add value post-investment through monitoring and support.

Building upon these insights, we argue that, when VCs are confident they select companies that require little value adding support in order to become successful, they will be less likely to engage in value adding activities. This is a consequence of both the time pressures faced by VCs (Gifford 1997) and the fact that the effort of entrepreneurs is generally viewed as being more efficient and hence less costly than that of VCs (Casamatta 2003). In what follows, we build upon self-efficacy and collective effort theories as theoretical frameworks to obtain a deeper understanding of how heterogeneity in the selection behavior of VCs affects their involvement in value adding activities.

2.2 Self-efficacy theory, collective effort theory and the association between selection and value adding behavior

Self-efficacy pertains to the belief that one can successfully execute the behavior required to produce a specific outcome (Bandura 1977; Gist and Mitchell 1992). Efficacy expectations are a major determinant of people's choice of activities and how much effort they will expend on these activities (Bandura 1977; Gist and Mitchell 1992). In a self-efficacy framework, people tend to avoid activities they believe exceed their coping skills, while people get involved in activities of which they judge themselves capable of handling. Self-efficacy further suggests that people who think they can perform well at a task do better than those who think they will fail (Gist and

Mitchell 1992). Thus, people prefer to perform activities they judge themselves capable of managing (Wood and Bandura 1989; Franke et al. 2006).

Self-efficacy is unlikely to be the sole driver of human effort, however. VCs do not operate in a social vacuum, but rather work together with the entrepreneurial teams in their portfolio companies to increase the potential of their investments. Indeed, Vanaelst et al. (2006) depict VCs as part of the extended management team. When working in a group, individuals are likely to expend less effort than when working individually (Karau and Williams 1993). This effect is also known as social loafing. Collective effort theory, however, indicate that social loafing is more likely to occur when individuals have high expectations of co-worker performance (Karau and Williams 1993). Hence, when VCs expect entrepreneurial teams to perform well by themselves, they may be less likely to be involved in value adding activities. This entails that differences in the selection behavior of VCs (e.g., when VCs want to select the best entrepreneurial teams rather than the best technologies) may significantly influence their involvement in value adding activities.

VCs differ on the selection criteria that matter most to them. Muzyka et al. (1996) were the first to identify differences in selection criteria used by VCs. They rejected the common assumption in the literature that a single hierarchy of decision criteria exists across all VCs. More recently, Kaplan et al. (2009) argue that although VCs prefer to invest in ventures with both strong business and strong management, different VCs are likely to weigh one or the other more heavily. This claim is also supported by Knockaert et al. (2010) who identified differences in importance attached to selection criteria in a sample of early stage high tech VCs. The latter study indicates that while some early stage high tech investors are more likely to focus on management team characteristics, others focus on technological criteria and still others focus on financial criteria when evaluating investment proposals. These differences in focus during the

selection of portfolio companies may have important implications for the involvement of VCs in subsequent value adding activities. In what follows, we build hypotheses on how a focus on management team characteristics ("people investors") and financial characteristics ("financial investors") in a business proposal can affect involvement in value adding behavior, while using investors who focus on technological characteristics ("technology investors") in a business proposal as a reference category. We use technology investors as the reference category given our research focus on early stage high tech investors and their technology-based portfolio companies.

Technology investors emphasize features related to technology and the product in the business proposal. The uniqueness of the product and the protection ability of the technology are important selection criteria to these investors (Kaplan et al. 2009; Knockaert et al. 2010). The selection literature indicates that the preference for technology-related characteristics in the business plan reflects a belief by VCs that when emphasizing these factors they will select the most promising proposals for the fund (Kaplan et al. 2009). However, the ultimate goal of VCs is not to have a portfolio of companies with superior technologies. Rather investors aim at seeing science translated into a viable business and revenue model, so they can eventually exit their investments with a significant return (Baeyens et al. 2006). It has been well documented, however, that commercializing new technologies is a process fraught with difficulties, given that early stage high tech ventures often operate in new, rapidly changing and global markets (Litvak 1990; Knight and Cavusgil 2004) and exploit technologies that are radically new, disruptive and often early stage (Christensen 2003; Danneels 2004; Nelson 2001). More significantly, the composition of entrepreneurial teams in these ventures is often homogeneous in terms of education, experience and skills, which are typically science-based (Ensley and Hmieleski 2005). As such these teams face a resource and knowledge gap related to the commercialization of

technology, whereas knowledge related to the technology is often abundantly available (Lockett et al. 2005). Furthermore, the founding teams generally have homogenous networks, which are typically limited to academic contacts, but lack valuable business contacts (Maurer and Ebers 2006). Hence, technology investors may be concerned about the abilities of entrepreneurial teams to overcome all these challenges by themselves. In line with collective effort theory, this implies that technology investors are likely to be heavily involved in value adding. Given that technology investors prioritize technology criteria in a business proposal, above any other criteria, their investments are likely to have gaps in the entrepreneurial team and their business network amongst others. VCs, however, have often accumulated experience with commercializing technologies and have a broad network of business contacts. As such, following self-efficacy theory, they may also feel more confident of being able to add value to the new venture and may therefore to a larger extent engage in value adding activities. We hence expect technology investors to be heavily involved in the provision of value adding services. In what follows, we provide a framework on the involvement in value adding activities of these technology investors compared to their counterparts emphasizing the human and financial characteristics in a business proposal.

People investors and involvement in value adding behavior

One of the aspects that has been documented extensively in the venture capital selection literature refers to the importance attached by VCs to the entrepreneur or entrepreneurial team (e.g., Muzyka et al. 1996; Franke et al. 2008). We propose that VCs who emphasize entrepreneurial team characteristics while selecting their investment companies, also called people investors, will

be less involved in value adding activities. When VCs prioritize entrepreneurial team characteristics in the business proposal it is their belief that a good and complete team is crucial for successful business development (Kaplan et al. 2009). The claim attributed to Arthur Rock "a great management team can find a good opportunity even if they have to make a huge leap from the market they currently occupy" (Quindlen 2000: 35) indicates that when VCs believe they selected a dedicated, high-quality and balanced team, they perceive that this team can do whatever it takes for a company to develop into a successful business. Some even argue "you can have a good idea and poor management and lose every time. You can have a poor idea and good management and win every time." (Gladstone and Gladstone 2002: 91-92).[3]

VCs that attach most importance to human capital characteristics in a business proposal, will perceive they are less able to add value in addition to what the selected entrepreneurial teams can do in their portfolio companies. Indeed, when VCs put great importance on the entrepreneurial team during the due diligence process, they are likely to perceive that these ventures require less value adding services. This is because ventures are expected to benefit most from the value adding activities when the entrepreneurial team is incomplete or inexperienced (Sapienza et al. 1996; Colombo and Grilli 2010). In collective effort models, when expectations of entrepreneurial team performance are high, VCs are expected to expend less effort. When entrepreneurs have industry-specific experience and networks within the industry, they are less likely to require assistance from VCs. Moreover, when VCs are confident they select the best teams, from a self-efficacy perspective, they may be less confident that they can successfully engage in value adding activities. After all scholars have argued that the entrepreneur's effort

[3] Whether people investors actually select teams that are of higher quality and are more complete compared to other investors is an interesting question. Nevertheless, irrespective of the actual decision, the *perception* of people investors that they select the best teams may be a sufficient condition for them to engage in less value adding.

will be more efficient than the effort by the VC (Casamatta 2003). Following self-efficacy and collective effort theories, we may hence expect that people investors will be less involved in value adding activities, since they will perceive both their own ability to add value in an effective way and the need to add value in addition to what entrepreneurial teams can do, to be low. This further allows them to dedicate their scarce time to other critical activities, including selection and contracting.

Overall, when we compare people investors to technology investors, we expect that people investors will be less involved in value adding activities. Both investors believe that prioritizing respectively people or technology characteristics will lead them to select the most successful ventures which will provide them the highest return at exit. Technology investors, however, typically invest in ventures where technological criteria are of first-order importance, while the quality of the team is of second-order importance and may hence be considered weaker (Kaplan et al. 2009). As technology investors are likely to see more gaps in the ability of the team to translate the technology into a market ready product, they will be more confident in their value adding capabilities and hence following self-efficacy and collective effort theories engage more extensively in value adding activities. People investors typically invest in ventures which they perceive to be headed by a strong team. While people investors may see gaps in other areas within the venture apart from the team, they are expected to believe that the management team, given its capabilities, should be able to address these problems and may feel less confident in their value adding capabilities. Following self-efficacy and collective effort theories we hence expect these investors to be less involved in value adding activities. This leads to the following hypothesis:

Hypothesis 1: People investors will exhibit a lower involvement in value adding activities compared to technology investors

Financial investors and involvement in value adding behavior

Prior research demonstrates that financial criteria, such as (potential) return on investment, and exit opportunities are important criteria in the VC selection process (Macmillan et al. 1985; Fried and Hisrich 1994). For some VCs, called "financial investors" these financial criteria may even be the primary factor driving their investment decisions (Knockaert et al. 2010). These selection criteria relate to the ultimate goal of any VC, namely the realization of successful exits typically three to seven years after the initial investment within their portfolio companies (Fried and Hisrich 1994; Gompers and Lerner 2001)[4].

Following self-efficacy theory the expectation of VCs that they can successfully execute the behavior required to produce an outcome, namely realizing an exit with a high return, will determine what activities VCs are likely to undertake and how much effort they will expend on these activities. When VCs put a great emphasis on financial criteria when selecting portfolio companies, they believe they can select portfolio companies for which the potential is already high even before they contribute any value adding services. Such investors are more likely to be overconfident in their selection abilities rather than be optimistically overconfident in their ability to actively influence the outcome of their decision through the provision of value adding services (Zacharakis and Shepherd 2001). Indeed, prior research indicates that VCs are generally

[4] Whether financial investors actually select the ventures with the highest ex-ante potential is an interesting question. The *perception* of financial investors that they select the ventures with the highest potential may be enough for them to engage in less value adding.

overconfident in their own abilities to select the "right" investments (Zacharakis and Shepherd 2001). Yet, perceptions of value adding involvement of VCs and entrepreneurs are largely aligned (Sapienza 1992; Fredriksen et al. 1997). Hence, building on arguments from self-efficacy theory and taking into account the time pressures faced by VCs, financial investors are expected to focus more on their selection activities, and will be less involved in value adding activities.

This is especially true when we compare the group of financial investors to technology investors. While technology investors may be confident that they select ventures with the most promising technologies, the ultimate goal of VCs is not to have a portfolio of companies with promising technologies. Technology investors may still perceive they need to spend a considerable amount of effort in helping their portfolio companies to translate technologies into marketable products. Technology investors may consider they are especially capable in helping their portfolio companies as these companies may have less business knowledge and less suitable networks. This is contrary to financial investors who believe they are capable of selecting companies which directly relate to the main goal of the investor, namely the exit and realization of a return. Financial investors may hence act more like "money managers", thereby putting money in ventures which they believe they have selected because of their high inherent return potential, but taking a more hands-off approach with respect to value adding (Zacharakis and Shepherd 2001). This leads to the following hypothesis:

> **Hypothesis 2:** Financial investors will exhibit a lower involvement in value adding activities compared to technology investors

3. Method

3.1. Data

The research setting is the population of early stage high tech VCs in seven European regions. We decided to focus on seven regions in Europe that had high R&D intensity and venture capital presence, which includes Cambridge/London (UK), Ile de France (France), Flanders (Belgium), North Holland (The Netherlands), Bavaria (Germany), Stockholm (Sweden) and Helsinki (Finland). It is well-established that the location of both high tech companies and venture capital investors that fund these companies is highly clustered in a handful of regions (Powell et al. 2002). We further focused on VCs drawn from multiple European regions in order to increase the generalizability of the findings compared to studies that focus on a single region or country.

In order to identify early stage high tech VCs, we started with constructing a list of venture capital funds that focus their investments on early stage high tech companies, even though early stage high tech investing did not have to be their sole investment focus. For this purpose, we could have used the member list of the European Private Equity and Venture Capital Association (EVCA). Yet, this would have resulted in a sample biased towards larger private venture capital firms. We created our own sample frame, combining data from EVCA, multiple regional venture capital associations, and information obtained through contacts with academics who had specific regional expertise and contacts. We excluded funds that had not made more than 10 investments in early stage high tech ventures (to ensure that we focused on active investors in early stage high tech companies) and funds that had not existed for more than one year (since investment managers in these funds may not have had enough time to provide value adding services to their portfolio companies), both at the time of database creation in 2003/2004.

Further, we did not include corporate venture funds, given that their investment objectives, often focusing on the promotion of organizational learning about emerging technologies and changing market dynamics greatly differ from other funds in the market (Bertoni et al. 2010; Ivanov and Xie 2010).

This resulted in a set of 220 venture capital funds investing in early stage and high tech ventures across the seven regions. We wanted to have a balanced representation of early stage high tech VCs operating in different funds. Hence, the sample of venture capital funds was stratified into different groups or subpopulations according to the size of the funds and their institutional investors. This is important as venture capital fund size is known to influence the amount of assistance provided by VCs to their portfolio companies (Elango et al. 1995). Moreover, different types of funds have different motives for investing and VCs in these funds are expected to differ in the amount of assistance they provide (Sapienza et al. 1996; Leleux and Surlemont 2003; Hassan and Leece 2008; Hellmann et al. 2008). Out of the different strata, we *randomly* selected 68 venture capital funds of which 11 from Cambridge/London, 10 from Ile de France, 8 from Flanders, 11 from North Holland, 10 from Bavaria, 11 from Stockholm and finally 7 from Helsinki. With respect to fund size the sample includes 33 small funds, 21 large funds and 14 mega funds[5]. With respect to the type of funds the sample includes 6 private equity arms of banks, 9 public funds, 12 public/private partnerships and the others are independent funds. Given that we were aware of the difficulty of gaining access to VCs for research purposes (Muzyka et al., 1996), we contacted all VCs by phone and explained the purpose of our research and the novelty of the research technique (see below). The personal contact over phone, in

[5] Venture funds having a fund size between 100 million Euro and 250 million Euro are considered to be large funds for venture investments. Mega funds are those funds having a size of more than 250 million Euro, small funds have less than 100 million Euro under management (EVCA definition).

combination with the novelty of the research technique and the face-to-face interviews, likely explains why none of the selected funds refused to participate in this research, which indicates that our study does not suffer from a non-response bias. We selected one investment manager per venture capital fund given that data collection required considerable time and effort from VCs. Finally, given that we have selected venture capital funds in the European regions that have been found to be distinctive from each other (UK, Scandinavia and continental Europe), we may expect our results to be more generalizable to the early stage high tech venture capital community in Europe compared to studies that focus on any region in isolation.

Data were collected over the period 2003-2004. Interviews with investment managers were carried out, each taking on average 90 minutes. Interviews first focused on the characteristics of the venture capital firm and the investment manager. Information already obtained from other secondary sources, including trade directories and websites was verified at this stage of the interview. Data on the venture capital firm includes, amongst others, fund size, origin of the fund and year of establishment. Data on the investment manager includes his/her experience in the venture capital industry, industry and geographic investment focus amongst others. In the second part of the interview, following a conjoint technique, investment managers were asked to rate 27 fictitious business proposals. This allowed us to examine the relative importance of different selection criteria used by the manager (see 3.2.2). A final part of the interview focused on the value adding involvement by investment managers.

Our research was designed to avoid common methods bias (CMB). First, Podsakoff et al. (2003) advocate the use of procedural remedies related to questionnaire design. They suggest that obtaining data on the dependent and independent variables from different sources and through different methodologies is the most effective remedy. We ensured methodological

separation of measurement of the dependent, independent and control variables by collecting these variables using different data collection methods (conjoint analysis, interviews including open and closed ended questions) and different data sources (interviews complemented by secondary data sources, including the EVCA and local venture capital directories, venture capital fund website information and social network sites such as LinkedIn). Second, statement ambiguity was reduced by pre-testing the survey (Tourangeau et al. 2000) and triangulation from archival sources was conducted (Parkhe 1993).

3.2. Measures

Our unit of analysis corresponds with the unit of observation, namely the individual venture capitalist. Hence, both value adding (dependent variable) and the selection behavior (independent variables) are measured through the eyes of investment managers, using different techniques. We discuss our dependent, independent and control variables in more detail below.

3.2.1. Dependent variable

Involvement in value adding activities. A synthesis of previous research, notably MacMillan et al. (1989), Sapienza (1992), Sapienza et al. (1996) and Pruthi et al. (2003) resulted in a list of 14 value adding activities. Knockaert et al. (2006) indicated the relevance of three additional value adding activities which were specific to high tech investments, including negotiating intellectual property rights, recruiting the head of Research and Development and forming an advisory board. An overview of the resulting 17 value adding activities is presented in Table 1.

Insert Table 1 about here

In line with Sapienza (1992) and Sapienza et al. (1996), investment managers were asked to score these value adding activities on two scales, namely frequency and importance. The frequency of each activity was scored on a 5-point Likert scale ranging from 1 "Never carry out this activity" to 5 "Always carry out this activity for portfolio companies". The importance attached to these activities was scored on another 5-point Likert scale ranging from 1 "Little important post-investment activity" to 5 "Very important post-investment activity". Multiplying both scores resulted in an involvement indicator for each of the 17 value adding activities, with scores ranging between 1 and 25, with 1 indicating low involvement and 25 indicating very high involvement in value adding activities. We subsequently combined the scores for each of the 17 value adding activities into a summated scale (Cronbach's Alpha = 0.774). This scale, which reflects the venture capitalist's overall *involvement in value adding activities* is used as the dependent variable in the current study.

3.2.2. Independent variables

We measured the selection behavior of VCs or the extent to which they attach more or less importance to specific selection criteria by using a conjoint methodology. Conjoint analysis has been previously used in the selection literature (e.g., Muzyka et al. 1996; Shepherd and Zacharakis 1999; Knockaert et al. 2010). Specifically, investment managers were asked to rate

27 fictitious business proposals on the likelihood that they would invest. These business plans included different scenarios, for instance in one business plan there was a complementary team with business experience, while in another business plan the team was non-complementary and there was no business experience. From the business plan ratings conjoint analysis derived utility scores which allowed us to produce relative rankings of the investment decision criteria for each venture capitalist. Next, hierarchical cluster analysis revealed that there were three distinct groups of early stage high tech venture capital investors: technology investors, people investors and financial investors (see Knockaert et al. 2010 for more details). Technology investors pay specific attention to the appropriability of the technology. For people investors, human factors such as leadership capacities of the entrepreneur and quality of the entrepreneurial team are of primary importance. Financial investors primarily focus on financial factors such as return on investment and time-to-break-even.[6] Important for the current study is that 22 (32.4%) VCs are defined as technology investors, 26 (38.2%) as people investors and 20 (29.4%) as financial investors. We use technology investors as a reference category and create two dummy variables, namely *people investors* and *financial investors* which equal one when the VC is defined as respectively a people investor or a financial investor and zero otherwise.

3.3.3. Control variables

[6] Although VCs may focus on more than one selection criterion, entrepreneurs rarely have business proposals that are complete in every respect (Bhide 1992). Moreover, while VCs may prefer to invest in ventures with both strong business and strong management, different VCs are likely to weigh one or the other more heavily (Kaplan et al. 2009). Consistent with these arguments, the cluster analysis revealed different groups of VCs, who focus more or less on specific selection criteria. Hence, as an example, we do not argue that technology investors do not focus on entrepreneurial team criteria, rather they put technology before people.

The involvement of VCs in value adding activities is not only determined by the selection behavior of VCs. We control for some key investment manager and venture capital fund characteristics that may be associated with the VC's involvement in value adding. As previous research indicates that venture capital fund size affects the involvement of VCs in their portfolio companies (Elango et al. 1995) we include a control *venture capital fund size.* Venture capital fund size is measured as the natural logarithm of the amount of capital managed (in millions of Euros). We also control for the type of venture capital investor as previous research indicates that different types of venture capital investors may be more or less involved in value adding activities (Sapienza et al. 1996; Leleux and Surlemont 2003; Hassan and Leece 2008). We include a dummy *captive* which equals one when the fund is the private equity arm of a bank or public fund, and zero otherwise.

Investment management experience is controlled for by including the number of years the investment manager has been operating in the venture capital industry. Previous research has shown that investment management experience affects the VC's value adding involvement (Sapienza et al. 1996). The investment managers in our sample had on average 4.85 years of experience as an investment manager, with a minimum of 1 year and maximum of 17 years. We further asked VCs to indicate the high tech sectors in which they had investment experience, including communications, computer-related, other electronics related, biotechnology, medical/health related, energy, chemicals and materials and industrial automation (EVCA industry classification), given that specialization by the VC may affect value adding involvement (Knockaert et al 2006). The *number of high tech sectors with investment experience* ranged from one to eight. The mean number of sectors in which VCs have investment experience equals 3.21. The geographical distance between VCs and their portfolio companies may also affect the

involvement of VCs in value adding (Sapienza et al. 1996; Sorenson and Stuart 2001; Devigne et al. 2011). We created a dummy variable equal to one when a VC was a *purely domestic investor* and zero otherwise.

Finally, we control for the location of the venture capital funds in which the VCs operate, since VCs operating in different countries may exhibit different value adding behavior (Sapienza et al. 1996) and since institutional influences of a country may explain heterogeneity in the decision policies of VCs (Zacharakis et al. 2007). We include six dummies which obtain a value of one when VCs operate from respectively North Holland, Ile de France, Flanders, Stockholm, Helsinki or Bavaria and zero otherwise. The UK is used as the reference category since it has the largest and most mature venture capital market in Europe. Moreover, the UK market is distinctive as a large amount of capital invested is allocated to later stage companies including buy-outs. Table 2 offers descriptive statistics and correlations.

Insert Table 2 about here

4. Findings

4.1. Main results

The results of the multivariate analyses are presented in Table 3. Variance inflation factors (VIF) are well below 10 (maximum VIF equals 2.52 and average VIF equals 1.80) and hence do not indicate that multicollinearity may be unduly influencing our results (Kutner et al. 2005).

The base model in the table presents the model with control variables only. This model is statistically significant at the $p < .01$ level and explains some 23% of the variance. The base model indicated that investment managers in captive funds are significantly less involved in value adding activities ($\beta = -2.036$; $p < .05$) compared to other types of VCs, which is consistent with previous research (e.g. Bottazzi et al. 2007). VCs located in the Stockholm-area ($\beta = 1.588$; $p < .05$) are significantly more involved in value adding activities.

The full model is statistically significant at the $p < .01$ level and explains 27% of the variance. The change in explanatory power between the base and full model is statistically significant at the $p < .05$ level. The full model supports our earlier findings with respect to captive funds and location in Scandinavia. Importantly, the full model further indicates that the selection behavior of VCs is associated with their subsequent involvement in value adding activities. Consistent with hypothesis 1, when VCs focus on the entrepreneur or entrepreneurial founding team during selection this is associated with a lower involvement in value adding activities ($\beta = -1.439$; $p < .05$) compared to technology investors. Moreover, our results indicate that when VCs focus on financial criteria during the selection of potential portfolio companies this is also associated with a lower involvement in value adding activities ($\beta = -1.484$; $p < .05$) compared to technology investors. This finding is consistent with hypothesis 2.

4.2. Post Hoc Analyses

We further conducted analyses to assess the robustness of our results and to provide more fine grained insights into the association between selection and value adding behavior.

First, we replicated the analyses using people investors as a reference category instead of technology investors. The results confirmed our findings on a higher involvement of technology investors in value adding activities, but did not reveal statistically significant differences between people and financial investors. However, as we will subsequently demonstrate, there are some important differences between people and financial investors with respect to the type of value adding activities in which they are involved.

Second, we replicated the analyses as presented in Table 3, but rather than using the involvement in value adding activities scale as a dependent variable, we uses the different value adding activities which together make up this scale as our dependent variables[7]. These analyses revealed some interesting insights concerning the link between heterogeneity in selection behavior and the variation in individual value adding activities. We find that people investors compromise on specific value adding activities which are less relevant if one is confident in the abilities of the selected entrepreneurial management team. Indeed, people investors were significantly less involved in daily management, hiring new employees (not related to top management team functions), contacting potential customers and finding additional finance compared to technology investors. Similar to people investors, financial investors were significantly less involved in daily management compared to technology investors. Different from people investors, however, financial investors also compromise on key strategic value adding activities. Financial investors, for instance, are significantly less involved in strategic planning, acting as a sounding board, hiring a CEO, determining the composition of the board and forming an advisory board.

[7] These 17 individual regressions (representing each individual value adding activity which represent the entire involvement in value adding scale) are not reported due to space considerations, but are available from the authors upon simple request.

Finally, we tested for regional differences in value adding behavior among VCs. While the proportion of people, technology or financial investors did not differ significantly across regions, our analyses did point towards the existence of regional differences in the involvement of VCs in value adding activities. Specifically, Scandinavian VCs were significantly more involved in value adding activities (average of 14.0 (s.d. 1.98)) compared to their continental European (average of 12.3 (s.d. 3.00)) and British colleagues (average of 11.8 (s.d. 1.57)). Scandinavian VCs were especially more involved in boards, meeting the entrepreneurs and hiring a CEO compared to their colleagues in continental Europe. Further, they were more involved in checking the sales figures and pipe and strategic planning compared to their British counterparts. Finally, VCs in continental Europe were significantly less involved in finding additional financing for their portfolio companies than UK VCs.

5. Conclusions, Implications and Directions for Future Research

In this paper we have addressed the following research question: "How is the heterogeneity in the selection behavior of early stage high tech VCs associated with their involvement in value adding activities?". We provided a theoretical answer to this question by using self-efficacy and collective effort theories as theoretical lenses. Self-efficacy theory posits that individuals are more likely to perform and spend more of their time on those activities they judge themselves capable of handling. Such a perspective may thus be particularly valuable in a VC context, since VCs are confronted with important dilemmas on how to allocate their limited time to multiple activities, including raising new funds, locating new investment deals and supporting their existing portfolio companies (Gifford 1997; Kanniainen and Keuschnigg 2003, 2004). Collective effort theory indicates that the behavior of individuals is not only influenced by their own

perceived capabilities, but also by the perceived capabilities of others. Such a perspective is also relevant as VCs are often depicted as part of the extended management team striving to influence the successful development of companies.

Based on self-efficacy and collective effort theories, we argued that VCs, who focus on selecting experienced and complete entrepreneurial management teams ("people investors") and VCs, who focus on selecting ventures with attractive financial perspectives ("financial investors") will be less involved in providing value adding activities compared to VCs, who focus on technological criteria ("technology investors"). Put briefly, people investors are expected to be less confident in their ability to effectively influence the outcome of their investment through their own involvement in addition to the entrepreneurial team's capabilities. In a similar vein, financial investors, who are confident in their ability to select ventures with high potential, may perceive less room to further influence venture development effectively through their value adding activities. In order to test our claims empirically, we used a stratified sample of 68 European early stage high tech VCs. The results confirmed our hypotheses that both people investors and financial investors are on average less involved in providing value adding activities compared to technology investors.

Our research has important academic implications. While some studies have already pointed to the existence of trade-offs between selection and value adding activities (e.g. Kanniainen and Keuschnigg 2003), little is known on how the heterogeneity in selection behavior affects value adding behavior. As such, we respond to the call by De Clercq and Manigart (2007) for more research on the factors that drive the involvement of VCs in their portfolio companies. Contrary to previous research we do not focus on a broad sample of VCs, but rather focus on a more homogenous sample of early stage high tech VCs. As such we avoid to replicate the

common findings that VCs investing in early stage and innovative companies will on average be more involved in value adding activities, and focus on factors that may drive differences in value adding behavior within a homogenous groups of investors. We show that the selection behavior of VCs is important to understand their value adding behavior, something which has been largely neglected in the venture capital literature hitherto.

By doing so this study also addresses an important anomaly in the venture capital literature. One the one hand, multiple studies have stated that VCs primarily select ventures with an experienced and complete entrepreneurial team irrespective of other criteria (MacMillan et al. 1985; Muzyka et al. 1996; Franke et al. 2008). Muzyka et al. (1996: 274) for instance conclude that the majority of VCs "prefer to select an opportunity that offers a good management team and reasonable financial and product-market characteristics, even if the opportunity does not meet the overall fund and deal requirements. It appears, quite logically, that without the correct management team and a reasonable idea, good financials are generally meaningless because they will never be achieved". On the other hand, multiple studies have indicated that VCs often spend a significant portion of their time in value adding services to their portfolio companies (Gorman and Sahlman 1989). Why would they do this, when their portfolio companies are managed by well-selected entrepreneurial teams, given that the effort of entrepreneurs is generally considered to be more effective and less costly than that of VCs (Casamatta 2003)? Moreover, several studies indicate that VCs are frequently involved in changing the structure and composition of the management teams in their portfolio companies (shortly) after their investments as part of their value adding activities (e.g., Hellmann and Puri 2002; Beckman and Burton 2008). Again, why would they do so, when they only select experienced and complete teams? In this study we demonstrate that taking into account the heterogeneity in the selection behavior of VCs and its

association with the involvement of VCs in providing value adding activities may help to address the above anomaly. Indeed, we show that people investors, those investors who focus primarily on the human capital characteristics of a business proposal, are less likely to be involved in the provision of value adding services compared to technology investors.

Although we believe this research provides new insights into the knowledge of VC's post-investment involvement, our research has a number of limitations that may lead to further research. First, we used perceptual measures for value adding behavior. Even though the perceptions of VCs on their value adding involvement has been found to be aligned with those of the entrepreneurs receiving value adding services (Sapienza 1992; Fredriksen et al. 1997), future research may purposefully analyze the extent to which the perceptions of investment managers on their value adding involvement are also related to their actual involvement. Second, our research is cross-sectional in nature. Longitudinal studies on value adding behavior by VCs in their portfolio companies may provide even more fine grained insights. Future research could for instance assess whether there is a persistent difference in value adding over time between different investors, and how do different investors react when performance metrics are not obtained. People investors, and especially financial investors may for example become more active once companies fail to achieve important milestones. Third, we do not demonstrate if any combination of selection and value adding behavior leads to superior investment outcomes.

Despite these limitations our research has a number of implications for VCs, high tech entrepreneurs and public policy makers. For VCs it provides insights into how their selection behavior is associated with their value adding involvement. VCs should be aware that their perceptions of what deals they select (i.e., deals with superior technology versus superior entrepreneurial teams versus superior financial prospects), will influence their value adding

behavior. This may be important for human resource management in venture capital firms when recruiting new VCs. For instance, VCs prioritizing financial criteria may fit less within a hands-on venture capital fund.

For high tech entrepreneurs, it provides insights into which VCs may be involved in value adding activities. The good news for these entrepreneurs is that although previous research has emphasized the importance VCs attach to human factors, some VCs may compensate the lack of skills or experience in the entrepreneurial team by their own involvement. The bad news, however, is that some VCs are more likely to act like "money managers" and contribute less value adding services. It is hence important that entrepreneurs not only undergo the due diligence of their potential investor(s), but conduct a due diligence themselves on their potential investor(s). Based on the emphasis that VCs put on specific elements such as technology (including patent screening and interventions from technical experts), team (including psychological profiles, contacting previous employers and checking track records) or financial elements (such as analyzing financial plans and valuations) during the due diligence process, entrepreneurs should be able to assess the level of active involvement in value adding activities they can expect from the VC.

Finally, many European governments are actively supporting their venture capital industries in an effort to boost the development of innovative ventures with high growth potential. Our findings provide insights to policy makers that their financial interventions in the VC industry may not result in equal effects across funds, but will be dependent on the investment managers that lead the fund. Support to technology investors may be very important in a developing entrepreneurial ecosystem where professional managers are lacking, as technology

investors not only contribute finance, but also provide more value adding services which may be needed to translate science in market ready products/services.

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Table 1: Overview of value adding activities

	Frequency		Importance		Involvement indicator (Frequency x Importance)	
Value adding activities	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Meet the entrepreneurs regularly	4.67	0.71	4.62	0.82	21.88	5.43
Strategic planning	4.24	0.95	4.41	0.87	19.35	6.20
Have a seat on Board of Directors	4.17	1.09	4.29	1.09	18.77	7.33
Act as a sounding board	4.24	0.98	4.24	1.03	18.75	6.76
Find additional financing	4.00	0.98	4.47	0.95	18.41	6.57
Open doors (use network)	4.17	1.05	4.15	0.95	17.92	6.75
Determine the composition of the Board	3.88	1.14	4.09	0.99	16.62	7.03
Hire a CEO	2.92	1.03	4.41	1.25	13.33	6.07
Contact potential customers	3.08	1.22	3.26	1.23	10.94	6.80
Hire a CFO	2.74	0.90	3.52	1.18	10.02	4.76
Hire the head of marketing and sales	2.52	0.97	3.42	1.27	9.18	5.48
Form an advisory Board	2.38	1.21	2.77	1.32	7.94	7.13
Negotiate important contracts	2.30	1.16	2.94	1.45	7.92	6.60
Negotiate intellectual property rights	2.24	1.23	3.14	1.47	7.92	6.57
Hire the R&D head	1.77	0.80	2.82	1.40	5.53	4.14
Hire new employees	1.74	1.06	1.68	0.88	3.42	3.60
Daily management (operational tasks)	1.65	0.79	1.80	1.14	3.31	3.09
Value adding average	**3.10**	**0.94**	**3.53**	**1.13**	**12.63**	**2.66**

Table 2: Descriptive statistics and correlations

		Mean	*S.D.*	1	2	3	4	5	6	7
1	Involvement in value adding activities	12.63	2.66	1.00						
2	People investor	0.38	0.49	-0.19	1.00					
3	Financial investor	0.29	0.46	-0.06	**-0.51**	1.00				
4	Venture capital fund size	4.39	1.58	0.18	-0.09	**0.28**	1.00			
5	Captive	0.22	0.42	**-0.45**	0.09	-0.03	-0.12	1.00		
6	Investment management experience	5.07	3.98	-0.01	0.04	-0.01	0.00	-0.11	1.00	
7	Number of high tech sectors with investment experience	3.21	2.42	**-0.46**	0.18	-0.08	**-0.40**	**0.43**	0.02	1.00
8	Purely domestic investor	0.48	0.50	**-0.36**	0.13	-0.23	**-0.64**	**0.32**	0.13	**0.54**

Bold: Correlations are significant at 0.05 level.

Variables 2, 3, 5 and 8 are binary and their correlations should hence be interpreted with care.

Table 3: Regression model with involvement in value adding activities as dependent variable

	Base Model	Full Model
Independent variables:		
People investor		-1.439 **
Financial investor		-1.484 **
Controls:		
Venture capital fund size	-0.047	0.062
Captive	-2.036 **	-2.131 ***
Investment management experience	-0.035	-0.039
Number of high tech sectors with investment experience	-0.199	-0.137
Purely domestic investor	-0.906	-0.925
North Holland	0.245	0.511
Ile de France	-0.450	-0.373
Flanders	0.150	0.759
Stockholm	1.588 **	1.650 **
Helsinki	0.881	0.976
Bavaria	-0.127	-0.072
Constant	12.417 ***	12.782 ***
F-Statistic	2.73 ***	4.61 ***
Adjusted R^2	0.23	0.27

Number of venture capitalists = 68.

Levels of significance: * $p < 0.10$; ** $p < 0.05$ and *** $p < 0.01$.

One-tailed tests for theorized (directional) effects. Two-tailed tests for control variable effects.