

IS MORE BETTER? DIVERSIFICATION STRATEGY IN THE VENTURE CAPITAL MARKET

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ABSTRACT

Diversification strategy in the venture capital (VC) market has received increasing research interest, as studies have shown this strategy adds value to venture capitalists' (VCs) investment. We build on previous study results and investigate how the nature of diversification strategy—related and unrelated—affects VCs' investment including early startups. We draw arguments from a perspective of efficient knowledge management and a perspective of structural coordination need. Two opposing hypotheses are developed. Secondary data of the VC investment from 1990 to 2010 was collected and panel analysis was performed. The study results suggest that related diversification is associated with better VC firm performance, while unrelated diversification shows little effect.

INTRODUCTION

Research about investment strategies in the venture capital (VC) market has always been an important topic for entrepreneurship studies (Croce, Marti, & Murtinu, 2013; Davila, Foster, & Gupta, 2003; Gupta & Sapienza, 1992; Matusik & Fitza, 2012; Tyebjee & Bruno, 1984). Two polarizing investment strategies have received special attention: specialization and diversification. Specialization strategy is a low level of diversification, mainly targeting a few businesses from one industry. This strategy gains benefits from an efficient knowledge management in a domain area (Busenitz & Barney, 1997; Heeley & Matusik, 2006). Diversification strategy targets multiple businesses across various industries. This strategy benefits from the value of a diverse knowledge pool across industries, which facilitates the identification of an innovative solution to unique venture problems (Ahuja & Katila, 2001). In previous studies, when venture capitalists (VCs) invest in early startups, they prefer specialization to diversification (Gupta & Sapienza, 1992; Norton & Tenenbaum, 1993). Nevertheless, some researchers are doubtful about the benefits of such a preference, as both strategies seem to be equally effective (Matusik & Fitza, 2012). We continue this line of research and ask: *If VCs choose diversification strategy to manage their investment, including early*

startups, how does the nature of diversification—related or unrelated—influence firm performance?

Venture capital is defined as a professionally managed pool of equity capital, which is contributed by wealthy limited partners of a VC firm (Hisrich, Peters, & Shepherd, 2008). VC financing is one essential funding source for startups, and VCs' investment strategies influence startups' financing approaches (Hisrich et al., 2008; Meyer & Crane, 2011; Stevenson & Roberts, 2006).

The VC market is different from the general financial market. In this market, VCs raise capital from their partners, with the amount varying between \$100 million and \$500 million under management (Clercq, Fried, Lehtonen, & Sapienza, 2006). Investment decisions are made collectively by individual VCs who are also the partners. VCs earn a management fee of 1 to 2.5 percent of the fund's committed capital, covering their salaries and management expenses. VCs also receive a share of 20 percent of the profits of the fund. In terms of management style, VCs show more hands-on involvement in their portfolio ventures than investors from the general financial markets (Clercq et al., 2006).

There are four VC financing stages: seed, early, expansion and later stage. Financing for early startups occurs at the first two stages, which most VCs choose to avoid because of the higher risk associated with the stages (Clercq et al., 2006). Two consequences follow from this approach. First, the supply of VC financing drops for early startups that, however, can be a main force of economic growth in a society. Second, avoiding early startups reduces the potential return of VCs as suggested by the high risk-high return relationship, an ultimate goal of the VC market. It is possible for VCs to manage the stage-related risk, as research has shown that VCs with exposure to the seed and early stage can perform well (Wright & Robbie, 1998). We focus on VC firms that do not avoid the stage-related risk, and aim to understand the relationship between the nature of diversification strategy and firm performance.

We draw arguments from knowledge management literature (Barnett, Greve, & Park, 1994; Busenitz & Barney, 1997; Ingram & Baum, 1997), and a perspective of structural coordination need in the strategy field (Hill & Hoskisson, 1987). We use knowledge management to analyze efficiency under related and unrelated diversification strategies, and we apply structural coordination need to examine structural features of these two strategies.

There are two major contributions in this paper. First, departing from analyzing the level of diversification, an often-examined topic, we study the nature of diversification—related and unrelated diversification, which has received little research attention in the VC market. Second, our study shows that VCs can do well at seed and early stage by deploying a specific diversification strategy, a result perhaps can encourage VCs to include early startups in their portfolios and play an active role for them.

The rest of the paper is structured as follows: we first present a literature review of diversification strategy, perspectives of knowledge management, and structural coordination need. Hypotheses are then developed. After that, we introduce the research methodology and

data collection, followed by the section of analysis and results. Last, we conclude the paper with a discussion and future research suggestions.

THEORY AND HYPOTHESES

Venture financing strategy has progressed from a general investment strategy (Fried & Hisrich, 1994; Paul, Whittam, & Wyper, 2007; Tyebjee & Bruno, 1984) to a more refined classification, such as specialization vs. diversification strategy (Ahuja & Katila, 2001; Fern, Cardinal, & O'Neill, 2012; Heeley & Matusik, 2006; Matusik & Fitza, 2012). Specialization strategy, also termed as a low-level of diversification strategy, focuses on developing specialized knowledge in a domain area of an industry. According to knowledge management, this strategy can minimize coordination costs because efficient information processing becomes possible within the domain of expertise (Barnett et al., 1994). Consequently, when VCs select investment candidates, they choose new ventures from the same domain area to leverage the specialized knowledge. There are, however, limitations associated with this strategy. Mastering specialized knowledge does not promote the skill of identifying an innovative solution outside the pre-defined domain (Ahuja & Katila, 2001). As a result, diversification strategy becomes attractive. This strategy calls attention to a knowledge pool from related and unrelated fields, which can strengthen investors' ability to seek innovative answers outside the box. Specifically, diversification strategy helps to develop a type of analogical thinking skill that taps into similarities among different knowledge domains to find novel solutions to address complex venture problems at hand (Gavetti, Levinthal, & Rivkin, 2005). The ability to find novelty is particularly useful for investments that include early startups where new problems that have not been seen or solved often surface. In short, from the perspective of knowledge management, specialization strategy improves the efficiency of knowledge utilization in a domain area, while diversification strategy improves the skill of identifying novel solutions from a knowledge pool.

Earlier studies of specialization and diversification strategy in the VC industry suggest that specialization works better than diversification particularly at the early stage of a venture (Gupta & Sapienza, 1992; Norton & Tenenbaum, 1993). Nevertheless, Matusik and Fitza argued that both strategies should be equally emphasized, as both strategies create operational flexibility and adaptability that startups need (2012). They showed a "U" curvilinear relationship between the level of diversification and firm performance. That is, VCs who apply specialization strategy or a high level of diversification strategy achieve better firm performance than VCs who apply a medium level of diversification strategy. This is an intriguing finding in two ways. First, it questions early observations where VCs seem to prefer specialization to diversification when investment in early startups is involved. Second, it questions a general understanding of an inverted "U" curvilinear relationship between firm performance and the level of diversification from the strategy field, where a medium level of diversification outperforms specialization and a high level of diversification (Hill & Hoskisson, 1987; Palich, Cardinal, & Miller, 2000).

The above new development suggests that VCs do not shy away from diversification strategy when they include early startups in their portfolios. If they do take diversification strategy, we propose that the nature of diversification perhaps sheds light on the above intriguing findings—the purpose of our investigation.

When a firm follows diversification strategy, the strategy can be related or unrelated in nature (Hill & Hoskisson, 1987; Hitt, Ireland, & Hoskisson, 2010). Related diversification describes a relationship among the diversified businesses. The relationship could be exemplified as knowledge sharing and activities sharing among portfolio businesses, or know-how transferring from headquarters to businesses. Synergy is created when joint activities are identified, integration is supported or knowledge is spread through links among businesses. Unrelated diversification occurs when diversified businesses could hardly be linked with each other. Instead of creating synergy, unrelated diversification creates financial economies from the internal capital market. That is, pooling together imperfectly correlated income streams generated by unrelated businesses would produce a superior return, as the unrelated businesses cancel out each other's inherited firm specific risks (Bodie, Kane, & Marcus, 2002).

There is a difference between studies of specialization vs. diversification and those of related vs. unrelated diversification. Studies that investigate specialization vs. diversification are interested in the level of total diversification in a portfolio. Studies that examine related and unrelated diversification are interested in the relationship among diversified businesses. For example, at a high level of diversification, the diversified businesses could be related to each other, or unrelated to each other.

COORDINATION NEED

Coordination need describes how various portfolio ventures are managed under a specific diversification structure and costs to satisfy that structural need (Hill & Hoskisson, 1987). Related and unrelated diversification strategies create different coordination needs and therefore different coordination costs. We are thus recommended to examine coordination need to ensure the strategy of a business fits the structure of the business (Hill & Hoskisson, 1987).

One specific coordination need that differentiates related from unrelated diversification comes from corporate control of portfolio ventures (Hill & Hoskisson, 1987). For example, if related diversification strategy is selected, it is necessary to establish corporate control to ensure connections among portfolio ventures such that synergy can be efficiently and effectively created. In the case of unrelated diversification, corporate control is nevertheless of little concern. This is because the benefit of unrelated diversification relies on the efficiency of the internal capital market of a firm, where individual businesses are highly responsible for their own profits and losses, and they are rewarded by their performance through receiving more corporate resources. Business efficiency is encouraged at the individual level to save costs and to increase return. Consequently, unrelated diversification creates less structural need for corporate control than related diversification, and is therefore less costly than a related diversification strategy.

In the VC market, studies show that individual ventures in a portfolio operate independently, and they seldom share resources with one another (Matusik & Fitza, 2012). This observation indicates that the creation of connections among portfolio ventures is not the focus of VCs. Unrelated diversification seems to be a better fit with this structural feature, which demands little

coordination among portfolio ventures and consequently results in less control costs. If related diversification strategy is chosen to govern a portfolio with little need for coordination, costs would be generated that can become exceedingly high and soon overruns the value of diversification (Hill & Hoskisson, 1987; Norton & Tenenbaum, 1993). It is reasonable to suggest that unrelated diversification strategy performs better than related diversification strategy in the VC market.

The above conclusion finds further support from a general understanding of financial portfolio management. According to financial portfolio literature, unrelated diversification strategy targets industries of great varieties, which reduces unsystematic risk that is industry specific to an arbitrarily low level (Bodie et al., 2002). For example, the biotechnology and computer software industries have little in common, and a portfolio of businesses from these two industries greatly reduces the unsystematic risk that is industry specific. Related diversification, on the other hand, is less efficient, as related diversification targets industries with some similarities. For example, hardware and software industries share similarities of the high-tech sector, and the portfolio formed by these two industries could not optimally reduce unsystematic risk that relates to the high-tech sector. To put it differently, portfolio risk management is better carried out through unrelated diversification strategy.

Comparing with related diversification, unrelated diversification strategy fits VCs' independent portfolio structure better, it is less costly and it is more efficient in spreading unsystematic risks. VC firms including early startups are likely to choose unrelated diversification strategy.

Hypothesis 1: Unrelated diversification strategy strengthens firm performance for VCs who include early startups.

Knowledge management: The knowledge management perspective has been applied to distinguish between the effect of specialization and diversification strategy (Matusik & Fitza, 2012). We apply this perspective to address the difference between related and unrelated diversification. Specifically, related diversification provides more efficient knowledge management than an unrelated one. Meanwhile, related diversification facilitates the identification of novel solution to solve venture problems, which specialization could not do (Matusik & Fitza, 2012).

Similar to the argument of specialization strategy (Ahuja & Katila, 2001; Heeley & Matusik, 2006), the creation of a shared knowledge base is more feasible between related industries than unrelated industries. For example, the degree of the domain knowledge background between computer programming and computer software—two related industries—is higher than that between computer programming and financial service—two unrelated industries. Concerning knowledge management, shared knowledge makes it possible to effectively communicate information of critical importance using a common knowledge base to cohesively solve venture problems (Lane & Lubatkin, 1998), and to even produce innovative outputs because of accumulated superior knowledge (Ahuja & Katila, 2001). It is also important to point out that VCs learn from their successful portfolio ventures (Clercq & Sapienza, 2005), and the learning effect becomes more valuable when VCs integrate additional new knowledge with the current knowledge base (Grant, 1996). We further assert that the efficiency of integration improves

when knowledge is related between learning and the current portfolio, as learning facilitated by related diversification strengthens VCs' capability to exploit others' knowledge in the network (Clercq & Dimov, 2008), such that co-investors are efficiently and effectively identified and risks of portfolio ventures are reduced (March, 1991; Uotila, Maula, Keil, & Zahra, 2009).

The perspective of knowledge management is in line with VCs' hands-on management style. Studies show that young ventures face great challenges such as identifying a viable business model, and VCs provide multiple services besides capital injection (Clercq et al., 2006; Sapienza, 1992). For example, VCs help ventures to develop organizational structures, transfer marketing experiences, recruit key personnel, provide technological insights, secure follow-up financing and so on (Sapienza, 1992; Shane & Cable, 2002). The efficiency of offering those services varies depending on the number of portfolio ventures involved. According to literature from the strategy field, unrelated diversification can involve more ventures in a portfolio than related diversification (Hill & Hoskisson, 1987; Palich et al., 2000), and consequently if unrelated diversification is chosen, the level of attention that VCs give to each individual venture is likely to decrease and the quality of VCs' service is likely to drop.

Related diversification also strengthens VCs' skill of identifying novel solutions. This is because portfolio ventures are from various industries even though they share some knowledge backgrounds. The difference between related and unrelated diversification is perhaps the degree of knowledge varieties in the pool. That is, the knowledge pool associated with related diversification is less differentiated; it is nevertheless beyond one focused knowledge domain and can still enable the development of analogical skill, the key to innovative solutions (Gavetti et al., 2005). In addition, the level of appropriateness of a novel solution to a venture problem is perhaps higher when a related industry is involved, as the analogical skill is hard to cultivate without some levels of similarities.

Related diversification may not optimally reduce the unsystematic risks that are industry specific, but to a certain degree, superior knowledge accumulated in one industry can serve as a good guide in venture selection from other industries. For example, knowledge in 4G technology from the telecommunication industry can benefit selection of ventures from other industries that utilize this technology such as the gaming industry, high definition mobile TV, and video conferencing.

In conclusion, related diversification shows a distinctive advantage over an unrelated one in terms of the efficient knowledge management. This leads to our second hypothesis:

Hypothesis 2: Related diversification strategy strengthens firm performance for VCs who include early startups.

METHODOLOGY AND DATA

We performed panel data analysis to test the hypotheses in the study. Panel data analysis is known as an effective tool to examine cross-sectional time-series data. This tool allows us to control for variables that are difficult to observe or measure and are unique to individual

observation over time, therefore enables us to uncover the underlying mechanism across individual VC firms. Furthermore, we are able to better use the full set of information available both across companies and over time.

Secondary data is collected from Private Market of Thomson Reuters, which is a major database for studying the VC market (Matusik & Fitza, 2012; Shane & Cable, 2002; Tyebjee & Bruno, 1984). We draw our data primarily from the U.S. VC market. There are thousands of VC firms registered between 1969 and 2012 in the database. We selected VC firms with investment exposure to the seed and early stage, and screened out VC firms without providing information about the size of capital under management and the outcome of their investment.

According to the National Venture Capital Association, VC investment typically lasts ten years, while some studies use an eight-year duration as the investment period (Matusik & Fitza, 2012). In this study, we follow Matusik and Fitza's (2012) footsteps, assuming that VCs would hold their investment up to eight years. This assumption has the implication on the measurement of dependent, independent and control variables. Specifically, our dependent variable, the percentage of ultimately successful investment made by a VC firm, is collected between 1990 and 2010, and the independent and control variables are the moving average of the eight-year window. For example, the successful investment in 1990 is regressed on variables averaged over the period from 1990 to 1997, the successful investment in 1991 is regressed on variables averaged over the period from 1991 to 1998, and the successful investment in 2003 is regressed on variables averaged over the period from 2003 to 2010. The reasoning is that a successful investment is the outcome of resources endowed during an eight-year period (Matusick & Fitza, 2012, P: 414). The total observation is 3,584 for 256 VC firms for our analysis period.

DEPENDENT VARIABLE

Ideally, VC performance should be measured by internal rate of return; however, this information is generally difficult to obtain because of the nature of the industry (Hsu, 2004). Some researchers have used percentage of total investment that goes IPO (Initial Public Offerings) as a desired outcome to measure VC firm performance (Clercq & Dimov, 2008; Matusik & Fitza, 2012). Besides IPO, acquisition is also used as another important exit strategy to realize high return (Hisrich et al., 2008). In this study, we use the percentage of total investment of a VC firm in a particular year that ultimately IPOed as the proxy of the VC firm's performance in that year.

INDEPENDENT VARIABLES

We use the entropy measure of diversification (Palepu, 1985). This measurement is central to our investigation of related and unrelated diversification. Entropy measure takes both the number and the classification of industries into consideration, and calculates an index. There are three indices measuring related, unrelated and total diversification. The total diversification index can

be indirectly calculated through the sum of related and unrelated diversification indices (Palepu, 1985). It reflects the diversification level of the total portfolio, and this method has been widely used to study diversification (Fitza, Matusik, & Mosakowski, 2009; Matusik & Fitza, 2012). However, the total diversification index does not tell us the difference between related and unrelated diversification. Departing from earlier studies such as Matusik and Fitza's study in 2012, we distinguish between related and unrelated diversification by directly measuring them using the method developed by Palepu (1985).

Private Market of Thomson Reuters has used the industry coding system based on the Venture Economics Industry Codes (VEIC), which is slightly different from the Standard Industrial Classification Codes (SIC). However, the VEIC coding is structured in the same logic as the SIC such that the numerical distance between industries informs the relatedness of the industries. Moreover, the VEIC classification is more fine-grained towards the high-tech sector, but not so much towards the non-tech-sector. This difference has little influence on studies in the VC industry where major attentions are played in the in-tech-sector (Matusik & Fitza, 2012).

Let DR_j stand for related diversification arising out of investing in several industry segments i within an industry group j , and is defined as:

$$DR_j = \sum_{i \in I^j} I_i^j \mathbf{1}(I_i^j)$$

where i stands for each industry segment that belongs to the industry group j . I_i^j is the percentage of the investment of each industry i in the investment of the industry group j . The total related diversification DR is the weighted average of DR_j within all groups the VC firm has invested, defined as:

$$DR = \sum_{j=1}^m DR_j I^j$$

where I^j is the percentage of the investment of the industry group j in the total investment of the VC firm.

Let DU stand for unrelated diversification, measuring diversification across different industry groups. It is a weighted average of all the industry groups, and defined as:

$$DU = \sum_{i=1}^m I^i \mathbf{1}(I^i)$$

Let DI be the total diversification index. As we stated earlier, it can be derived from the sum of related and unrelated diversification:

$$\begin{aligned} DI &= \sum_{j=1}^m DR_j I^j + \sum_{i=1}^m I^i \mathbf{1}(I^i) \\ &= \sum_{i=1}^m \sum_{i \in I^j} I_i^j \mathbf{1}(I_i^j) \end{aligned}$$

We also measure the percentage of related diversification in total diversification. This measurement indicates to what extent the portfolio ventures are related in nature:

$$PerDR = DR / DT$$

CONTROL VARIABLES

VC investment occurs in all four stages: seed financing, early financing, expansion stage and later stage (Clercq et al., 2006). Departing from earlier study design where an average stage of investment is used (Matusik & Fitza, 2012), we look into the detailed exposure to each stage, which is the percentage of total investment in each stage.

VCs generally make investment decision from referral, and they often choose to co-invest with other investors from the referral network to better leverage their resources (Wright & Lockett, 2003). It is argued that business screening risks are reduced, operational efficiency is achieved and problem solving skill is enhanced because of the added value from co-investors (Gupta & Sapienza, 1992). Co-investing also reduces the costs of coordination as coordination effort could be shared among co-investors, making a higher level of diversification not only feasible but also less risky. We therefore control the effect of co-investment by controlling for the average number of co-investors a VC firm has for a given eight-year window.

Size of capital can influence the performance of VC investment (Gupta & Sapienza, 1992), and we control for it. The size of capital describes the total available investment capital under management. In general, there is a great variation of the size between \$100 and \$500 million (Clercq et al., 2006). The smaller the size, the fewer the choices a VC firm can afford. It is also interesting to point out that when VCs have more successful track records of investments, more investors will put their money in the VC firm (Gupta & Sapienza, 1992).

ANALYSIS AND RESULTS

Data Description

In our data, the oldest firm was founded in 1911, and the youngest one in 2002. The medium of founding year of VC firms is 1982. The mean of the fund size under management is \$211 million. In our data, most of the VC firms have about five major co-investors, and most of them have exposure to all stages. Overall, in an eight-period window, 19% of the annual investment of a VC firm is at seed stage, and 57% at early stage. This investment pattern indicates that our data captures VC firms with exposure to the seed and early stage. We present the descriptive statistics and Pearson correlation coefficients in Table 1.

TABLE 1: DESCRIPTIVE STATISTICS AND CORRELATIONS

	Mean	Std. error										
Ipo%	.163	.31										
Seed%	.198	.193	.045									
Early%	.570	.248	-.100**	-.268**								
Expansion %	.318	.260	.044	-.296**	-.655**							
Later%	.158	.189	.063	-.161**	-.519**	.035						
Related D	.338	.312	-.001	.115*	.075*	-.005	-.238**					
Unrelated D	.920	.619	-.126**	.106**	.001	.035	-.161**	.124**				
Total D	1.258	.832	-.104**	.142**	.036	.026	.245**	.574**	.883**			
PerDR	.254	.186	.057	.027	.054	-.030	-.078*	.780**	-.482**	-.053		
Size	211	164	.075*	.055	.039	-.049	-.057	.054	-.116**	-.071	.127**	
Co-investors	5.989	2.448	-.036	-.103**	.116**	-.048	-.025	-.054	.038	.005	-.101**	-.472**

** . Correlation is significant at the 0.01 level, * . Correlation is significant at the 0.05 level

In Table 1, there are significant and negative correlations between different stages, such as seed and early, seed and expansion, and seed and later stage. This may help to explain that investment in one stage will reduce capital available for other stages. The coefficient is 0.655 between early and expansion and 0.519 between early and later stage. It suggests a possibility of multicollinearity among stage variables (Tabachnick & Fidell, 2007), and we therefore perform four panel regression models, using one stage for one model.

The relationships between stage and diversification strategies are worthy of exploring. The coefficients are significant and positive between the seed stage and the three indices—related, unrelated and total diversification—at 0.115, 0.106 and 0.142 respectively. As we outlined earlier, the total diversification is the sum of related and unrelated diversification, the significant coefficients indicate that, first, VC firms do diversify their portfolios at the seed stage, and second, both related and unrelated diversification are equally chosen as the diversification strategy. A similar conclusion emerges between the early stage and the three indices with one difference: VC firms seem to prefer related to unrelated diversification at early stage, as there is only one significant coefficient observed for related diversification at 0.075. There is no significant coefficient between the expansion stage and the three indices. For the later stage, there are significant but negative coefficients between this stage and the three indices. Further exploration of the data through regression is necessary. The three indices are also significantly correlated with each other. For example, related and unrelated diversification indices are positively correlated at the level of 0.124. However, the coefficient is 0.575 between related and total diversification indices and 0.884 between unrelated and total diversification indices, suggesting excluding the total diversification index in regression model due to the possibility of multicollinearity.

The size of the capital under management is significantly and positively correlated with the percentage of IPO at 0.075. This observation is in line with the conventional wisdom that there are more successful portfolio ventures when the investment capital gets larger. We also observe a significant but negative correlation between the size of capital and the number of co-investors, which suggests that the more capital a VC firm has, the less likelihood the VC firm will use the co-investment method.

RESULTS

The following regression analysis is performed:

$$Performance_i = a + \beta_1 Stage_i + \beta_2 \sum DiversificationIndex_i + \beta_3 \sum Control_i + \varepsilon_i$$

The regression estimates the effect from four different stages and two diversification strategies. Eight panel regression models were performed. The results are presented in Table 2. In running Panel Data analysis, it is necessary to select the type of panel data model that corresponds to the case in hand, that is, whether the fixed effect or random effect model should be used (Greene, 2008). The Hausman test is performed to select between these models, and the results show that

the fixed effect is the most suitable one for all eight regressions. F statistics indicate that all models are significant.

TABLE 2: RESULTS OF PANEL REGRESSION ANALYSIS

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	.248* (.098)	.234** (.084)	.354*** (.091)	.302* (.152)	.262* (.109)	.248** (.095)	.292** (.103)	.467* (.180)
Size	.001** (.001)	.001 (.001)	.001 (.001)	.001** (.001)	.001* (.001)	.001 (.001)	.001 (.001)	.001*** (.001)
Co-investment	-.049*** (.011)	-.029** (.009)	-.044*** (.010)	-.035* (.015)	-.053*** (.011)	-.036*** (.010)	-.045*** (.011)	-.046** (.016)
Seed%	.133* (.067)				.168* (.069)			
Early%		-.073 (.052)				-.075 (.053)		
Expansion%			-.167* (.065)				-.126 (.070)	
Late%				-.078 (.125)				-.084 (.133)
Related D	.137** (.046)	.148** (.042)	.143** (.045)	.117 (.070)				
Unrelated D	.031 (.036)	.041 (.032)	.023 (.034)	-.069 (.054)	.043 (.040)	.078* (.034)	.073 (.037)	.119 (.061)
PerDR					.223* (.091)	.220** (.079)	.251** (.089)	.035 (.143)
F value	.000	.000	.000	.002	.000	.000	.000	.006

Standard coefficients are reported in the table, with standard errors presented in the parentheses. ***. $P < .001$, **. $P < .01$, *. $P < 0.05$.

Hypotheses 1 and 2 are opposed to each other. Hypothesis 1 states that unrelated diversification strengthens firm performance with exposure to the seed and early stage, while hypothesis 2 describes otherwise. The direct effect of related and unrelated diversification is examined from model one to model four. The indirect effect exemplified by the percentage of related diversification in the total diversification index (PerDR) is examined from model five to model eight. For the seed stage, the coefficient is significant at 0.137 for related diversification as shown in model one, while the coefficient is not significant for unrelated diversification. In model five, the coefficient of PerDR is significant at 0.223, but not significant for unrelated diversification for the seed stage. For the early stage, the coefficient of related diversification is significant at 0.148 in model two, while the coefficient of unrelated diversification is not significant. In model six, the coefficient of PerDR is significant at 0.220, and we also have a significant coefficient for unrelated diversification but with a much weaker influence of 0.078. For the expansion stage, related diversification has shown a significant effect in model three and model seven. For the later stage, there is no significant effect detected for either related or unrelated diversification in model four and model eight. The overall results seem to suggest that related diversification improves firm performance for VC firms with exposure to the seed and early stage. Hypothesis 2 is accepted.

DISCUSSION AND CONCLUSION

Earlier studies of diversification strategy in the VC market have focused on the level of diversification (Matusik & Fitza, 2012). We build on the earlier results to explore the nature of diversification. Using a perspective of knowledge management and structural coordination need, we try to understand how the nature of diversification strategy, related and unrelated, affects firm performance for VCs who include early startups. Secondary data was collected from Private Market of Thomson Reuters. Panel data analysis was performed. The overall results of our models indicate that related diversification improves firm performance, while unrelated diversification has little effect.

It is difficult to examine the difference between related and unrelated diversification strategy using a total diversification index as shown in early studies (Matusik & Fitza, 2012). In our methodology, we separate related diversification from unrelated through measuring 1) the related and unrelated diversification indices separately and 2) the percentage of relatedness in the total diversification index (PerDR). The use of PerDR can complement our understanding of the related diversification and total diversification indices. This is because the total diversification index is the sum of the related and unrelated indices (Palepu, 1985), and a high value of the related diversification index does not necessarily mean that the total portfolio is related if the unrelated index is even higher than the related index. In addition, PerDR sheds some interesting observations in our study: When we compare the coefficients of PerDR with that of the related diversification index in panel regressions, the value of PerDR is higher than that of the related diversification index. For example, comparing model one with model five, the coefficient of the related diversification index is 0.137, while the coefficient of PerDR is 0.223. Model one suggests that using related diversification strategy is important for a VC firm's performance, and model five further suggests that a higher percentage of related diversification in the VC firm's portfolio is critical as well. In other words, the degree of relatedness of a portfolio perhaps is more influential than related diversification alone.

The study result supports the argument from knowledge management where the efficiency of knowledge management is critical for firm performance. The result does not support the perspective of structural coordination need, which can be explained by VCs' hands-on working style. That is, the close involvement of managing a related diversification portfolio generates higher value than costs saving of managing an unrelated diversification portfolio.

EARLY STAGE INVESTMENT

VC financing is only one part of external financing for early startups; nevertheless it is a crucial part because of the magnitude of the capital provision by VCs. However, a trend has gradually formed over years where VCs shy away from early startups, leaving the supply of financing for early startups to angel investors (Clercq et al., 2006; Jose, Roure, & Aernoudt, 2005; Morrissette, 2007; Van Osnabrugge, 2000). For example, in our database, we found more than 80% of VC deals in the U.S. market from 1969 to 2012 avoided investment at seed and early stage. The main

reason behind the lack of enthusiasm is perhaps the risk associated with the stage (Jose et al., 2005). As a result, VCs select ventures that have passed the seed and early stage development, where the ventures have shown well-developed concepts and have already generated a positive cash flow but looking for ways to expand (Clercq et al., 2006). Nevertheless, economic development of a society depends on a healthy growth of early startups in that society, and VCs are valuable to early startups (Croce et al., 2013). This study thus focuses on the specific group of VCs who do finance early startups, and our results suggest that these VCs can manage the stage related risk and improve firm performance through strategy.

Our study suggests that the nature of diversification is more important than the number of diversification, and thus more diversification is not necessarily better. This conclusion is consistent with the argument from the strategy field where a medium level of diversification outperforms a high level of diversification (Hill & Hoskisson, 1987; Palich et al., 2000).

LIMITATIONS AND FUTURE RESEARCH

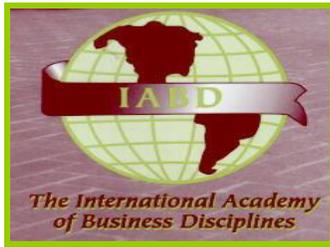
There are several limitations in this study. First, our data collection is from the U.S. market. Albeit that the U.S. market is the largest VC market in the world, there is a possibility of data selection bias due to the limitation to one nation. Future research should replicate the panel regression by using a more inclusive database. Second, this study supports the argument from the perspective of efficient knowledge management; but, how knowledge experience of VCs moderates the relationship between firm strategy and firm performance is not explored. For example, one study shows that VCs' industrial experience moderates the relationship between co-investment and firm performance (Clercq & Dimov, 2008), and future research can investigate similar moderating effects between diversification strategy and firm performance. Third, this study examined the direct impact of related and unrelated diversification strategies on firm performance. There is a possibility that diversification strategy interacts with other variables creating mediating effect on firm performance, an area that future studies can also examine. Fourth, this study has used secondary data to analyze related and unrelated diversification; future research should consider survey method to enhance our understanding of VCs' preferences towards related and unrelated diversification. On the whole, this paper has presented some interesting findings about related diversification in the VC market.

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