COMPOSITE STRUCTURAL ADVANTAGE IN VENTURE CAPITAL SYNDICATES: THE ROLE OF DIVERSITY AND LEAD FIRM REPUTATION

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ABSTRACT

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Instead of focusing on individual network attributes, such as centrality or constraint, and their respective effects on performance, this study investigates the overall advantage that results from holding a network position (i.e., composite structural advantage) and its effect on performance at the syndicate level. Specifically, in the context of venture capital syndication, it investigates a syndicate's composite structural advantage and suggests its positive effect on syndicate performance. Moreover, this study examines two moderating factors to this relationship. Composite structural advantage diversity within a syndicate is suggested to weaken the positive effect, while the lead venture capital firm's reputation is proposed to strengthen it. Two-stage least squares analyses, with 1,137 venture capital syndicate investments, confirmed the predicted effect of composite structural advantage and the negative effect of composite structural advantage diversity on the relationship. However, the lead venture capital firm reputation showed the opposite result from the expectation. The reputation weakened the positive effect of composite structural advantage on performance, as did composite structural advantage diversity.

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I. INTRODUCTION

Social network researchers have investigated various network attributes of an actor's structural position such as centrality (Freeman, 1979), closure (Coleman, 1988), density (Scott, 1991), and brokerage (Burt, 1992). However, a position within a network possesses multiple attributes that potentially bring conflicting effects on performance. For example, a position with a high level of centrality may increase performance, while the same position decreases performance via its low level of brokerage. In spite of this inconsistency, limited research has addressed the network position as a whole with a comprehensive construct reflective of overall advantage. Researchers have recently started to focus on overall advantage that results from holding a network position (e.g., Burt, 2010; Burt, Kilduff, & Tasselli, 2013; Greve, Rowley, & Shipilov, 2013).

However, there has not been a widely-accepted agreement about what this relatively new construct actually represents and how it is to be measured. For example, Burt (2012) considered network advantage as overall increase of performance and measured it as the number of non-redundant ties and network constraint in his research about virtual networks. Nevertheless, he also argued that network advantage is closely associated with both status and network constraint (Burt & Merluzzi, 2013). Greve et al. (2013) suggested network advantage as a more concrete construct with a number of field-based examples. According to them, network advantage refers to competitive advantage that a focal actor's network position brings, and is composed of three

key elements: better cooperation, superior information, and increased power (Greve et al., 2013). However, there was a limitation in that they did not propose a concrete measure of this construct. As their network advantage includes advantages both from a specific position in the network structure and from specific partners, the operationalization seems to be in need of refinement. This study suggests a subset of network advantage as a new construct which is worthwhile to investigate. This construct is solely about structural advantage that results from holding a position within a network. Then, three structural attributes in a network are combined to form a comprehensive measure to represent three components of Greve et al.'s network advantage (2013). This study proposes to call this new construct as composite structural advantage (hereafter, CSA).

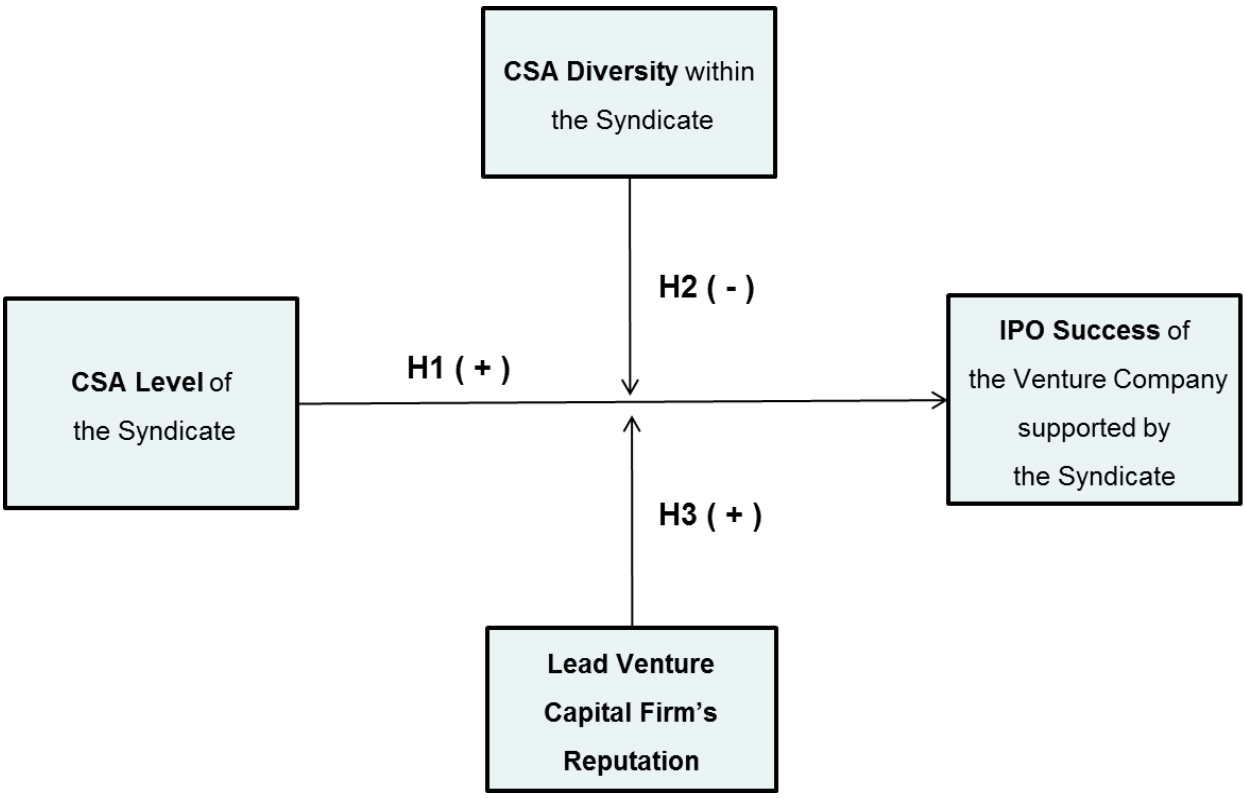
Then, CSA is suggested to play a meaningful role in the focal actor's performance as does network advantage. Prior research has shown that network advantage increases the focal actor's performance (Burt, 2010; Greve et al., 2013). However, this raises another issue depending on the focal actor's type. If a study is about network advantage of an individual, that study focuses on the network advantage the individual's network position brings (Burt, 2010). If another study is about network advantage of an organization, then, that study focuses on the network advantage the organization's network position brings (Greve et al., 2013). In both these cases, the network advantage level directly increases the focal actor's performance. Critically, in both these instances - reflective of the vast majority of studies – the focal actor is unitary (i.e., a single individual or organization). However, what if the focal actor is a group composed of multiple members who are themselves unitary actors? For instance, what if the focal actor is either a team composed of individuals or a syndicate composed of organizations? As previous studies at the unitary actor levels have shown, will the group's network advantage level, more

specifically, its CSA level, still increase its performance? Will there be any contingency factor governing the relationship between the group's CSA level and its performance? These considerations were developed into my research questions: How does a group's CSA level affect its performance? What factors will moderate the relationship between a group's CSA level and its performance?

This study addresses these research questions in the context of a syndicate of which members are organizations. More specifically, venture capital (hereafter, VC) syndication is investigated as the context of this study. A VC syndicate refers to a temporary group of two or more venture capital firms (hereafter, VCFs) that have the purpose of financial investment in a venture company (i.e., a start-up company). Recently, researchers have begun to show more interest in VC syndication, not only because it is a major form of VC investment (Tian, 2012), but also because it provides a rich empirical setting for investigating interorganizational ties (Podolny, 2001; Echols & Tsai, 2005). This study investigates CSA level of a VC syndicate and its effect on the syndicate's performance. The level is suggested to increase performance as previous studies at the unitary actor levels have shown. With regard to the second research question, the composition of the members' CSA levels may affect the group's performance. Moreover, the characteristics of the member that plays the role of the group's leader can affect the group's performance. Thus, this study looks into these two moderating factors. More specifically, this study investigates CSA diversity within a syndicate and the lead VCF's characteristics. CSA diversity refers to how diverse a group's members are in terms of CSA level. This factor is suggested to weaken the positive effect of CSA level on performance. The other moderating factor this study examines is the lead firm's reputation. Although the lead VCF plays a dominant role in the VC syndicate's investment (Wright & Lockett, 2003), it has not

received the attention it deserves. A reputable lead VCF is hypothesized to enhance its syndicate's performance by increasing the positive effect of the syndicate's CSA level. Figure 1 illustrates the research model. With regard to a venture company's success, both company characteristics and VC characteristics will be critical determinants. For example, quality of the entrepreneurs, knowledge, technologies, and initial resources will play an essential role in the company's success. However, this study mainly investigates VC's characteristics as the focus, while controlling for the venture company's characteristics in the analyses.

Figure 1. The Research Model: CSA Level, CSA Diversity and the Lead VCF's Reputation on the Venture Company's IPO Success



This study makes three primary contributions. First, it contributes to social network research. Although network advantage has recently started to receive more attention as the overall benefit that results from holding a network position, there has not been a widely-agreed view about what it really means and how to measure it. This study suggests a subset of network advantage as a new construct (i.e., CSA) which represents the structural benefits (i.e., information, cooperation, and power from holding a network position) that result from three network attributes: brokerage, direct ties, and power centrality. Moreover, this study addresses CSA at the syndicate level. Although previous research has shown the effects of network advantage at the unitary actor level (i.e., the levels of individual and organization), network advantage of a group such as a team or a syndicate may make distinct influences. This study focuses on a syndicate's CSA and demonstrates its effect on performance. Second, this study extends the understanding of diversity research by introducing CSA diversity. This diversity within a syndicate is shown to play a critical role as a moderating factor impacting the relationship between CSA level and performance. Third, this study directs attention to the lead organization as a determinant of syndicate performance. While research on the leader's influence has been a popular theme in the management field, interest in the lead organization has been limited. This study demonstrates the importance of the lead organization to its syndicate by indicating the lead firm reputation's moderation on the relationship between CSA level and performance.

The study is organized as follows. First, I review relevant literature related to network attributes, venture capital syndication, diversity, and reputation. Then, I develop the hypotheses. In the next part, I describe the research design including sample, data, and variables. Then, I

explain the statistical analyses and results. Finally, conclusions, contributions, limitations, and future directions are presented.

II. THEORY DEVELOPMENT

In this part, I review relevant literature related to network attributes, CSA, venture capital syndication, diversity, and reputation. After the review, I develop the hypotheses on the basis of the literature.

1. Network Attributes and Composite Structural Advantage

Every actor in a network maintains relationships with his/her alters. Actors and the relationships with their alters constitute the social network. One stream of social network research has emphasized the strength of links within a network (i.e., the relationships among actors). In his seminal article, Granovetter (1973) suggested the benefits of a weak tie as a source of novel information from disparate parts within a network. On the other hand, Krackhardt (1992) emphasized a strong tie as a base of trust in an uncertain environment. He argued that strong ties reduce resistance to change and provide support in the case of severe change. Also, contingency factors were suggested to govern the effects of tie strength. For example, strong ties are more beneficial in the exploitative context, while weak ties bring better performance in the

exploratory context (Rowley, Behrens, & Krackhardt, 2000). This research stream shows that the strength of ties affects the actors' choices among possible actions and their performance.

Other social network researchers have focused on the functions of a network. These second stream researchers symbolized the functions as 1) pipe, 2) bond, and 3) prism (Podolny, 2001; Borgatti & Halgin, 2011). The researchers of the first group looked into flows via network. A network works as channels through which knowledge (Powell, Koput, & Smith-Doerr, 1996), information (Koka & Prescott, 2002), innovative outputs (Ahuja, 2000), management practices (Davis & Greve 1997), and resources (Uzzi, 1996, 1997) flow. The second group of researchers focused on power created from the linked actors. Emerson (1962) pioneered to consider a network as a nexus where power resides by explaining reciprocal power-dependence relations within a network. Cook and Emerson (1978) conducted experimental studies about exercising power in exchange networks. These studies investigated power creation within a network and uneven allocation of the power to the members. Meanwhile, other researchers in this group emphasized the total power shared by the members that form a network (Powell, 1990; Jones, Hesterly, & Borgatti, 1997). Borgatti and Halgin (2011) reviewed relevant literature of this group and explained differences between the network as pipe and the network as bond. The third group of researchers considered a network as a prism that helps audiences evaluate the focal actor's quality (Podolny, 1993) and legitimacy (Baum & Oliver, 1992). In particular, this perspective enabled researchers to further develop social status research by considering a network as a source of status as well as the indicator (e.g., Stuart, Hoang, & Hybels, 1999; Podolny, 2001).

Another stream of social network research has addressed the structure of a network. This stream can be categorized into two groups as well. The former has focused on structural characteristics of a whole network such as density (Friedkin, 1981; Sparrowe, Liden, Wayne, &

Kraimer, 2001), centralization (Freeman, 1979; Sparrowe et al., 2001; Bunderson, 2003), and small world characteristics (Milgram, 1967; Uzzi & Spiro, 2005). The latter has shown interest in a focal actor and the actor's structural position within a network. However, there has been less effort to look into the structural position within a network as a whole. Instead, researchers have explained the distinct consequences of holding a position within a network by investigating the position's individual attributes such as centrality, closure, density, and brokerage (e.g., Freeman, 1979; Coleman, 1988; Scott, 1991; Burt, 1992). Compared to other network attributes, centrality has been consistently shown to increase performance such as innovative output (Powell et al., 1996; Tsai, 2001), new tie formation (Powell et al., 1996; Gulati & Gargiulo, 1999), and power (Burkhardt & Brass, 1990; Ibarra, 1993). However, other attributes have shown mixed results in terms of their influences on performance. Both closure and density are decided by whether a focal actor's partners form ties with each other. Closure refers to a structure where two specific partners of a focal actor form a tie with each other (i.e., each of the three actors linked with the other two actors), while density means the degree to which all the partners of a focal actor form ties with one another irrespective of the focal actor. These attributes enhance social capital (Coleman, 1988), knowledge transfer (Reagans & McEvily, 2003), and innovative performance (Tortoriello & Krackhardt, 2010) through their higher levels of trust and cooperation. Meanwhile, they can decrease managerial performance (Rodan & Galunic, 2004) and innovative performance (Gargiulo & Benassi, 2000; Fleming, Mingo, & Chen, 2007), as the focal actor can be more constrained by established (and often obsolete) norms. Likewise, brokerage has been shown to make conflicting effects on performance. It enhances performance by providing access to novel ideas and information (Burt, 1992; McEvily & Zaheer, 1999). In contrast, brokerage can reduce performance because it can lead to less trust and less shared norms of behavior (Ahuja,

2000). To explain this inconsistency, Burt (2001) suggested that a low level of brokerage within a group combined with a high level of brokerage beyond the group maximizes the group's performance.

Taken together, it has not been uncommon to see that a given structural position positively affects the actor's performance with regard to one network attribute of the position, while the same position negatively affects performance with regard to another network attribute. For example, a position with high centrality may increase performance, while the same position decreases performance via its low level of brokerage. Recently, researchers have started to look into a network position as a whole, instead of decomposing it into individual network attributes (Burt, 2010; Greve et al., 2013). Emphasizing the need to consider a network position as a whole, I address CSA which is the overall competitive advantage associated with a particular structural position in the network (Greve et al., 2013). More specifically, I investigate CSA level of a syndicate and its effect on performance. Additionally, I look into two moderating factors on this relationship. These effects on performance are investigated in the context of VC syndication.

2. Venture Capital Syndication

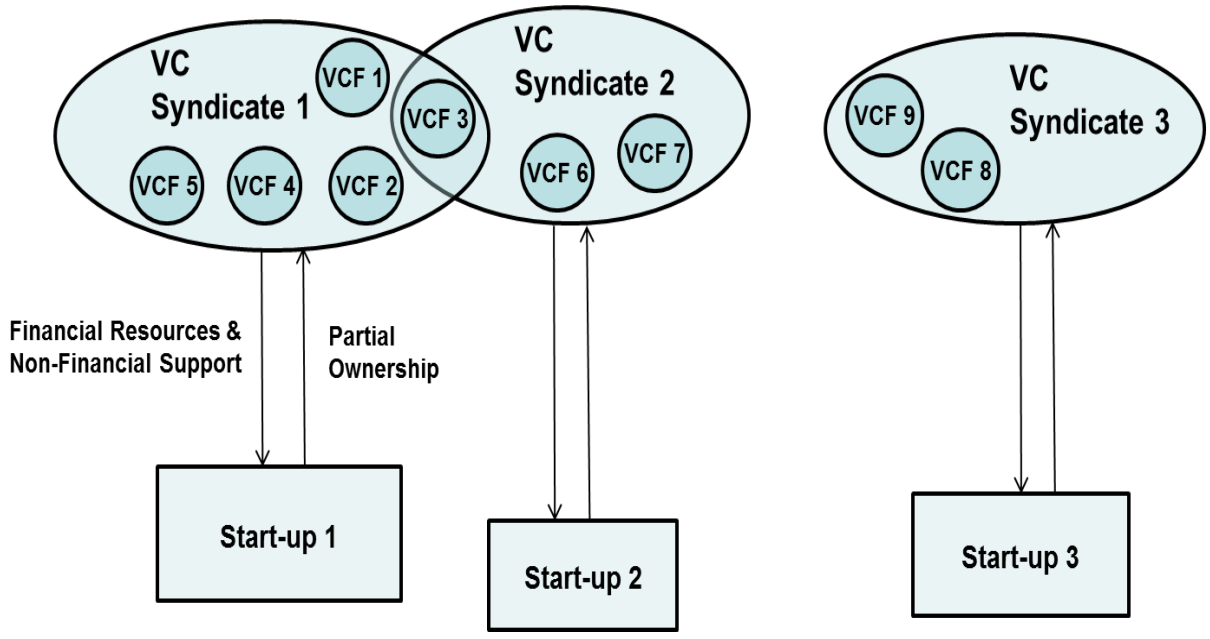
VC complements start-up companies (i.e., venture companies). From 1980 to 2005, VC supported approximately 30,000 U.S. venture companies (Tian, 2012). VC facilitates their growth by providing financial resources and non-financial supports. In particular, researchers have investigated the role of VC as providing financial resources to a venture company

(Gompers & Lerner, 2004), signaling a venture company's quality to potential investors (Stuart et al., 1999), sharing collective knowledge with a venture company (Ferrary & Granovetter, 2009), and embedding a venture company in pre-established entrepreneurial networks including accounting firms, law firms, and next-stage investors (Hsu, 2006). Although providing financial resources can be the most typical support to a venture company, the other non-financial contributions are also essential. This study emphasizes these non-financial contributions VC makes to a venture company (i.e., signaling, knowledge sharing, and embedding) as the factors affecting the venture company's performance and subsequently, the VC's performance.

As a pattern of investment, a number of VCFs often form a syndicate with other VCFs. They make a collective contribution to a venture company as they make a joint investment. An illustration of a VC syndicate is shown in the Figure 2. This can be considered as the dominant investment pattern among VCFs. From 1980 to 2005, 70% of VC investments in U.S. companies were conducted via syndicates (Tian, 2012). Research on VC syndication can be categorized into three sets of studies: motivation, process, and performance. First, the motivations of VC syndication have been suggested as overcoming the financial constraint of an individual VCF (Steiner & Greenwood, 1995), sharing the investment risks (Lockett & Wright, 2001), receiving a confirmation of the investment decision (Lerner, 1994), and obtaining benefits such as subsequent investment opportunities and a status increase from the affiliation with prestigious partners, which can be desired by both a VCF and a venture company (Lerner, 1994). Additionally, VCFs form a syndicate to exercise initiatives against a venture company (Kaplan & Strömberg, 2003) and to learn other VCFs' knowledge and to access their resources and capabilities (Brander, Amit, & Antweiler, 2002).

Second, VC syndication researchers have looked into the syndication process. Some of them investigated what types of VCFs are chosen as syndicate members, emphasizing the process of member selection. The studies showed that a lead VCF try to choose 1) reputable VCFs (Lerner, 1994), 2) VCFs possessing higher status within the syndication network (Dimov

Figure 2. Venture Capital Syndicates and their Investment



& Milanov, 2010), 3) VCFs that are complementary in terms of expertise (Lockett & Wright, 2001; Meuleman, Lockett, Manigart, & Wright, 2010), and 4) VCFs that had previous relationships which provide higher levels of trust (Sorenson & Stuart, 2008), as its syndicate partners. Other researchers focused on the distinct roles of a lead VCF and non-lead VCFs in

their investment processes. Gorman and Sahlman (1989) described a higher level of contribution that a lead VCF makes to its syndicate as compared to non-lead VCFs. Also, a lead VCF was suggested as the most important member in terms of its influences on syndicate performance (Wright & Lockett, 2003; Sorenson & Stuart, 2008).

Finally, the performance outcome of syndication has been the third theme in VC syndication research. Most of these studies measured performance with non-financial indicators such as exit type of a VC syndicate and survival rate of a venture company and focused on what factors bring VC syndicates better outcomes. They demonstrated that 1) syndication itself (Brander et al., 2002; Dimov & Milanov, 2010), 2) size of syndication (Dimov & De Clercq, 2006; Nahata, 2008), 3) higher centrality of VCFs (Hochberg, Ljungqvist, & Lu 2007), and 4) prior knowledge of VCFs (De Clercq & Dimov, 2008) are positively associated with better outcomes. This study belongs to this third stream of VC syndication research, focusing on the performance resulting from VC syndication. VC's investment is typically regarded as a success when it exits through initial public offering (hereafter, IPO), mergers and acquisitions, or stock buybacks (Guler, 2007). Among these successful exits, VC tends to obtain the highest returns when the venture company it supports does IPO (Gompers & Lerner, 2004). Thus, this study adopts IPO exit as performance criterion for the VC. These successful exits including IPO are affected by the VC's characteristics as well as the venture company's characteristics. Capable entrepreneurs and knowledge in a venture company will help the company to obtain higher performance and the VC which supports the company will be more likely to exit successfully. At the same time, resources, knowledge, and technologies in the VCF will play a similar role as do those in the venture company the VC supports.

This study focuses on VC's characteristics and their effect on its successful exit. More specifically, this study examines how performance (i.e., IPO success) of the venture company which a VC syndicate supports is influenced by the syndicate (i.e., CSA level) and how this relationship is moderated by two contingency factors (i.e., CSA diversity within the syndicate and the lead VCF's reputation). First of all, CSA tends to increase the focal actor's performance (Burt, 2010; Greve et al., 2013). This relationship is also applicable to VC syndication. VCFs with high levels of CSA have various benefits in terms of information, cooperation, and power, as firms with high levels of CSA obtain those benefits within their alliance network (Greve et al., 2013). These VCFs can receive superior information which flows within the network and tends to be brought to the actors holding advantageous positions (Burt, 1992; Powell et al, 1996). They can have better cooperation with their partners, which can be enabled through shared norms and trust (Coleman, 1988). Furthermore, they are able to possess higher levels of power their advantageous positions bring. For example, the power may include bargaining power against partners (Bonacich, 1987), reputation among competitors (Mehra, Dixon, Brass, & Robertson, 2006), and prestige from a high level of social status (Podolny, 1993). All these benefits help the VCFs contribute to the venture company supported by their syndicate more effectively, through signaling the quality, sharing knowledge, and embedding it in entrepreneurial networks. Then, the venture company will be more likely to obtain higher performance and subsequently, IPO success. It leads to higher performance of the syndicate. Therefore, I propose the following.

Hypothesis 1. A syndicate's CSA level is positively associated with its performance.

3. Diversity and Performance

The performance consequences of diversity has been a key theme in the management field (Williams & O'Reilly, 1998). The findings, however, have shown conflicting results. For example, at the individual level, age diversity (Kilduff, Angelmar, & Mehra, 2000), ethnic diversity (Richard, 2000), nationality diversity (Elron, 1997), and functional diversity (Barsade, Ward, Turner, & Sonnenfeld, 2000; Carpenter, 2002) have been found to positively affect performance. By contrast, a negative relationship was found between gender (Jehn & Bezrukova, 2004), age (Timmerman, 2000), and ethnic (Townsend & Scott, 2001) diversity and team performance. Consequently, researchers have suggested several contingency factors. Williams and O'reilly (1998) emphasized the role of task characteristics. According to them, with regard to simple and routine tasks, diversity is negatively related to performance. However, complex, creative, and innovative tasks allow diversity to enhance performance. West (2002) showed the moderating effects of several favorable conditions, such as shared team objectives, feelings of safety, and effective conflict management on the relationship between team diversity and performance. Additionally, temporal factors were suggested as a moderator of this relationship (Harrison, Price, & Bell, 1998; Carpenter, 2002). In a broader context related to individual diversity, Putnam (2007) demonstrated that ethnic diversity tends to reduce social solidarity and social capital in the short run, while it brings cultural, economic, fiscal, and developmental benefits to the community in the long run.

At the organizational level, researchers have investigated diversity among organizations and its consequences. However, in line with the results at the individual level, researchers have found mixed results at this level. On one hand, keeping relationships with diverse partners

enhances performance through a wider range of learning (Powell et al., 1996; Beckman & Haunschild, 2002). On the other hand, maintaining ties with diverse partners can bring lower performance to the focal organization because of higher coordination costs (Goerzen & Beamish, 2005). Likewise, greater diversity of alliance partners can be associated with a lower level of trust (Gulati, 1995). Furthermore, organizational diversity may affect performance in both directions (Zahra, Ireland, & Hitt, 2000; Koka & Prescott, 2002).

4. CSA Level and CSA Diversity

Diversity of members' network attributes has been relatively underexplored in spite of its influences on their team. A few exceptions include a study showing that higher creative performance of a team is obtained by a balance between core position members and periphery position members in the Hollywood film industry (Cattani & Ferriani, 2008). As a key determinant of performance, Cattani and Ferriani (2008) suggested distinct effects of core and periphery. Member in peripheral positions are more willing to receive novel ideas from outside as they have an intention to increase their status (Burt, 1980), while members in core positions provide legitimacy that supports novel ideas (Cross & Cummings, 2004). So, both the roles of introducing novel ideas and supporting them can be essential to a team. In their study of the Hollywood film industry, Cattani and Ferriani (2008) demonstrated that a team of either only core members or only peripheral members tends to obtain lower creative performance than a balanced team. A study by Aven and Hillmann (2014) demonstrated that higher performance is

obtained by a founding team with structural complementarity, which is composed of both entrepreneurs who play a brokerage role and entrepreneurs who have access to cohesive clusters (i.e., a diverse team in terms of network structure). Although these studies have shown a positive effect of diversity on performance in terms of members' network attributes, it may affect performance negatively in certain conditions. For example, it can decrease performance through the interaction with another factor regardless of its simple effect on performance. This study looks into the interaction effect between CSA level and CSA diversity by examining both the condition where CSA level is low and the condition where CSA level is high.

In the condition where CSA level of a syndicate is low, CSA diversity's contribution to performance increases, when compared to the other condition (i.e., the condition where CSA level of a syndicate is high). First, coordination costs from CSA diversity become reduced. When CSA level of a syndicate is low, the majority of the syndicate members hold low levels of CSA. They tend to possess lower levels of resources and capabilities (hereafter, R&Cs). In most cases, they prefer prestigious partners that tend to have high levels of CSA as they expect benefits from high levels of R&Cs these partners possess. But, forming links with prestigious partners is not easy as every actor seeks a better partner than itself. So, when they have a chance, they are more willing to cooperate even under a disadvantageous contract (Castellucci & Ertug, 2010). Furthermore, the majority are more willing to cooperate with partners with high levels of CSA because they will not only consider the current syndicate performance but also look forward to a future syndication with these partners. They show this tendency because they intend to increase their status through affiliating with prestigious partners. Thus, within the syndicate, they will be more collaborative and there will be less conflict. As a result, coordination costs from CSA diversity decrease as the majority of the syndicate members are more cooperative. Second,

benefits from CSA diversity become enhanced in the condition where CSA level of a syndicate is low. In this condition, the majority of the members have low levels of CSA. They are more willing to accept novel and different ideas, as they have an intention to enhance their current position (Becker, 1970; Burt, 1980), than members with high levels of CSA. So, the dominant atmosphere of the syndicate becomes to encourage difference and diversity. The syndicate can adopt novel ideas and opinions from diverse members more effectively. Taken together, the costs decreases and the benefits increases. Therefore, the contribution of CSA diversity to performance becomes higher than in the condition where CSA level is high.

In contrary, when CSA level of a syndicate is high, the contribution of CSA diversity to performance decreases, compared to the former condition (i.e., the condition where CSA level of a syndicate is low). First, benefits from CSA diversity become reduced in this condition. When CSA level of a syndicate is high, the majority of the syndicate members have high levels of CSA. They tend to possess higher levels of R&Cs and they are less willing to accept novel and different ideas for fear of losing their current high status. In other words, they show risk-averse behaviors. Many studies have shown that the incumbents that already possess secure positions do not adopt contra-normative or competence-destroying innovation (Tushman & Anderson 1986; Bower & Christensen 1995). Although they may obtain higher performance in the short term, they are likely to have a difficulty in the long term. These studies indicate that members with high levels of CSA in a syndicate can be reluctant to adopt novel ideas and opinions coming from diverse partners. The dominant atmosphere of the syndicate becomes to maintain the current norms and traditions. So, they do not take advantage of the contribution from diverse others and the benefits from CSA diversity decreases. Second, costs from partners with low levels of CSA still incur in this condition, although this syndicate is less likely to obtain the

benefits diverse partners can bring to the syndicate. More specifically, diversity in terms of CSA can increase the coordination costs because diversity leads to information discontinuities, lack of trust and familiarity, and the need to gather and assimilate a wide range of information (Goerzen & Beamish, 2005). In other words, in this condition, diversity's costs are not mitigated, while its benefits are reduced. Therefore, when CSA of a syndicate is high, the contribution of CSA diversity to performance becomes lower than in the case where the CSA is low. In line with this logic, I propose the following.

Hypothesis 2. CSA diversity within a syndicate weakens the positive relationship between the syndicate's CSA level and its performance.

5. CSA Level and Lead Venture Capital Firm's Reputation

This study follows the definition of reputation by Fombrun (1996, p.72), "A perceptual representation of a company's past actions and future prospects that describe the firm's overall appeal to all its key constituents when compared to other leading rivals." Reputation tends to bring the focal actor benefits such as signals of their higher abilities to others (Spence, 1973), access to valuable resources and information (Gompers, 1996), and price premium (Podolny, 1993; Hsu, 2004). Reputation also prevents the focal firm from engaging in opportunistic behaviors through the fear of reputational damage (Wright & Lockett, 2003). Likewise, reputation has been suggested as a positive factor in the VC industry. As a prominent (i.e.,

reputable) VCF signals the quality of the venture company it supports, the company obtains higher performance with regard to IPO (Gulati & Higgins, 2003; Hsu, 2006; Nahata, 2008). Also, a reputable VCF's investment brings higher premium to its venture company in M&A (Reuer, Tong, & Wu, 2012). However, the lead VCF's reputation has not received the attention it deserves, although reputation has been widely addressed in the VC industry.

A lead VCF plays an important role in the syndicate and critically affects the syndicate performance. Gorman and Sahlman (1989) showed that a lead VCF devotes three to five times more time to managing the investment, as compared to non-lead VCFs. A lead VCF also takes the largest stake, receives more informal information, and wields dominant power in decision making processes (Wright & Lockett, 2003). Sorenson and Stuart (2008) focused on the distance between a lead VCF and potential VC partners in terms of geography and industry experience. They found that distant ties between them are more likely to be formed when specific investment conditions are met (i.e., the venture company's industry, home region, age, syndicate size, and ties among syndicate members). All these studies indicate the critical role of a lead VCF in the VC syndicate's performance. Among the characteristics of a lead VCF, I suggest that its reputation can be a critical determinant of its syndicate's performance. A lead VCF's reputation can enhance its syndicate's performance in itself. First, potential investors are aware that a reputable lead VCF will behave less opportunistically because its reputational damage is more significant in close knit communities such as the VC industry (Meuleman et al., 2010). Thus, potential investors will consider the venture company supported by a reputable lead VCF's syndicate as a less risky investment target in terms of opportunistic behaviors. Second, a reputable VCF maintains a higher standard in choosing their partners. Because reciprocity between partners is critical, a reputable firm tries to select a firm that is both capable and reliable

(Stuart et al., 1999). The partners of a reputable lead VCF include both non-lead VCFs and the venture company. This tendency will increase the possibility of the venture company's success. Moreover, potential investors regard the VC syndicate led by a reputable VCF as a capable and reliable syndicate and the venture company backed by the reputable lead VCF as a promising target.

All these positive influences of a reputable lead VCF can increase if its syndicate's CSA level is high. In other words, a lead VCF's reputation can be another contingency factor impacting the relationship between its syndicate's CSA and performance. When a syndicate's CSA level is high, the lead VCF's reputation can bring higher performance. As audiences consider two consecutive positive signals as a confirmation of the focal actor's quality (Zhao & Zhou, 2011), the combination between a syndicate's high level of CSA and the lead VCF's reputation can work as a confirmation of the venture company's quality to potential investors. Then, they will have more confidence in the value of the venture company and the company is more likely to do an IPO than otherwise. Furthermore, coordination of non-lead VCFs can be affected by their lead VCF's reputation. When a syndicate's CSA level is high, coordination of the members will not be easy to a lead VCF with low reputation as they tend to have higher levels of criteria about their leader. Instead, if this syndicate is led by a reputable VCF, the reputation can provide legitimacy to the lead VCF as a signal of its capabilities and experience (Spence, 1973). In other words, the non-lead VCFs will acknowledge the lead VCF's capabilities and decision making of the syndicate will be made with lower coordination costs. Also, a reputable lead VCF is likely to have more experience and resources through previous experiences. Then, the lead VCF will be able to coordinate its non-lead VCFs with high levels of CSA more effectively. On the contrary, if a syndicate's CSA level is low, a less-reputable leader

will have fewer difficulties in coordinating its non-lead VCFs than a similar leader coordinating powerful partners. Thus, the contribution of a lead VCF's reputation to performance becomes lower in this condition than the condition where a syndicate's CSA is high. In line with this logic, I propose the following.

Hypothesis 3. A lead venture capital firm's reputation strengthens the positive relationship between its syndicate's CSA level and the syndicate's performance.

III. RESEARCH DESIGN

1. Sample and Data

I analyzed all VC syndicate investments from 1990 to 2000 and their exit performance from 1990 to 2010. I adopted this timeframe because the 10-year period after the last investment round should be considered when evaluating the success of a venture company (Guler, 2007). I collected data from the VentureXpert database of SDC Thomson, which has been extensively used to investigate the VC industry (Sorenson & Stuart, 2001). The dataset provided 6,173 VC syndicate investments made by 16,119 VCFs in the period from 1990 to 2000 (i.e., the investments of which both the first and the last investment rounds belong to the period from 1990 to 2000). With regard to the patent information of venture companies, I used the dataset provided by National Bureau of Economic Research's Patent Data Project. In terms of lead VCFs' reputation, I referred to the Lee, Pollock, & Jin's VC Reputation Index (Lee, Pollock, & Jin, 2011). After removing missing observations, the final sample consisted of 1,137 VC syndicate investments by 6,268 VCFs. Among 1,137 VC syndicate investments, 17.5% (i.e., 199 venture companies) held an IPO. These syndicates invested in venture companies from 26 countries. The nationalities of the venture companies are shown in Appendix 1. IPO successes according to their nationalities are presented in Appendix 2. The industries of venture companies and IPO success rates according to their industries are indicated in Appendix 3 and Appendix 4.

Additionally, I presented IPO success rates according to the number of VCFs within a syndicate, the number of corporate VCFs within a syndicate, and the number of financial affiliates within a syndicate in Appendices 5 to 7.

2. Dependent Variable: Exit Performance

The dependent variable was included in the models as a dummy variable indicating successful exit of a syndicate. The successful exit was measured as whether the venture company the syndicate supported succeeded in an IPO or not (i.e., *IPO success*). Although this variable represents a venture company's performance, it is directly linked to the VC syndicate's performance that results from supporting the venture company. If a venture company supported by a VC syndicate succeeded in doing an IPO from 1990 to 2010, I assigned one to the dependent variable as a successful exit of the VC syndicate. Otherwise, zero was assigned.

3. Independent Variables

This study investigated the effects of three independent variables measured at the syndicate level: CSA level of the syndicate, CSA diversity within the syndicate, and the lead VCF's reputation. CSA of a VCF was measured from network ties formed by the VCF with

other VCFs within the VC industry. I assumed that a tie was formed between two VCFs if they belonged to the same VC syndicate at least once (Hochberg et al., 2007). Also, I adopted an assumption that network ties last for five years (Sorenson & Stuart, 2001). Through these steps, annual network matrices were created for each year from 1990 to 2000. The number of VCFs in annual networks ranged from 2,117 to 6,366. On the basis of these network ties formed by VCFs, I calculated network characteristics of each VCF in each year. I matched each VCF's network characteristics to the values in the year of its last investment round. After removing missing values, I obtained 16,119 observations of VCFs' network characteristics, using UCINET 6 (Borgatti, Everett & Freeman, 2002). Then, I conducted a principal factor analysis with three network characteristics of these observations (i.e., number of ties, brokerage level, and power centrality), as they represent three components of CSA: cooperation, information, and power (Greve et al., 2013). The number of ties is associated with more cooperation, while brokerage level is related to quality of information. Higher power centrality of a focal actor within a network means higher level of power the actor can wield. The number of ties was measured by the number of direct ties a focal VCF formed (Freeman, 1979). Brokerage level was measured by the inverse value of network constraint (Burt, 1992). As in previous research about VCFs (Podolny, 1993; Sorenson & Stuart, 2001), power centrality was measured by using Bonacich's measurement (1987). This measure is formally defined as follows:

$$c\,(\alpha,\beta) = \alpha \sum_{k=0}^{\infty} \beta^k R^{k+1}\,1,$$

where α is a scaling factor, β is a weighting factor, *R* is a matrix of relationships, and 1 is a column vector of 1's. I set all main diagonal elements to 0, each element r_{ij} and r_{ji} in the matrix R

to 1 if a tie is formed, and 0 otherwise. According to this measure, a focal firm's status is a positive function of the number of ties and the status of other firms the focal firm forms ties with. Also, I followed the example of previous research for the designation of β in this measure and set it equal to three-quarters of the reciprocal of the largest eigenvalue (Podolny, 1993; Sorenson & Stuart, 2001). The new factor explained 93.5% of the variation of three network characteristics and I operationalized this factor as CSA level. I checked this factor's validity over time by conducting factor analyses every year from 1990 to 2000. As the analyses brought constant results that explained more than 90% of the variation every year, the factor's validity was confirmed. These results are presented in Appendix 6. *CSA level of a syndicate* was calculated as the sum of VCFs' CSA levels and included in the model as the first predictor.[1] *CSA diversity within a syndicate* was included in the analyses as the first moderating variable. Both the diversity and its interaction term with CSA level were included in the model to investigate its moderating effect. Diversity value was measured as coefficient of variation (i.e., the ratio of the standard deviation to the mean, Harrison, Price & Bell, 1988), as CSA was expressed as numeric values instead of categorical values which is common in diversity research.[2] Finally, the *lead VCF's reputation* as the second moderating variable and its interaction term with CSA level were included in the

[1] As an alternative to the initial measure of a syndicate's CSA level (i.e., the sum of VCFs' CSA levels), I also tested the model with the average value of VCFs' CSA levels. I found no significant changes from the initial result. However, the sum of VCFs' CSA levels represents the syndicate's CSA level more appropriately than average of VCFs' CSA levels. For example, a syndicate of ten VCFs with CSA level 0.5 will possess higher level of CSA than a syndicate of two VCFs with CSA level 0.5. Also, the number of VCFs within a syndicate is already included in the model as a control. Therefore, I adopted the sum of VCFs' CSA levels as the measure of a syndicate's CSA level.

[2] Diversity can be variously measured, such as Blau's heterogeneity index (Blau, 1977), Shannon's measure of entropy (Shannon, 1949), coefficient of variation (Harrison, Price & Bell, 1988), and so on. However, because the observations used in this study have numeric value instead of categorical value, the coefficient of variation can measure diversity value much more appropriately than other measures. For example, both Blau's heterogeneity index and Shannon's measure of entropy regard these different two syndicates (i.e., a syndicate A of member 1 with CSA level 0.1 & member 2 with CSA level 0.9 and a syndicate B of member 3 with CSA level 0.4 & member 4 with CSA level 0.5) as the same.

model. I applied three criteria to identify a lead VCF.[3] Following Sorenson and Stuart (2008), I considered the first round investor as the lead VCF. If multiple VCFs invested in the first round, I adopted the one that invested in all the rounds. If more than one VCF still remained as candidates, I regarded the VCF that invested the largest amount of money as the lead investor (Lee & Wahal, 2004). Reputation value was assigned to each lead VCF on the basis of the Lee, Pollock, & Jin's VC Reputation Index (Lee, Pollock, & Jin, 2011). This index was annually calculated from 1990 to 2010 on the basis of six factors: average of the number of investment funds under management in the prior five years, number of venture companies invested in over the prior five years, total dollar amount of funds invested in start-ups over the prior five years, number of companies taken public (i.e., IPO success) in the prior five years, and VCF's age.

4. Control Variables

In this study, I controlled for a number of variables. First, characteristics of investment are associated with a venture company's performance. I controlled for the *amount of money* invested in the venture company by a VC syndicate, which increases the syndicate's exit success likelihood (Guler, 2007; Waguespack & Fleming, 2009). Also, temporal aspects affect performance. As *length of investment* is related to more non-financial support, this can increase the venture company's performance. Thus, I controlled for the months from the first investment

[3] I checked another option for identifying the lead firm of a VC syndicate. I applied only the first two criteria (i.e. 1) the first investor and 2) the investor that participated in all the rounds, if more than two investors in the first round) and conducted the analyses. Though the number of observations was lower than the initial observation number (i.e., n=642), the analyses brought similar results.

round to the last one. The number of *investment rounds* can increase a venture company's performance, as more rounds mean continual financial support (Tian, 2011). So, I controlled for the number of the investment rounds a VC syndicate made.

Second, syndicate members may affect the likelihood of the syndicate's exit success. For example, the number of syndicate members may affect the venture company's performance. As all VCFs of a syndicate potentially contribute both financial and non-financial resources to the venture company the syndicate supports (Sorenson & Stuart, 2008), more VCFs can increase the venture company's performance (Guler, 2007; Hallen, 2008). Also, more VCFs may incur less risk to their syndicate (Sorenson & Stuart, 2008). Although the reduced risk may not be directly related to the venture company's success, it can affect the VCFs' supports to the company. Thus, I controlled for the *number of participating VCFs* in a syndicate. Moreover, the types of syndicate members may affect the venture company's IPO success. In particular, corporate VC (Dushnitsky & Shapira, 2010) and syndicate members affiliated with a financial institution (Higgins & Gulati, 2006) can affect the venture company's performance. Thus, I controlled for the *number of corporate VCF* and the *number of syndicate members affiliated with financial institutions* within a VC syndicate. Additionally, as previous investment experiences can be helpful to VCFs (Sørensen, 2007), I controlled for the *average number of investment rounds in which VCFs participated.*

Third, as a leader affects the group to which he/she belongs, a lead VCF can affect its syndicate's performance (i.e., the venture company's IPO success likelihood). I controlled for *the lead VCF's centrality*, as a VCF's network centrality enhances its investment performance (Hochberg et al., 2007). I referred to previous research which adopted Bonacich's measure to operationalize the centrality (Podolny, 1993; Sorenson & Stuart, 2001). Moreover, I controlled

for *foreignness of a lead VCF to a venture company*. If the lead VCF and a venture company are from the same nation, they may have less difficulty in their cooperation, particularly with regard to laws, institutions, and languages. If the nationalities of these two organizations are different, I assigned one. Contrarily, if these two organizations are from the same country, I assigned zero.

Fourth, I controlled for a venture company's characteristics. First of all, I included a dummy variable of whether a venture company possessed any *patent* during the focal period in the analyses. This represents a venture company's quality in terms of knowledge and technology. Furthermore, this can be considered as a proxy of the venture company's overall capability. If a company possesses a patent, potential investors tend to regard it as a signal of capability. Then, the venture company's IPO success likelihood may increase. In addition, I included *a venture company's nationality* in the analyses. In particular, this variable was included in the two stage least squares models as the instrument. I categorized 56 nationalities of the venture companies into six groups: the U.S., Canada, the U.K., other European countries, South Korea, and other countries. This categorization was conducted on the basis of the number of investments each group had in the 6,713 VC investments during the focal period. Also, I controlled for effects of the *industry* to which a venture company belongs, as the industry can affect the venture company's IPO success (Guler, 2007). I categorized 17 industry clusters into five groups: bio/medical industry group, software industry group, internet specific industry group, communication industry group, and the group of other industries. Similar to the variable of a venture company's nationality, this categorization was based on the investment number of each group among the 6,713 VC investments during the focal period. I controlled for industry effects by including four dummy variables representing the first four industry groups each. Additionally, I considered any potential location effect by including a dummy variable indicating whether a

venture company is located in California. A venture company in this specific area is able to obtain the best location advantages in the world and its IPO success likelihood may increase (Dimov & Milanov, 2010). Thus, I controlled for *investment in California* by assigning one to VC syndicates which invested in a venture company located in California. I assigned zero to the other VC syndicates.

Finally, I controlled for general conditions during the focal period by including *period variables* in the models. Ritter and Welch (2002) categorized the focal period from 1990 to 2000 into three spans in terms of IPO success rate (i.e., 1990~1994, 1995~1998, and 1999~2000). I assigned each VC syndicate to one of these three spans on the basis of the year to which the syndicate's last investment round belongs and included the dummy variables transformed from these categorical values. In my dataset, 46.0% of the IPOs were made in the year of the last investment round, and 32.8% of the IPOs in the next year. Table 1 explains how each variable is operationalized.

Table 1. Variables, Definitions, and Operationalizations

Variable	Definition	Operationalization	Sources
1. IPO of the Venture Company	Success of the venture company in terms of IPO from 1990 to 2010	Dummy variable (Success: 1 and Failure: 0)	SDC Thomson, Global New Issues Database
2. CSA Level	Competitive advantage from holding a network position	Factor obtained by a factor analysis with three network attributes (degree, centrality, and brokerage) in the year of the last investment round	SDC Thomson, VentureXpert
3. CSA Diversity	Diversity within the VC syndicate in terms of CSA level	Coefficient of variation (i.e., standard deviation over mean)	SDC Thomson, VentureXpert
4. Lead VCF Reputation	Reputation of the lead VCF	Reputation value of the lead VCF in the year of the last investment round (The Lee, Pollock, & Jin's index value)	Lee, Pollock, & Jin's VC Reputation Index
5. Invested Money	Total amount of money invested in the venture company	Invested money (USD)	SDC Thomson, VentureXpert
6. Length of Investment	Length of the investment period	Months from the first investment round to the last investment round	SDC Thomson, VentureXpert
7. # of Investment Rounds	Number of the investment round	Number of the investment round	SDC Thomson, VentureXpert
8. # of Participating VCFs	Number of the VCFs within a VC syndicate	Number of the VCFs within the VC syndicate	SDC Thomson, VentureXpert

Table 1. Variables, Definitions, and Operationalizations (cont.)

Variable	Definition	Operationalization	Sources
9. # of Corporate VCFs	Number of the corporate VCFs within the VC syndicate	Number of the corporate VCFs within the VC syndicate	SDC Thomson, VentureXpert
10. # of Financial Affiliates	Number of the VC syndicate members affiliated with a financial institution	Number of the VC syndicate members affiliated with a financial institution	SDC Thomson, VentureXpert
11. Experience of VCFs	Experience of the VCFs within the VC syndicate	Average of the previous investment rounds conducted by the VC syndicate's members	SDC Thomson, VentureXpert
12. Lead VCF's Centrality	Centrality of the lead VCF	Bonacich's power centrality	SDC Thomson, VentureXpert
13. Lead VCF's Foreignness	Difference between the venture company's nationality and the lead VCF's nationality	Dummy variable (Different nationalities: 1 and the same nationality: 0)	SDC Thomson, VentureXpert
14. Patent Dummy	Possession of any patents by the venture company	Dummy variable (Any patent until the last investment round: 1 and no patent: 0)	National Bureau of Economic Research patent data project
15. Company's Nationality	Nationality of the venture company	Assignment of numeric value according to the category (US: 6, Canada:5, UK:4, Other European countries: 3, South Korea:2, Etc.: 1)	SDC Thomson, VentureXpert

Table 1. Variables, Definitions, and Operationalizations (cont.)

Variable	Definition	Operationalization	Sources
16. Industry Dummy (Bio/medical industry group)	The venture company's inclusion in the bio/medical industry group	Dummy variable (Bio/medical industry group: 1 and otherwise: 0)	SDC Thomson, VentureXpert
17. Industry Dummy (Software industry group)	The venture company's inclusion in the software industry group	Dummy variable (Software industry: 1 and otherwise: 0)	SDC Thomson, VentureXpert
18. Industry Dummy (Internet specific industry group)	The venture company's inclusion in the internet specific industry group	Dummy variable (Internet specific industry group: 1 and otherwise: 0)	SDC Thomson, VentureXpert
19. Industry Dummy (Communication industry group)	The venture company's inclusion in the communication industry group	Dummy variable (Communication group: 1 and otherwise: 0)	SDC Thomson, VentureXpert
20. Investment in California	The venture company's location (California versus other places)	Dummy variable (California: 1 and other places: 0)	SDC Thomson, VentureXpert
21. Period Dummy (1995-1998)	The period when the investment was made	Dummy variable (The last investment round belonging to the period from 1995 to 1998: 1 and otherwise: 0)	SDC Thomson, VentureXpert
22. Period Dummy (1999-2000)	The period when the investment was made	Dummy variable (The last investment round belonging to the period from 1999 to 2000: 1 and otherwise: 0)	SDC Thomson, VentureXpert

IV. ANALSYSES AND RESULTS

1. Statistical Analyses

Table 2 presents the descriptive statistics and correlation coefficients of all the variables in this study. This table was created from the variables' raw values. Before conducting analyses, I checked each variable's distribution. Among a variable's various forms such as inverse, square, log, and cubic, I adopted the form which is most similar to the normal distribution for each variable. With regard to most variables, the raw values were closer to the normal distribution than any other forms. However, in terms of three variables (i.e., invested money, experience of VCFs, and lead VCF centrality), their log forms showed a closer distribution to the normal one than others. So, I transformed the raw values of these three variables into log values. Then, I standardized all the variables including three log-transformed variables and included them in the models. To assess the potential threat of collinearity, I estimated the variance inflation factors (i.e., VIFs) of the standardized values. I found that the greatest VIF of a variable was 4.15, which is much lower than the commonly used criterion (i.e., 10; Aiken & West, 1991). The average VIF of the variables was 2.09.

To predict the dichotomous dependent variable (i.e., IPO success of a venture company backed by a VC syndicate), I conducted probit analysis, which estimates the probability that an

Table 2. Descriptive Statistics and Correlations [a]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11
1. IPO success	0.18	0.38											
2. CSA Level	0.53	2.20	-0.05										
3. CSA Diversity	0.90	34.27	0.00	0.03									
4. Lead VCF Reputation	24.99	22.47	0.02	0.38	0.07								
5. Invested Money	24614.59	30602.74	0.14	0.22	0.03	0.14							
6. Length of Investment	21.69	20.35	0.21	-0.24	-0.04	0.02	0.17						
7. # of Investment Rounds	3.13	1.76	0.16	-0.14	-0.02	0.07	0.35	0.72					
8. # of Participating VCFs	5.54	3.47	0.24	0.05	0.03	0.15	0.61	0.34	0.50				
9. # of Corporate VCFs	0.66	1.11	0.13	0.04	0.00	0.01	0.39	0.09	0.19	0.55			
10. # of Financial Affiliates	0.39	0.77	0.10	0.17	0.01	0.07	0.42	0.17	0.26	0.56	0.22		
11. Experience of VCFs	3338.73	3110.05	0.04	0.02	0.01	0.10	-0.04	0.09	0.14	-0.05	-0.15	-0.12	
12. Lead VCF's Centrality	1740.12	1903.69	0.00	0.45	0.06	0.90	0.11	-0.04	0.01	0.11	0.04	0.05	0.06
13. Lead VCF's Foreignness	0.09	0.29	0.07	-0.03	-0.01	-0.12	-0.05	0.02	-0.08	-0.12	-0.04	-0.02	-0.12
14. Patent	0.08	0.28	0.64	0.01	0.00	0.04	0.12	0.12	0.14	0.21	0.11	0.10	0.06
15. Company's Nationality	5.62	1.19	-0.08	0.03	0.00	0.16	0.11	0.01	0.14	0.16	0.05	0.02	0.16
16. Bio/ Medical Industry	0.13	0.34	0.08	-0.09	0.03	0.05	-0.07	0.21	0.13	-0.01	-0.12	-0.01	0.03
17. Software Industry	0.25	0.43	0.02	-0.03	-0.01	0.00	-0.09	0.05	0.04	0.00	0.00	-0.05	0.04
18. Internet Industry	0.30	0.46	-0.06	0.12	0.02	-0.05	0.16	-0.26	-0.14	0.08	0.14	0.07	-0.05
19. Communication Industry	0.13	0.34	-0.02	0.08	-0.01	0.09	0.11	-0.01	0.05	0.04	0.01	0.03	-0.01
20. Investment in California	0.44	0.50	-0.02	0.12	0.01	0.17	0.04	0.00	0.04	0.11	0.05	-0.01	0.04
21. Period (1995-1998)	0.27	0.44	0.10	-0.15	-0.02	0.09	-0.18	0.06	0.08	-0.09	-0.15	-0.08	0.01
22. Period (1999-2000)	0.65	0.48	-0.11	0.15	0.02	-0.14	0.26	-0.02	-0.06	0.13	0.21	0.12	-0.06

[a] n=1,137. Correlations above |.06| are significant at the .05 level.

Table 2. Descriptive Statistics and Correlations [a] (cont.)

Variable	12	13	14	15	16	17	18	19	20	21
1. IPO success										
2. CSA Level										
3. CSA Diversity										
4. Lead VCF Reputation										
5. Invested Money										
6. Length of Investment										
7. # of Investment Rounds										
8. # of Participating VCFs										
9. # of Corporate VCFs										
10. # of Financial Affiliates										
11. Experience of VCFs										
12. Lead VCF's Centrality										
13. Lead VCF's Foreignness	-0.05									
14. Patent	0.03	-0.02								
15. Company's Nationality	0.07	-0.63	0.03							
16. Bio/ Medical Industry	0.02	-0.02	0.07	0.04						
17. Software Industry	0.00	-0.03	0.00	0.04	-0.22					
18. Internet Industry	-0.02	0.01	-0.08	0.01	-0.25	-0.37				
19. Communication Industry	0.08	-0.03	0.05	-0.03	-0.15	-0.22	-0.25			
20. Investment in California	0.16	-0.21	0.02	0.29	-0.05	-0.02	0.06	-0.01		
21. Period (1995-1998)	0.04	-0.08	0.07	0.07	0.09	0.07	-0.23	0.09	0.01	
22. Period (1999-2000)	-0.08	0.09	-0.07	-0.11	-0.13	-0.10	0.32	-0.06	-0.06	-0.83

[a] n=1,137. Correlations above |.06| are significant at the .05 level.

observation with specific characteristics will fall into one of two categories. However, there might be an endogeneity problem in the model, because the independent variables (i.e., CSA level) may be significantly correlated with the error term. Therefore, I adopted the two-stage least squares approach to address this problem (Wooldridge, 2002). In particular, a relationship may exist between a venture company's nationality and CSA level of the syndicate that supports the company. In some countries, both VCFs with low levels of CSA and VCFs with high levels of CSA can invest in venture companies. Meanwhile, only VCFs with high levels of CSA can invest in venture companies in other countries because VCFs with low levels of CSA can't endure risks and can't get sufficient information. So, a venture company's nationality affects the pool of potential VCFs and consequently, the VCFs' CSA, although it does not directly decide the advantage. Simultaneously, the nationality does not directly affect the syndicate performance. Furthermore, this approach was methodologically justified as all the relevant models (i.e., Model 2, 3, 4, and 5) brought significant endogeneity at the level of 99.9% in the Wald test of exogeneity (Wooldridge, 2002). Thus, I included the venture company's nationality as the instrument, with CSA level of the syndicate as the instrumented predictor. I conducted these 2-stage least squares analyses by using the *ivprobit* command of the statistical package Stata 11.

2. Results

Table 3 summarizes the results of the analyses. First, Model 1 is the base probit model only with control variables. This model shows that the amount of invested money, the length of

Table 3. Probit Estimates of IPO Success [a, b, c]

Variables	Model 1 (probit)		Model 2 (ivprobit)		Model 3 (ivprobit)	
Control						
Invested Money	0.28	(0.09)**	-0.11	(0.07)	-1.12	(0.07)†
Length of Investment	0.35	(0.08)***	0.35	(0.07)***	0.29	(0.07)***
# of Investment Rounds	-0.20	(0.09)*	0.00	(0.07)	0.02	(0.07)
# of Participating VCFs	0.20	(0.09)*	0.32	(0.06)***	0.96	(0.09)***
# of Corporate VCFs	0.05	(0.07)	-0.00	(0.04)	0.11	(0.04)*
# of Financial Affiliates	-0.07	(0.07)	-0.27	(0.05)***	-0.07	(0.05)
Experience of VCFs	0.07	(0.07)	-0.12	(0.04)**	-0.19	(0.05)***
Lead VCF's Centrality	-0.11	(0.06)†	-0.52	(0.04)***	-0.46	(0.04)***
Lead VCF's Foreignness	0.16	(0.24)	0.12	(0.17)	0.19	(0.16)***
Patent	3.38	(0.32)***	1.34	(0.54)*	1.31	(0.53)*
Company's Nationality [c]	-0.26	(0.07)***				
Bio/ Medical Industry	0.11	(0.20)	0.09	(0.13)	0.12	(0.13)
Software Industry	0.10	(0.17)	0.09	(0.11)	0.05	(0.11)
Internet Industry	0.22	(0.19)	0.12	(0.12)	0.07	(0.12)
Communication Industry	-0.53	(0.25)*	-0.33	(0.16)*	-0.47	(0.16)**
Investment in California	-0.05	(0.13)	-0.13	(0.08)	-0.17	(0.08)
Period Dummy (1995-1998)	-0.27	(0.21)	-0.02	(0.15)	0.09	(0.15)
Period Dummy (1999-2000)	-0.96	(0.23)***	-0.58	(0.19)**	-0.32	(0.20)
Predictor						
CSA Level			1.15	(0.09)***	1.55	(0.13)***
CSA Diversity					0.28	(0.03)
CSA Level * CSA Diversity					-1.24	(0.13)***
Lead VCF Reputation						
CSA Level * Lead VCF Reputation						
n	1137		1137		1137	
LR $\chi 2$	460.1					
Wald $\chi 2$			1014.3		1070.21	
Log-likelihood	-297.24		-1650.07		-1293.13	

a. Standard errors are reported in parentheses.

b. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

c. Included as an instrumental variable in Model 2, 3, 4, & 5

Table 3. Probit Estimates of IPO Success [a, b, c] (cont.)

Variables	Model 4 (ivprobit)		Model 5 (ivprobit)	
Control				
Invested Money	-0.09	(0.07)	-0.11	(0.07)†
Length of Investment	0.26	(0.07)***	0.23	(0.07)**
# of Investment Rounds	-0.03	(0.07)	-0.02	(0.07)
# of Participating VCFs	0.35	(0.06)***	0.98	(0.09)***
# of Corporate VCFs	-0.04	(0.05)	0.06	(0.04)
# of Financial Affiliates	-0.25	(0.05)***	-0.08	(0.05)†
Experience of VCFs	-0.11	(0.04)*	-0.18	(0.05)***
Lead VCF's Centrality	-0.70	(0.06)***	-0.66	(0.06)***
Lead VCF's Foreignness	0.29	(0.17)†	0.36	(0.16)*
Patent	1.32	(0.56)*	1.37	(0.55)*
Company's Nationality [c]				
Bio/ Medical Industry	0.04	(0.13)	0.08	(0.13)†
Software Industry	0.02	(0.11)	-0.01	(0.11)
Internet Industry	0.04	(0.12)	0.00	(0.12)
Communication Industry	-0.36	(0.16)*	-0.52	(0.15)**
Investment in California	-0.05	(0.08)	-0.10	(0.08)
Period Dummy (1995-1998)	0.06	(0.15)	0.15	(0.15)
Period Dummy (1999-2000)	-0.27	(0.20)	-0.08	(0.21)
Predictor				
CSA Level	1.62	(0.12)***	2.06	(0.17)***
CSA Diversity			-0.01	(0.03)
CSA Level * CSA Diversity			-1.17	(0.14)***
Lead VCF Reputation	0.57	(0.07)***	0.53	(0.07)***
CSA Level * Lead VCF Reputation	-1.20	(0.09)***	-1.14	(0.09)***
n	1137		1137	
LR $\chi 2$				
Wald $\chi 2$	1023.35		1007.65	
Log-likelihood	-1282.49		-981.41	

a. Standard errors are reported in parentheses.

b. † p < .10; * p < .05; ** p < .01; *** p < .001

c. Included as an instrumental variable in Model 2, 3, 4, & 5

investment, the number of VCFs, and patent possession significantly increase IPO success rate at least at the .05 level. The model also presents negative effects of the investment round number, the venture company's nationality, the venture company's inclusion in the communication industry, and the period from 1999 to 2000 on the rate at least at the .05 level. With regard to the venture company's nationality, I assigned higher value to each country on the basis of the degree to which the major country's VCFs in terms of the number (i.e., 78.56% of the VCFs belonged to the U.S. during the focal period) can easily make investments. [4] The result means that venture companies located in a country where VCFs of the U.S. will have difficulties in their investment tend to obtain higher performance. I expect that this result comes from the excellence of the companies chosen by the VCFs despite the difficulties they might have in the investment. The analysis result of this simple probit model is presented in Appendix 9.

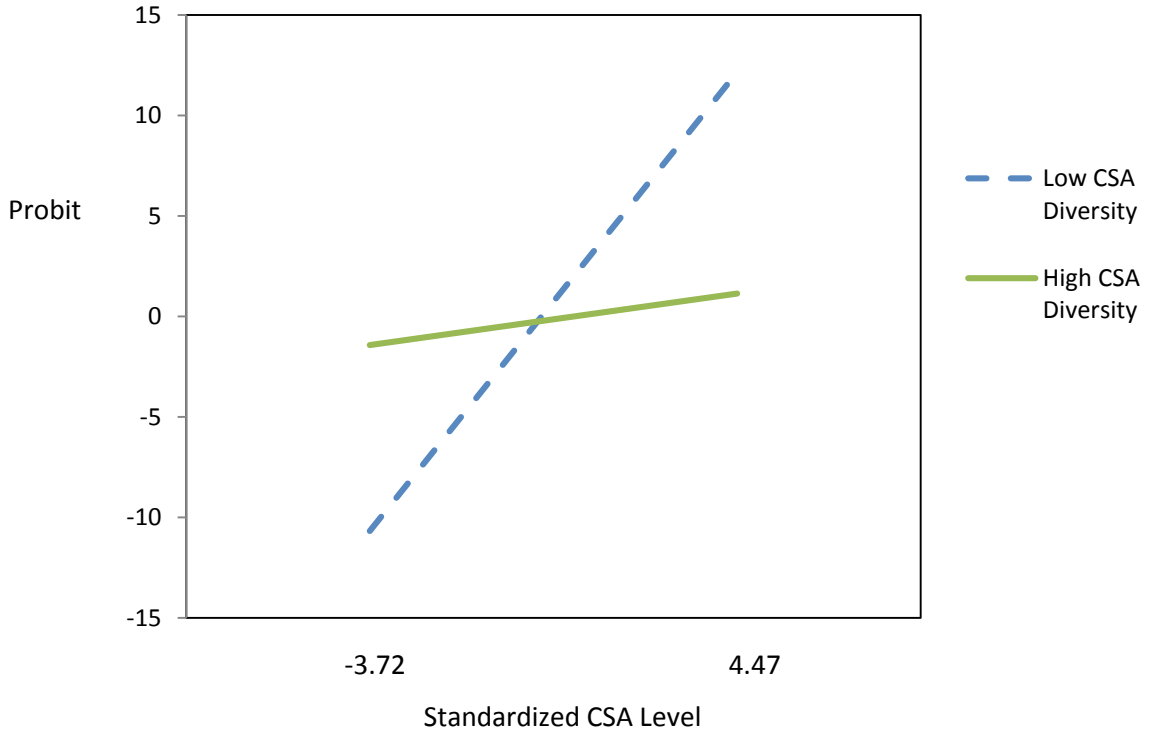
As mentioned above, I adopted 2SLS approach to address the possible endogeneity problem from Model 2 to Model 5. Model 2 includes CSA level of a syndicate as the independent variable in addition to the controls in Model 1. The result provides strong support to the expectation. CSA level has a positively significant coefficient (i.e., 1.146) in the probit regression. As predicted in Hypothesis 1, the level of a syndicate's CSA increases the syndicate's performance ($p < .001$).

In Model 3, CSA diversity is included as a moderating factor on the relationship between CSA level and performance. Both CSA diversity and its interaction term with CSA level are added to Model 2. The result shows that CSA diversity strongly weakens the positive relationship between CSA level and performance. In other words, when CSA diversity is high, the performance increase resulting from CSA level is reduced. So, Hypothesis 2 is strongly

[4] The value was assigned from 1 to 6 (US: 6, Canada:5, UK:4, Other European countries: 3, South Korea:2, Etc.: 1).

supported ($p < .001$). Figure 3 illustrates the interaction effects of Model 3. The figure shows the probit of IPO success according to standardized CSA level under two conditions (i.e., a high level of CSA diversity and a low level of CSA diversity). When CSA level is low, a high level of CSA diversity is more likely to bring IPO success than a low level of CSA diversity. But, the increasing likelihood of IPO success from increasing CSA level in the condition of a high level of CSA diversity is lower than the one in the condition of a low level of CSA diversity. After a threshold, this situation is changed. As CSA level becomes high, a low level of CSA diversity is more likely to bring IPO success than high level of CSA diversity. The increasing likelihood of

Figure 3. Interaction Effect on the Venture Company's IPO Success: CSA Level & CSA Diversity

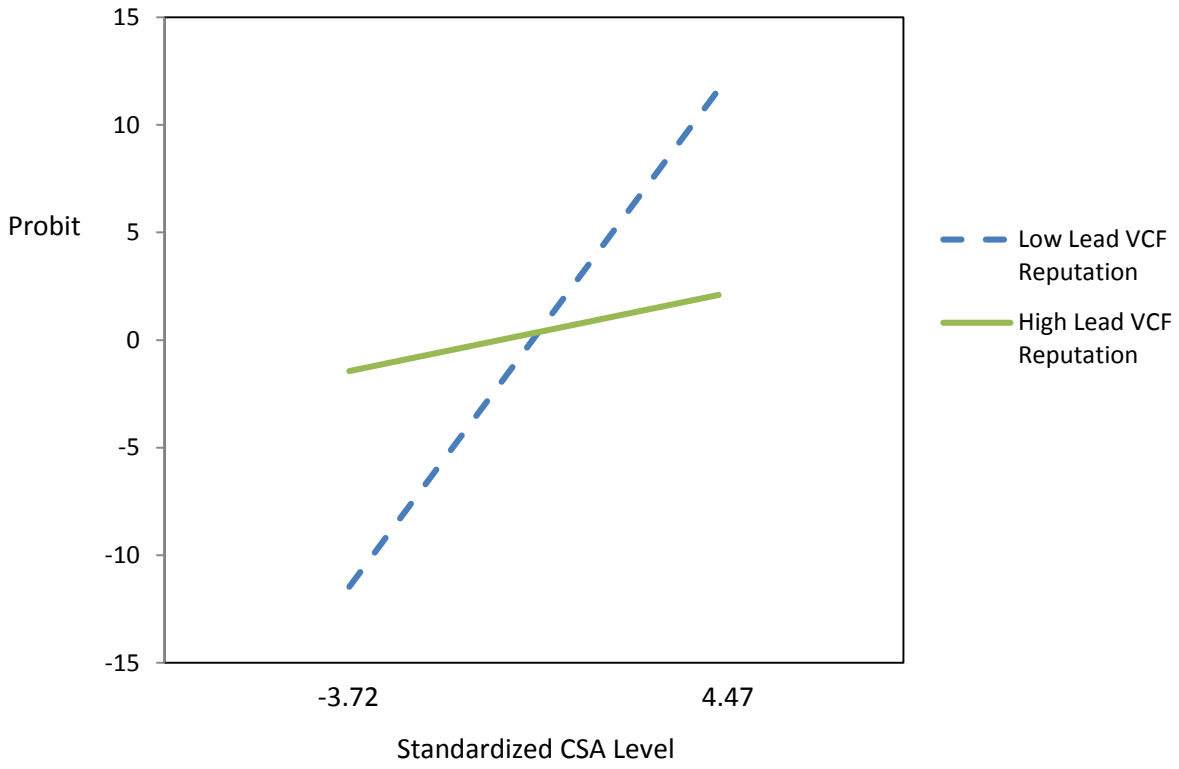


IPO success from increasing CSA level in the condition of a low level of CSA diversity is still higher than the one in the condition of a high level of CSA diversity. As mentioned above, CSA diversity is shown to weaken the positive relationship between CSA level and performance.

Model 4 is about the second moderating variable (i.e., the lead VCF's reputation). Lead VCF's reputation and its interaction term with CSA level are included in addition to Model 2. However, contrary to the expectation, the analysis result shows that the interaction term significantly decreases performance ($p < .001$). It indicates that the positive effect of CSA level on performance is reduced when lead VCF's reputation is high. So, Hypothesis 3 is not supported. The result provides even the opposite effect from the expectation with regard to the moderation of the lead VCF's reputation. Figure 4 illustrates the interaction effects of Model 4. The figure shows the probit of IPO success according to standardized CSA level under two conditions (i.e., a high level of lead VCF reputation and a low level of lead VCF reputation). When CSA level is low, a high level of lead VCF reputation is more likely to bring IPO success than a low level of lead VCF reputation. But, the increasing likelihood of IPO success from increasing CSA level in the condition of a high level of lead VCF reputation is lower than the one in the condition of a low level of lead VCF reputation. After a threshold, this situation is changed, as shown in Figure 3. As CSA level becomes high, a low level of lead VCF reputation is more likely to bring IPO success than a high level of lead VCF reputation. The increasing likelihood of IPO success from increasing CSA level in the condition of a low level of lead VCF reputation is still higher than the one in the condition of a high level of lead VCF reputation. Lead VCF reputation is shown to weaken the positive relationship between CSA level and performance as does CSA diversity.

Model 5 includes all the variables including CSA diversity, lead VCF reputation and their two interaction terms with CSA level in addition to Model 2. The result is consistent with Model 3 and 4. Both CSA diversity and lead VCF reputation significantly decrease the positive effect of CSA level on performance ($p < .001$). All the results of these probit models through 2 stage least squares approach are presented in Appendices 10 to 13.

Figure 4. Interaction Effect on the Venture Company's IPO Success: CSA Level & Lead Firm Reputation



V. DISCUSSION

1. Conclusions

This study addressed VCFs' influences on performance in the context of VC syndication. First of all, this study demonstrated that a venture company' network (i.e., its VCFs and the ties with them) plays a critical role in its performance. A venture company's performance is, of course, driven by its quality such as the entrepreneurs, knowledge, technology, and initial resources. Nevertheless, this study showed that its partners affect its performance, too. More specifically, who the partners are both in the global network (i.e., CSA within the whole VCFs' network) and in the local network (i.e., CSA diversity within each syndicate) was demonstrated to impact a venture company's performance.

As well as three main predictors, several control variables are noteworthy as meaningful determinants of performance. First, the invested money, the length of investment, and the number of VCFs were shown to increase performance. This result suggests that non-financial support contributes to a venture company's performance, as well as financial support does. Second, the significance of patent possession is a reminder of intellectual properties' importance as an indicator of a company's overall capabilities. The coefficient of the patent variable in Model 1 indicates that possessing any patent contributed to a venture company's IPO success more than any other factors. Meanwhile, some factors negatively affected syndicate

performance. Contrary to the expectation, the number of investment rounds was shown to decrease the syndicate's performance. This means that a venture company that receives financial support at multiple rounds is less likely to do an IPO. I expect that this result was from a VCFs' tendency to adopt an option with lower risks. In particular, if a venture company is considered more promising and less risky than others, VCFs will provide sufficient resources at earlier stages to obtain initiatives in the investment. But, if VCFs choose to support a venture company of which potential is less certain and more risky, they will provide financial resources at multiple rounds. In this case, the venture company may have less likelihood of doing an IPO than a venture company that could convince the investors of its potential and receive sufficient support at earlier rounds. Conversely, a large number of investment rounds may not be a positive signal to some potential investors. It can be understood that VCFs which support a venture company through a lot of rounds are not quite confident about the company's future. This leads to a lower likelihood of the company's IPO success. Moreover, nationality was demonstrated to work as a determinant of performance. As explained in the result part, this result means that venture companies located in a country where the U.S. VCFs (i.e., 78.56% of all the VCFs during the period) will have difficulties in their investment tend to obtain higher performance. I expect that this result comes from the excellence of the companies chosen by VCFs in spite of the difficulties they might have in the investment. For instance, if a VC syndicate from the U.S. decides to support a venture company located in a country which they cannot easily invest because of distance in geography, language, and culture, it means that the company is regarded as possessing highly promising capabilities. Its potential capabilities will be able to bring an IPO success to it. In other words, the high likelihood of IPO success that a venture company in a minor country had can be understood as its higher potentials that would attract their investors.

The analysis with control variables also confirmed that a venture company's industry affects its performance. In particular, a venture company in the communication industry showed a lower likelihood of IPO success than other industry companies. The other four industry groups showed no significant effect on a player's IPO success in their industries. Additionally, a venture company that received its final round support from 1999 to 2000 showed less likelihood of IPO success. Perhaps, this result can be understood as investments that were conducted less carefully in this buoyant period.

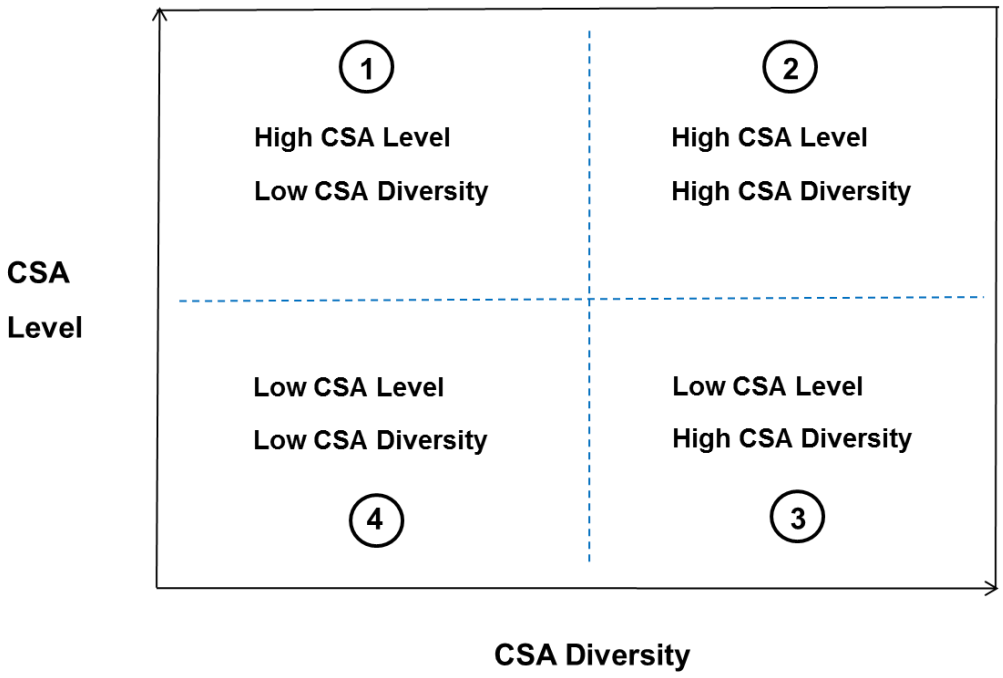
This study focused on the relationship between a syndicate's CSA level and its performance. First of all, a syndicate's CSA level was hypothesized to increase the syndicate's performance. As CSA brings superior information, better cooperation, and a higher level of power to the focal actor, CSA of a VC syndicate was considered to increase the syndicate's performance through these benefits. The analysis results confirmed that CSA level is positively associated with syndicate performance, as expected. If a VC syndicate holds higher level of CSA (i.e., more partners with which the syndicate forms direct relationships, higher level of brokerage through more structural holes, and higher level of power), the venture company it supports has a higher likelihood of IPO success. Furthermore, this study suggested two moderating factors impacting the relationship between CSA level and performance. The first factor (i.e., CSA diversity) weakened the positive effect of CSA level on performance, supporting the hypothesis. However, the second factor (i.e., lead VCF reputation) also weakened the positive effect, which was the opposite from the theoretical expectation.

CSA diversity was hypothesized to decrease the positive effect of CSA level on performance. As mentioned above, I explained this with two categories (i.e., the condition where CSA level is low and the condition where CSA level is high). In the former condition, as a

syndicate's CSA level is low, the majority of the syndicate members hold low levels of CSA. They want to form ties with prestigious partners that tend to have high CSA, as they expect both benefits from the partners' higher levels of R&Cs and from status increase. Thus, they are more willing to cooperate within the syndicate. This tendency decreases overall coordination costs from CSA diversity within the syndicate. Moreover, they tend to be more willing to accept novel and different ideas as they have an intention to enhance their current position. Because they are the majority of the syndicate, the dominant atmosphere of the syndicate becomes to encourage difference and diversity. The syndicate can enhance the benefits resulting from CSA diversity. Therefore, the contribution of CSA diversity to performance becomes higher than in the other condition. In the latter condition, as CSA level of a syndicate is high, the majority of the syndicate members hold high levels of CSA. They tend to possess higher levels of R&Cs and they are less willing to accept novel and different ideas for fear of losing their current high status. The dominant atmosphere of the syndicate becomes to maintain the current norms and traditions. They do not take advantage of the benefits from diverse members. Meanwhile, costs from diverse members are still incurred in this condition. Costs from diversity are not reduced, while its benefits are mitigated. Therefore, when CSA of a syndicate is high, the contribution of CSA diversity to performance becomes lower than in the former condition where CSA is low. The analysis result confirmed this expectation. Figure 3 presented in the previous part displays this result. In the area where CSA is low, performance with low CSA diversity is lower than performance with high CSA diversity. In the other area, low CSA diversity brings higher performance.

Figure 5 shows a 2 by 2 matrix about this interaction between CSA level and CSA diversity. One example of the first category is a VC syndicate led by Kleiner Perkins Caufield &

Figure 5. Four Categories by CSA Level and CSA Diversity

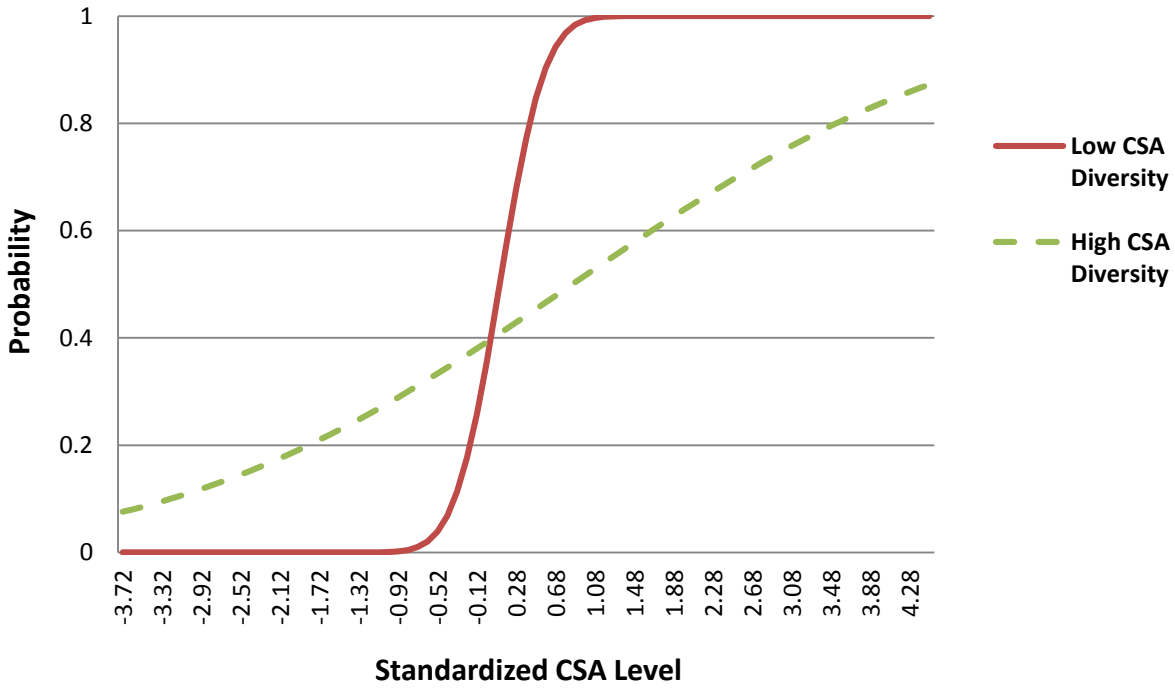


Byers. This syndicate invested in a venture company, Concentric Network from 1995 to 1996. This syndicate had high level of CSA and a low degree of CSA diversity. Concentric Network held an IPO in 1997. A syndicate in this category is more likely to succeed in terms of the target company's IPO than syndicates in any other categories. A syndicate in the fourth category is least likely to succeed. Planning & Logic, Inc. was supported by a syndicate in this category. Although the syndicate was led by Mayfield Fund, one of the most prominent VCFs in the U.S., the company could not succeed in term of IPO. Syndicates in category 2 and category 3 will have moderate likelihoods of IPO success compared to syndicates in category 1 and category 4. Although there are many factors impacting the IPO success of a venture company, the interaction

between CSA level and CSA diversity within a VC syndicate seems to make another critical effect on the venture company supported by the syndicate.

Figure 6 is about each cumulative probability of IPO success affected by CSA level in both conditions (i.e., low CSA diversity and high CSA diversity). The figure shows that a high degree of CSA diversity enhances the IPO success likelihood more than low degree of CSA diversity, when the syndicate's CSA level is low. Meanwhile, when the syndicate's CSA level is high, a low degree of CSA diversity enhances the IPO success likelihood more than high degree of CSA diversity.

Figure 6. Cumulative Probability of IPO Success affected by the interaction between CSA level and CSA diversity

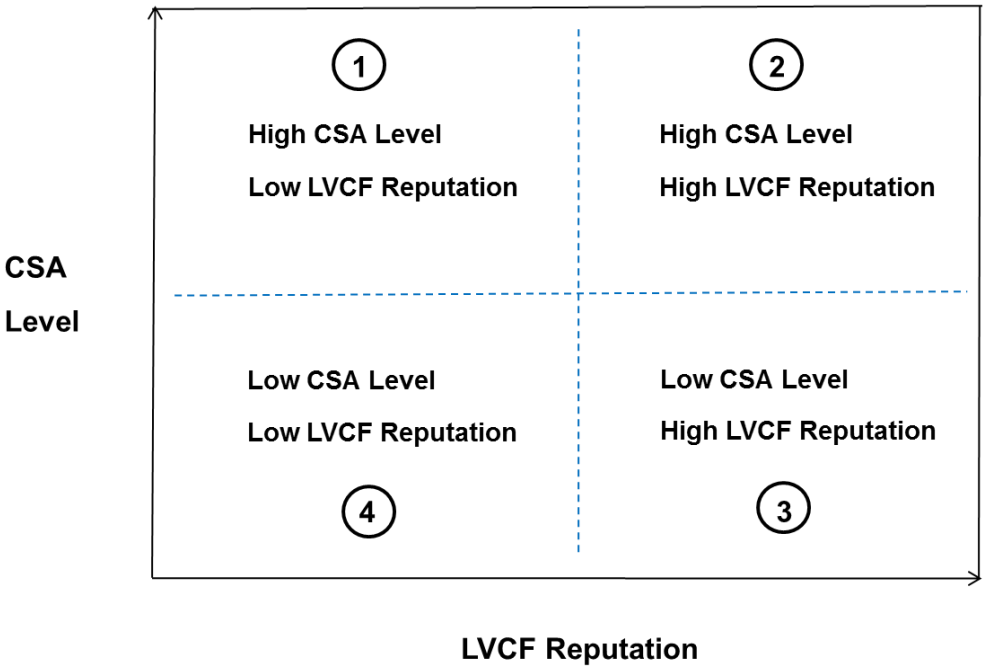


Unlike CSA diversity, the direction of the moderation by the lead VCF's reputation was the opposite from the theoretical expectation. As Figure 4 in the result section presents, in the area where CSA level is low, performance with a reputable leader is higher than performance with a less reputable leader. Meanwhile, in the other area where CSA level is high, performance with a reputable leader is lower than performance with a less reputable leader. In the theoretical part, I hypothesized that the lead VCF's reputation strengthens the positive effect of the syndicate's CSA level on syndicate performance. I considered that the lead VCF's reputation would provide a kind of legitimacy as it signals higher capabilities of the leader. So, the reputation was expected to reduce difficulty in the coordination of VCFs. If non-lead VCFs have higher levels of CSA and possess more knowledge, power and experience, the positive effect of the lead VCF' reputation was regarded to be larger. But, the opposite result the analysis provided seems to imply that the more reputable the lead VCF, the lower the positive effect of CSA level. As explained above, there are two conditions in terms of CSA level (i.e., low CSA level and high CSA level). First, when CSA level is low, the result shows that performance with a reputable leader is higher than performance with a less reputable leader. In this condition, the majority of the non-lead VCFs have low levels of CSA and they will be more cooperative to a reputable lead VCF for both benefits from the leader's higher level of R&Cs and from status increase through future syndication with the leader. So, there will be less conflict within the syndicate. Coordination will be easier for this reputable lead VCF. With the reduced difficulty in coordination, this syndicate will be able to obtain higher performance than similar syndicates led by a VCF with low reputation. In this condition, the positive effect of the lead VCF's reputation becomes meaningful. In contrary, in the condition where CSA level is high, the result shows that performance with a reputable leader is lower than performance with a less reputable leader. In

this condition, the majority of the non-lead VCFs have high levels of CSA and they tend to possess high levels of knowledge, power, and experience as well as network position. If this syndicate is led by a reputable VCF, there may be conflicts for initiatives between the reputable VCF and other non-lead VCFs. In a similar condition, status conflicts among members was shown to decrease the team's performance (Groysberg, Polzer, & Elfenbein, 2011; Bendersky & Hays, 2012). These conflicts may lead to dysfunctional and counterproductive behaviors within the group. Also, among lots of powerful members, there can be confusion between power hierarchy and status hierarchy and it can lead to a dysfunctional effect on performance (Ma, Rhee, & Yang 2012). So to speak, a syndicate composed of VCFs with high levels of CSA may not need a reputable lead VCF as they already possess knowledge, power, experience, and network position that are required for supporting a venture company. Simultaneously, the lead VCF might be less likely to accept the contribution of the non-lead VCFs to its syndicate as it assumes that similar support is already given by the lead VCF itself. Through these possible conflicts, I expect that performance with a reputable leader becomes lower than performance with a less-reputable leader in this condition, as shown in the result.

Figure 7 shows a 2 by 2 matrix about this interaction between CSA level and lead VCF reputation. On example of the first category is a VC syndicate led by Information Technology Ventures. This syndicate invested in a venture company, Epiphany Incorporation from 1997 to 1999. Although this syndicate had high level of CSA, Information Technology Ventures did not possess a high level of reputation at that time. In spite of this weakness, Epiphany Incorporation succeeded in its IPO in 1999. A syndicate in this category is more likely to succeed in terms of the target company's IPO than syndicates in any other categories. Meanwhile, a syndicate in the fourth category is least likely to succeed. This category players' lower likelihood of IPO success

Figure 7. Four Categories by CSA Level and Lead VCF Reputation

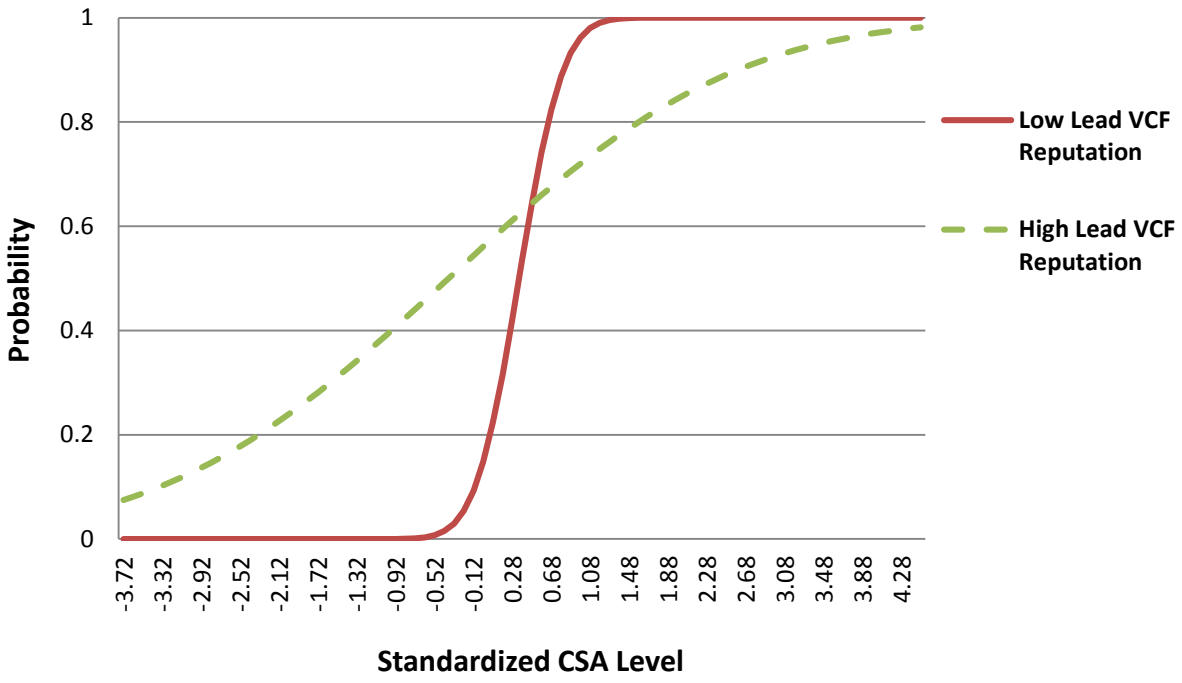


than others makes sense if low CSA level and low reputation of the lead VCF are considered. A syndicate in the third category is less likely to succeed than a syndicate in the second category. Although Mayfield Fund supported as the lead VCF both Focal Incorporation from 1991 to 1996 and MaterniCare Incorporation from 1994 to 1999, performance differed. The former company succeeded in its IPO in 1997, while the latter failed. In this case, the difference between the CSA levels of two syndicates seemed to work as one critical factor.

Figure 8 is about each cumulative probability of IPO success affected by CSA level in both conditions (i.e., low reputation of a lead VCF and high reputation of a lead VCF). The figure shows that a reputable lead VCF enhances the IPO success likelihood more than a less reputable lead VCF, when the syndicate's CSA level is low. However, the tendency is changed,

when the syndicate's CSA level is high. A less reputable lead VCF enhances the IPO success likelihood more than a reputable lead VCF.

Figure 8. Cumulative Probability of IPO Success affected by the interaction between CSA level and Lead VCF Reputation



2. Contributions and Implications

This study makes three theoretical contributions. First, this study contributes to social network research. Instead of examining the individual effects of specific network attributes that

we already know are associated with distinct outcomes, this study focused on CSA viewed as comprehensive advantage a structural position brings in its entirety. Previous research about network advantage has addressed it as overall benefits originated from holding a network position without suggesting how to concretely measure it. Although some measures have been adopted as this construct, there has not been a widely-accepted measure for it. I conducted a factor analysis with brokerage, direct ties, and power centrality and confirmed this measure's validity as a determinant of performance. Then, I suggested the factor to be called as CSA. Moreover, this study investigated CSA at the syndicate level unlike previous research which has examined CSA at the unitary actor level (i.e., the levels of individual and organization). A syndicate's CSA was demonstrated to affect its performance positively, as do CSAs of an individual and an organization. Besides, this study found that two moderating factors (i.e., CSA diversity and the lead firm reputation) govern this positive relationship. Second, it extends the understanding of diversity research by introducing CSA diversity. By examining a syndicate's diversity in terms of CSA, this study demonstrated that this type of diversity within a syndicate is a meaningful factor to the syndicate, which impacts the relationship between CSA level and performance. Third, this study directs attention to the lead organization as another determinant of syndicate performance. The analyses confirmed the lead organization's importance to its syndicate by demonstrating the moderating effect of the lead VCF's reputation on the relationship between CSA level and performance. Although this study focused on reputation, other attributes of the lead organization and their roles in the syndicate leave much room for future research.

In terms of managerial implications, this study can help VCFs with their syndicate management. First, managers in a lead VCF are able to understand what kinds of VCFs should

be invited. They will consider potential partners' CSA levels as critical when they form a syndicate. Moreover, if they are aware of the syndicate's current CSA level, they will be able to differentiate the target in terms of the syndicate's CSA diversity, according to the level. When the level is low, the lead VCF may consider inviting a VCF which will increase the syndicate's CSA diversity. On contrary, if the level is high, the lead VCF will need to keep the syndicate's CSA diversity low. More importantly, managers in a reputable lead VCF can understand the increasing significance of their coordination role when they form a syndicate with non-lead VCFs with high CSA levels. They will have to remember that its reputation may decrease performance, particularly as their coordination of these partners can incur higher costs. Second, this study also provides a useful guide to managers in a non-lead VCF. For example, if they need to join a VC syndicate, they will consider the syndicate's CSA as a critical determinant of its performance. More specifically, they will look into both the level and diversity in terms of CSA. They will be able to grasp at a better investment chance by considering not only a venture company's characteristics, but also the potential partners' characteristics. Taken together, managers in both lead VCFs and non-lead VCFs will be able to obtain higher performance through the findings of this study. In addition, through this study, both managers of a start-up company and potential investors can learn the importance of the composition within a VC syndicate to the success of a start-up company the syndicate supports. By considering VC syndicate's CSA and other characteristics, such as diversity and reputation, managers of a start-up company can make more sophisticated choices if they receive investment offers from multiple VC syndicates. Similarly, potential investors will be able to choose a better target if they consider these factors in their investment choices.

3. Limitations and Future Directions

In interpreting the results of this study, two limitations should be kept in mind. First, the CSA measure developed here was based on a sub-set of network attributes. Although I conducted the factor analysis with the most commonly used network attributes, future research may broaden the set of network attributes that are combined to obtain a more comprehensive measure of CSA. For example, the number of indirect ties, efficiency, or the number of networks to which a focal actor belongs can be considered as another component of CSA. Second, this study addressed only one type of syndicate diversity (i.e., CSA diversity). However, other types of diversity may affect performance differently (e.g., organizational type diversity, age diversity, size diversity, nationality diversity, and experience diversity). Further, Harrison and Klein (2007) suggested three categories of diversity (i.e., separation, variety, and disparity) in their seminal study about diversity. These three categories of diversity differ in terms of their representation, their effects on performance, and their operationalization. As CSA diversity within a syndicate was demonstrated as a meaningful determinant of performance in this study, further research on all these various types of syndicate diversity and their effects on performance will provide additional insight.

This study provides several opportunities for future research. First, as a relatively under-explored concept in social network research, the main theme of this study (i.e., CSA) points to promising research opportunities. What are the antecedents of CSA? What are the processes and dynamics in obtaining CSA? What are the consequences of CSA? In answering these questions, the operationalization of CSA adopted in this study will be helpful. In addition, CSAs at the multi-levels and CSAs in multiple networks will help us extend our understanding of networks.

For instance, entrepreneurs' CSA at the individual level and its interactions with VCFs' CSA at the organizational level can be meaningful determinants of performance. Also, as well as CSA in the VCFs' network, CSA in their venture company's alliance network and interactions between the two advantages will be another intriguing theme for future research.

Second, some factors addressed in this study have much room for further research. The type of syndicate members is one of these factors. Models 2 and 4 show that the number of syndicate members affiliated with a financial institution is negatively associated with performance, while Model 3 presents that the number of corporate VCFs is positively related to it. Although the type of VCFs was not the focus of this study, the results imply that the type of VCFs can be another critical predictor of syndicate performance. What composition of VCFs within a syndicate will bring higher performance to the syndicate? When will corporate VCFs and syndicate members affiliated with a financial institution be valuable to the syndicate? What stage will be the best for these members to join the syndicate? What interactions among different types of VCFs will exist and what effects will they make? Answering these questions will bring valuable insights to VC syndicate researchers. In addition, a lead VCF is another factor to be further researched. Although this study only addressed the lead VCF's reputation, other characteristics of a lead VCF including status, size, expertise, nationality, and experience will need to be examined as important determinants of its syndicate performance. Also, a lead VCF's type can be another determinant associating with its syndicate performance. Though a general VCF tends to take a role of a lead VCF within a syndicate, a corporate VCF and a firm affiliated with a financial institution may take this role. Will these types of VCFs obtain higher performance? Under what conditions will they obtain higher performance? Exploring these questions will represent a step forward in syndicate research.

Finally, several aspects of a syndicate investment which were not addressed in this study are worthy of exploration. For example, in terms of investment performance, different constructs can be considered. Though this study focused on the venture company's IPO success as a syndicate's main performance, selling the company to an established firm (i.e., M&A) is often regarded as another success by both the syndicate and the company. Effects of the predictors in this study on M&A can be another topic that can bring interesting findings. Will CSA level enhance M&A success as it does IPO success? Will CSA diversity and a lead VCF reputation moderate the relationship between CSA level and M&A success? What factors will enhance M&A success in a VC syndicate investment? Will the factors be consistent in terms of their effects on both M&A success and IPO success? Moreover, new product development and patent application can be examined as another performance construct of both a venture company and its VC syndicate. Furthermore, with regard to investment timing, many interesting questions can be examined. For a corporate VCF, what is the best stage to join a VC syndicate? For an investor affiliated with a financial institution, what is the best stage? As a reputable VCF, what is the best stage? Will the best stage be either earlier or later? As investment rounds are extended, will keeping the same members bring higher performance? If new members are considered to join, will there be an appropriate number of syndicate members in each stage? If new members are to join after several investment rounds, what should be considered to evaluate potential newcomers? In conclusion, further studies on all these issues will deepen our understanding in the relevant areas including social network, syndicates, and VCFs.

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VII. APPENDICES

Appendix 1. Nationality of Venture Companies

Nationality	Frequency	Percentage
Australia	3	0.26
Belgium	2	0.18
Bermuda	1	0.09
Brazil	1	0.09
Canada	14	1.23
China	3	0.26
Denmark	1	0.09
Finland	2	0.18
France	9	0.79
Germany	4	0.35
Iceland	1	0.09
India	7	0.62
Indonesia	1	0.09
Israel	15	1.32
Japan	9	0.79
Malaysia	1	0.09
Mexico	1	0.09
Netherlands	7	0.62
Poland	1	0.09
Singapore	6	0.53
South Korea	6	0.53
Sweden	2	0.18
Switzerland	3	0.26
Taiwan	3	0.26
United Kingdom	23	2.02
United States	1,011	88.92
Total	**1,137**	**100%**

Appendix 2. IPO success and the Venture Company's Nationality

Nationality	Failure in IPO	Success in IPO	Success Rate (%)
Australia	2	1	33.3
Belgium	2	0	0.0
Bermuda	0	1	100.0
Brazil	1	0	0.0
Canada	13	1	7.1
China	3	0	0.0
Denmark	1	0	0.0
Finland	1	1	50.0
France	6	3	33.3
Germany	4	0	0.0
Iceland	1	0	0.0
India	6	1	14.3
Indonesia	0	1	100.0
Israel	11	4	26.7
Japan	4	5	55.6
Malaysia	1	0	0.0
Mexico	1	0	0.0
Netherlands	5	2	28.6
Poland	1	0	0.0
Singapore	5	1	16.7
South Korea	6	0	0.0
Sweden	1	1	50.0
Switzerland	0	3	100.0
Taiwan	1	2	66.7
United Kingdom	21	2	8.7
United States	841	170	16.8
Total	938	199	17.5 %

Appendix 3. Industry of Venture Companies

Industry	Frequency	Percentage
Internet Specific	338	29.73
Computer Software	281	24.71
Communications	150	13.19
Medical/Health	105	9.23
Semiconductor/Electricity	72	6.33
Computer Hardware	51	4.49
Biotechnology	42	3.69
Consumer Related	40	3.52
Industrial/Energy	18	1.58
Financial Services	10	0.88
Business Services	8	0.70
Computer Other	7	0.62
Manufacturing	5	0.44
Transportation	4	0.35
Agriculture/ Forestry/ Fishery	3	0.26
Other	2	0.18
Utilities	1	0.09
Total	**1,137**	**100**

Appendix 4. IPO Success and the Venture Company's Industry

Industry	Failure in IPO	Success in IPO	Success Rate (%)
Internet Specific	290	48	14.2
Computer Software	229	52	18.5
Communications	127	23	15.3
Medical/Health	84	21	20.0
Semiconductor/ Electricity	58	14	19.4
Computer Hardware	45	6	11.8
Biotechnology	26	16	38.1
Consumer Related	34	6	15.0
Industrial/Energy	12	6	33.3
Financial Services	8	2	20.0
Business Services	6	2	25.0
Computer Other	5	2	28.6
Manufacturing	4	1	20.0
Transportation	4	0	0.0
Agriculture/ Forestry/ Fishery	3	0	0.0
Other	2	0	0.0
Utilities	1	0	0.0
Total	**938**	**199**	**17.5%**

Appendix 5. IPO Success and the Number of VCFs within a Syndicate

# of VCFs	Failure in IPO	Success in IPO	Success Rate (%)
2	144	20	12.2
3	207	24	10.4
4	158	24	13.2
5	109	15	12.1
6	85	18	17.5
7	69	19	21.6
8	48	12	20.0
9	29	12	29.3
10	22	12	35.3
11	13	8	38.1
12	16	6	27.3
13	13	8	38.1
14	11	6	35.3
15	4	4	50.0
16	4	1	20.0
17	2	4	66.7
18	2	2	50.0
19	0	2	100.0
20	1	0	0.0
21	1	1	50.0
22	0	1	100.0
Total	**938**	**199**	**17.5%**

Appendix 6. IPO Success and the Number of Corporate VCFs within a Syndicate

# of Corporate VCFs	Failure in IPO	Success in IPO	Success Rate (%)
0	601	109	15.4
1	205	39	16.0
2	82	28	25.5
3	29	12	29.3
4	14	3	17.6
5	5	2	28.6
6	0	3	100.0
7	1	2	66.7
8	1	1	50.0
Total	**938**	**199**	**17.5%**

Appendix 7. IPO Success and the Number of Financial Affiliates within a Syndicate

# of Financial Affiliates	Failure in IPO	Success in IPO	Success Rate (%)
0	704	127	15.3
1	171	44	20.5
2	41	20	32.8
3	15	6	28.6
4	3	2	40.0
5	2	0	0.0
6	2	0	0.0
Total	**938**	**199**	**17.5%**

Appendix 8. Results of Factor Analyses from 1990 to 2000

Factor Analysis of the Investments in 1990

```
Factor analysis/correlation                       Number of obs    =        97
    Method: principal factors                     Retained factors =         2
    Rotation: (unrotated)                         Number of params =         3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.59369      2.49248            0.9814       0.9814
        Factor2  |      0.10121      0.15330            0.0383       1.0197
        Factor3  |     -0.05209            .           -0.0197       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  =  348.78 Prob>chi2 = 0.0000
```

Factor Analysis of the Investments in 1991

```
Factor analysis/correlation                       Number of obs    =        87
    Method: principal factors                     Retained factors =         2
    Rotation: (unrotated)                         Number of params =         3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.72953      2.69722            1.0027       1.0027
        Factor2  |      0.03231      0.07186            0.0119       1.0145
        Factor3  |     -0.03955            .           -0.0145       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  =  366.05 Prob>chi2 = 0.0000
```

Factor Analysis of the Investments in 1992

```
Factor analysis/correlation                       Number of obs    =       207
    Method: principal factors                     Retained factors =         2
    Rotation: (unrotated)                         Number of params =         3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.67326      2.58513            0.9830       0.9830
        Factor2  |      0.08813      0.12991            0.0324       1.0154
        Factor3  |     -0.04178            .           -0.0154       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  =  838.01 Prob>chi2 = 0.0000
```

Appendix 8. Results of Factor Analyses from 1990 to 2000 (cont.)

Factor Analysis of the Investments in 1993

```
Factor analysis/correlation                       Number of obs    =      272
    Method: principal factors                     Retained factors =        2
    Rotation: (unrotated)                         Number of params =        3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.69875      2.55759            0.9600       0.9600
        Factor2  |      0.14117      0.16994            0.0502       1.0102
        Factor3  |     -0.02877            .           -0.0102       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  = 1222.80 Prob>chi2 = 0.0000
```

Factor Analysis of the Investments in 1994

```
Factor analysis/correlation                       Number of obs    =      302
    Method: principal factors                     Retained factors =        2
    Rotation: (unrotated)                         Number of params =        3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.67941      2.53746            0.9606       0.9606
        Factor2  |      0.14195      0.17396            0.0509       1.0115
        Factor3  |     -0.03201            .           -0.0115       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  = 1310.18 Prob>chi2 = 0.0000
```

Factor Analysis of the Investments in 1995

```
Factor analysis/correlation                       Number of obs    =      542
    Method: principal factors                     Retained factors =        2
    Rotation: (unrotated)                         Number of params =        3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.62222      2.50287            0.9717       0.9717
        Factor2  |      0.11936      0.16237            0.0442       1.0159
        Factor3  |     -0.04302            .           -0.0159       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  = 2121.77 Prob>chi2 = 0.0000
```

Appendix 8. Results of Factor Analyses from 1990 to 2000 (cont.)

Factor Analysis of the Investments in 1996

```
Factor analysis/correlation                       Number of obs    =       763
    Method: principal factors                     Retained factors =         2
    Rotation: (unrotated)                         Number of params =         3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.57666      2.46311            0.9768       0.9768
        Factor2  |      0.11355      0.16589            0.0430       1.0198
        Factor3  |     -0.05235            .           -0.0198       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  = 2759.47 Prob>chi2 = 0.0000
```

Factor Analysis of the Investments in 1997

```
Factor analysis/correlation                       Number of obs    =      1152
    Method: principal factors                     Retained factors =         2
    Rotation: (unrotated)                         Number of params =         3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.53449      2.35541            0.9498       0.9498
        Factor2  |      0.17908      0.22410            0.0671       1.0169
        Factor3  |     -0.04502            .           -0.0169       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  = 4255.45 Prob>chi2 = 0.0000
```

Factor Analysis of the Investments in 1998

```
Factor analysis/correlation                       Number of obs    =      1486
    Method: principal factors                     Retained factors =         2
    Rotation: (unrotated)                         Number of params =         3

    ------------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+----------------------------------------------------------------
        Factor1  |      2.45044      2.21416            0.9298       0.9298
        Factor2  |      0.23628      0.28760            0.0897       1.0195
        Factor3  |     -0.05132            .           -0.0195       1.0000
    ------------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(3)  = 5080.53 Prob>chi2 = 0.0000
```

Appendix 8. Results of Factor Analyses from 1990 to 2000 (cont.)

Factor Analysis of the Investments in 1999

Factor analysis/correlation — Number of obs = 3344
Method: principal factors — Retained factors = 2
Rotation: (unrotated) — Number of params = 3

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	2.36110	2.11098	0.9268	0.9268
Factor2	0.25013	0.31387	0.0982	1.0250
Factor3	-0.06375	.	-0.0250	1.0000

LR test: independent vs. saturated: chi2(3) = 1.0e+04 Prob>chi2 = 0.0000

Factor Analysis of the Investments in 2000

Factor analysis/correlation — Number of obs = 7867
Method: principal factors — Retained factors = 2
Rotation: (unrotated) — Number of params = 3

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	2.27571	1.98550	0.9134	0.9134
Factor2	0.29021	0.36459	0.1165	1.0299
Factor3	-0.07438	.	-0.0299	1.0000

LR test: independent vs. saturated: chi2(3) = 2.2e+04 Prob>chi2 = 0.0000

Factor Analysis of the Investments from 1990 to 2000

Factor analysis/correlation — Number of obs = 16119
Method: principal factors — Retained factors = 2
Rotation: (unrotated) — Number of params = 3

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	2.31641	2.07952	0.9345	0.9345
Factor2	0.23689	0.31152	0.0956	1.0301
Factor3	-0.07463	.	-0.0301	1.0000

LR test: independent vs. saturated: chi2(3) = 4.6e+04 Prob>chi2 = 0.0000

Appendix 9. Result of Probit Regression with Controls (Model 1)

Probit Regression — Number of obs = 1137; LR chi2(18) = 460.10; Prob > chi2 = 0.0000; Log likelihood = -297.2433; Pseudo R2 = 0.4363

IPO of the Venture Company	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Invested Money	.2763091	.0872591	3.17	0.002	.1052845	.4473338
Length of Investment	.3487307	.0775052	4.50	0.000	.1968234	.500638
# of Investment Rounds	-.1952357	.0906919	-2.15	0.031	-.3729886	-.0174829
# of Participating VCFs	.199653	.092984	2.15	0.032	.0174077	.3818984
# of Corporate VCFs	.0469217	.0671607	0.70	0.485	-.0847109	.1785543
# of Financial Affiliates	-.0651834	.0675585	-0.96	0.335	-.1975956	.0672288
Experience of VCFs	.0657331	.0674957	0.97	0.330	-.066556	.1980222
Lead VCF's Centrality	-.1108926	.0605101	-1.83	0.067	-.2294903	.0077051
Lead VCF's Foreignness	.1616748	.2410057	0.67	0.502	-.3106877	.6340374
Patent	3.377155	.3227472	10.46	0.000	2.744582	4.009728
Company's Nationality	-.2575193	.0733194	-3.51	0.000	-.4012227	-.113816
Bio/ Medical Industry	.1087642	.202114	0.54	0.590	-.2873719	.5049003
Software Industry	.1038068	.1721745	0.60	0.547	-.233649	.4412627
Internet Industry	.2186518	.1863401	1.17	0.241	-.1465681	.5838717
Communication Industry	-.5318583	.2510333	-2.12	0.034	-1.023875	-.0398421
Investment in California	-.0540288	.1269143	-0.43	0.670	-.3027762	.1947186
Period (1995-1998)	-.2735836	.211254	-1.30	0.195	-.687634	.1404667
Period (1999-2000)	-.9620105	.2260927	-4.25	0.000	-1.405144	-.5188771
Constant	-.7738127	.228553	-3.39	0.001	-1.221768	-.3258571

Appendix 10. Result of Probit Regression through 2SLS approach with the Independent Variable of CSA Level (Model 2)

Probit model with endogenous regressors — Number of obs = 1137
Wald chi2(18) = 1014.30
Log likelihood = -1650.0704 — Prob > chi2 = 0.0000

IPO of the Venture Company	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CSA Level	1.146101	.0924455	12.40	0.000	.9649117	1.327291
Invested Money	-.1053399	.0707852	-1.49	0.137	-.2440764	.0333965
Length of Investment	.3492708	.0654554	5.34	0.000	.2209806	.4775611
# of Investment Rounds	.0029476	.0683865	0.04	0.966	-.1310876	.1369827
# of Participating VCFs	.3161842	.0629394	5.02	0.000	.1928252	.4395432
# of Corporate VCFs	-.0013384	.0447396	-0.03	0.976	-.0890264	.0863496
# of Financial Affiliates	-.2745784	.0450872	-6.09	0.000	-.3629477	-.1862091
Experience of VCFs	-.1152167	.0439144	-2.62	0.009	-.2012873	-.0291461
Lead VCF's Centrality	-.5243482	.0446655	-11.74	0.000	-.611891	-.4368054
Lead VCF's Foreignness	.1223613	.1685955	0.73	0.468	-.2080798	.4528024
Patent	1.343205	.5448267	2.47	0.014	.2753642	2.411046
Bio/ Medical Industry	.0873001	.1283548	0.68	0.496	-.1642706	.3388708
Software Industry	.0868191	.108843	0.80	0.425	-.1265092	.3001474
Internet Industry	.118398	.1181517	1.00	0.316	-.1131752	.3499711
Communication Industry	-.3288111	.1556918	-2.11	0.035	-.6339614	-.0236608
Investment in California	-.1272558	.0779696	-1.63	0.103	-.2800733	.0255618
Period (1995-1998)	-.0151623	.1472363	-0.10	0.918	-.3037402	.2734156
Period (1999-2000)	-.5790687	.1859799	-3.11	0.002	-.9435825	-.2145548
Constant	-.1782766	.2079261	-0.86	0.391	-.5858044	.2292511
/athrho	-1.563819	.4190258	-3.73	0.000	-2.385095	-.7425439
/lnsigma	-.2290992	.0209703	-10.92	0.000	-.2702002	-.1879982
rho	-.916037	.0674112			-.983185	-.6306797
sigma	.7952496	.0166766			.7632266	.8286162

Wald test of exogeneity (/athrho = 0): chi2(1) = 13.93 Prob > chi2 = 0.0002

Appendix 11. Result of Probit Regression through 2SLS approach with the Interaction Term between CSA Level and CSA Diversity (Model 3)

Probit model with endogenous regressors — Number of obs = 1137
Wald chi2(20) = 1070.21
Log likelihood = -1293.1284 — Prob > chi2 = 0.0000

IPO of the Venture Company	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CSA Level	1.550202	.1299136	11.93	0.000	1.295576	1.804828
CSA Diversity	.0183084	.0323478	0.57	0.571	-.045092	.0817089
CSA Level * CSA Diversity	-1.236585	.132801	-9.31	0.000	-1.49687	-.9762998
Invested Money	-.1238505	.0702139	-1.76	0.078	-.2614671	.0137662
Length of Investment	.2944219	.0674464	4.37	0.000	.1622294	.4266144
# of Investment Rounds	.0182312	.0679954	0.27	0.789	-.1150374	.1514997
# of Participating VCFs	.9643761	.0856891	11.25	0.000	.7964285	1.132324
# of Corporate VCFs	.1107095	.0432817	2.56	0.011	.0258789	.1955401
# of Financial Affiliates	-.0744804	.0453182	-1.64	0.100	-.1633024	.0143416
Experience of VCFs	-.1863429	.0459792	-4.05	0.000	-.2764606	-.0962253
Lead VCF's Centrality	-.4649326	.042142	-11.03	0.000	-.5475294	-.3823358
Lead VCF's Foreignness	.1942269	.1602354	1.21	0.225	-.1198287	.5082826
Patent	1.313677	.5341025	2.46	0.014	.2668557	2.360499
Bio/ Medical Industry	.1229548	.1256269	0.98	0.328	-.1232693	.369179
Software Industry	.0463646	.1069682	0.43	0.665	-.1632893	.2560184
Internet Industry	.0700634	.1169962	0.60	0.549	-.159245	.2993718
Communication Industry	-.4746978	.1461659	-3.25	0.001	-.7611777	-.1882178
Investment in California	-.1687876	.0755938	-2.23	0.026	-.3169488	-.0206265
Period (1995-1998)	.0886557	.1473729	0.60	0.547	-.2001898	.3775012
Period (1999-2000)	-.3237732	.1981177	-1.63	0.102	-.7120768	.0645304
Constant	-.2840296	.1979359	-1.43	0.151	-.6719769	.1039177
/athrho	-1.653107	.4445039	-3.72	0.000	-2.524318	-.7818951
/lnsigma	-.5415577	.0209703	-25.82	0.000	-.5826588	-.5004567
rho	-.9292827	.0606453			-.9872457	-.6537931
sigma	.5818412	.0122014			.5584117	.6062537

Wald test of exogeneity (/athrho = 0): chi2(1) = 13.83 — Prob > chi2 = 0.0002

Appendix 12. Result of Probit Regression through 2SLS approach with the Interaction Term between CSA Level and the Lead Firm Reputation (Model 4)

Probit model with endogenous regressors — Number of obs = 1137
Wald chi2(20) = 1023.35
Log likelihood = -1282.4891 — Prob > chi2 = 0.0000

IPO of the Venture Company	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CSA Level	1.624543	.1157514	14.03	0.000	1.397674	1.851412
Lead VCF Reputation	.5685187	.0653654	8.70	0.000	.4404048	.6966326
CSA Level * LVCF Reputation	-1.193881	.0860885	-13.87	0.000	-1.362611	-1.02515
Invested Money	-.0898844	.0703918	-1.28	0.202	-.2278498	.048081
Length of Investment	.2606712	.0690499	3.78	0.000	.1253359	.3960064
# of Investment Rounds	-.0344721	.067714	-0.51	0.611	-.1671891	.098245
# of Participating VCFs	.3487392	.0636512	5.48	0.000	.2239851	.4734934
# of Corporate VCFs	-.0435269	.0455881	-0.95	0.340	-.132878	.0458241
# of Financial Affiliates	-.2517058	.0450004	-5.59	0.000	-.3399049	-.1635067
Experience of VCFs	-.105912	.0439776	-2.41	0.016	-.1921066	-.0197174
Lead VCF's Centrality	-.6959821	.0599775	-11.60	0.000	-.813536	-.5784283
Lead VCF's Foreignness	.2931746	.165699	1.77	0.077	-.0315894	.6179386
Patent	1.319639	.562567	2.35	0.019	.2170284	2.42225
Bio/ Medical Industry	.036317	.1293758	0.28	0.779	-.2172548	.2898889
Software Industry	.0165277	.1101614	0.15	0.881	-.1993847	.2324401
Internet Industry	.037296	.120048	0.31	0.756	-.1979938	.2725857
Communication Industry	-.3585065	.1585628	-2.26	0.024	-.6692839	-.0477291
Investment in California	-.0516761	.0794676	-0.65	0.516	-.2074297	.1040775
Period (1995-1998)	.0590243	.148899	0.40	0.692	-.2328123	.3508609
Period (1999-2000)	-.2703444	.1962992	-1.38	0.168	-.6550838	.114395
Constant	-.404991	.2071512	-1.96	0.051	-.8109999	.001018
/athrho	-1.544021	.4214393	-3.66	0.000	-2.370027	-.718015
/lnsigma	-.5509371	.0209703	-26.27	0.000	-.5920381	-.509836
rho	-.9127935	.0702994			-.982675	-.6156782
Sigma	.5764094	.0120875			.5531987	.6005941

Wald test of exogeneity (/athrho = 0): chi2(1) = 13.42 — Prob > chi2 = 0.0002

Appendix 13. Result of Probit Regression through 2SLS approach with all the variables and the Interaction Terms (Model 5)

Probit model with endogenous regressors — Number of obs = 1137
Wald chi2(22) = 1007.65
Log likelihood = -981.41194 — Prob > chi2 = 0.0000

IPO of the Venture Company	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CSA Level	2.059387	.1663879	12.38	0.000	1.733273	2.385502
CSA Diversity	-.0095034	.0326802	-0.29	0.771	-.0735554	.0545486
CSA Level * CSA Diversity	-1.16791	.1368193	-8.54	0.000	-1.436071	-.8997494
Lead VCF Reputation	.5302752	.0651505	8.14	0.000	.4025826	.6579678
CSA Level * LVCF Reputation	-1.136527	.0859249	-13.23	0.000	-1.304937	-.9681174
Invested Money	-.1142253	.0717866	-1.59	0.112	-.2549245	.0264739
Length of Investment	.2348594	.0699411	3.36	0.001	.0977773	.3719414
# of Investment Rounds	-.0188598	.0684475	-0.28	0.783	-.1530145	.1152949
# of Participating VCFs	.9825137	.0901983	10.89	0.000	.8057283	1.159299
# of Corporate VCFs	.062663	.0443831	1.41	0.158	-.0243262	.1496522
# of Financial Affiliates	-.0824437	.0464476	-1.77	0.076	-.1734792	.0085918
Experience of VCFs	-.1813162	.0475163	-3.82	0.000	-.2744465	-.0881859
Lead VCF's Centrality	-.6562435	.0598523	-10.96	0.000	-.7735518	-.5389351
Lead VCF's Foreignness	.3606176	.1600387	2.25	0.024	.0469475	.6742878
Patent	1.370873	.5488024	2.50	0.012	.2952396	2.446505
Bio/ Medical Industry	.0816029	.128807	0.63	0.526	-.1708542	.33406
Software Industry	-.0146223	.1102695	-0.13	0.895	-.2307466	.2015019
Internet Industry	.0014213	.1209767	0.01	0.991	-.2356888	.2385313
Communication Industry	-.5154209	.1514103	-3.40	0.001	-.8121796	-.2186623
Investment in California	-.1030576	.0781695	-1.32	0.187	-.256267	.0501518
Period (1995-1998)	.1529999	.1513309	1.01	0.312	-.1436033	.4496031
Period (1999-2000)	-.0819291	.2083942	-0.39	0.694	-.4903741	.326516
Constant	-.502438	.1993656	-2.52	0.012	-.8931874	-.1116886
/athrho	-1.55911	.4200829	-3.71	0.000	-2.382457	-.7357623
/lnsigma	-.8146834	.0209703	-38.85	0.000	-.8557845	-.7735824
rho	-.9152761	.0681667			-.9830968	-.626578
sigma	.4427795	.0092852			.4249497	.4613573

Wald test of exogeneity (/athrho = 0): chi2(1) = 13.77 — Prob > chi2 = 0.0002