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Post-Investment Activities of Venture Capitalists When Making Investments in New Technology-Based Firms in Japan

Tetsuya Kirihata[†]

[†] *Visiting Associate Professor, Ph.D., Kansai Urban Banking Corporation Chair of Kansai Economic and Management Research, Graduate School of Management, Kyoto University*
E-mail: kiri@gsm.kyoto-u.ac.jp

In Japan, there has been recent notable growth in the percentage of investments made by venture capitalists (VCists) in new technology-based firms (NTBFs), as well as an increase in the active involvement of VCists in the management of their portfolio firms (PFFs). On the basis of the results of a questionnaire survey, this paper examines the post-investment activities that Japanese VCists conduct for early stage and technology-based PFFs. The results of this study show that VCists who invest in early stage firms seem to be partially characterized by closer involvement with firms and the utilization of their own value-adding abilities. Furthermore, while it was observed that the more VCists tended to invest in early stage firms, the more they also invested in technology-based firms, it seemed that the value-adding abilities of these VCists that were necessary for the commercialization of technological innovation may still be at the developing stage.

Keywords: venture capitalists, new technology-based firms, post-investment activities, managerial support, supporting abilities
JEL Classification Numbers: G24, M13, O34

1. Introduction

The contribution of new technology-based firms (NTBFs) to economic development and innovation has become a topic of interest to both researchers and policymakers in many countries. In this paper, NTBFs are defined as innovative and progressive early stage firms that thrive on inventions generated by technological ideas and pursue advanced technology-based businesses by focusing on their own intellectual properties, especially legally protected patents.

Venture capitalists (VCists) play an important role in fostering NTBFs, several of which, such as Google, Apple, and Intel, are among some of today's largest

business corporations (Florida and Kenney, 1988; Pfirrmann, Wupperfeld and Lerner, 1997). VCists essentially raise money from either institutions or individuals in order to invest in unlisted relatively high potential but also high risk firms. Prior research regarding the roles of VCists in fostering NTBFs has covered both the financial and non-financial involvement of VCists in their portfolio firms (PFFs) (Sapienza, 1992; Timmons and Bygrave, 1986). With regard to financial involvement, VCists, according to the OECD (2003), remain the primary source of funding for NTBFs, despite the amount of venture capital (VC) investments being rather small when compared to a country's GDP (OECD 2003: 46). However, the mere provision of risk money may not be the sole required condition for VCists' investments in technologically innovative startups to ensure the success of those startups (Timmons and Bygrave, 1986: 161). Sahlman (1990) indicated that VCists are actively involved in the management of the firms that they fund, typically by becoming members of the board of directors and retaining important economic rights in addition to ownership rights (Sahlman, 1990: 473). There is considerable diversity in the VC industry in different countries, and the notion of non-financial involvement may differ across countries or regions. However, in the more developed VC markets such as those in the U. S., it is assumed that VCists offer more than money by also actively participating in the management of PFFs (Black and Gilson, 1998).

In Japan, there has been notable growth in the percentage of investments made by VCists in NTBFs[1]. According to analyses by the Venture Enterprise Center (VEC) on the new annual investments of Japanese VCists by growth stage during the period 1995−2006, there has been a rapid increase in investments in early stage firms. Specifically, the percentage of investments in these firms during their first 5 years of inauguration was 17.2% in 1995. This number sharply increased to 62.2% in 2000, and slightly declined to 48.1% in 2006.

An analysis of the breakdown of new investments by business category (based on investment amount) shows that the percentage of investments in biotechnology — a major technological area — more than doubled from 4% in 2001 to 9.9% in 2006. At the same time, the percentage of investments in the medical/health industry increased from 5% in 2001 to 8.2% in 2006, and investments in other new technical innovation areas such as semiconductor/electronic components and computer-related businesses still captured a considerable share of investments. In addition to this increasing trend in investments, a number of VC funds for university spin-offs (which are major funds for new technologies in Japan established following the founding of the Hokkaido University Ambitious Fund in 1997) have also shown a rapid increase since 2001.

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[1] One of the reasons why these changes occurred is because the markets of high-growth and emerging stocks were established in succession in the late 1990s. These markets included MOTHER, which was established in the Tokyo Stock Exchange in 1999, and NASDAQ Japan, which was founded in 2000. These changes lowered the number of listing requirements for new stocks, which in turn, attracted more VCists who were seeking an exit for their investments.

These changes in the investment activities of Japanese VCists present a tremendous opportunity to research the issues pertaining to the post-investment activities of Japanese VCists with particular emphasis on the relationship between these post-investment activities and the growth stage and technology base of the VCists' PFFs — a subject that has not been previously examined in detail. To address this topic, this paper posits several hypotheses, as described below.

2. Hypotheses

2. 1. Post-investment activities of Japanese VCists and the growth stage of their PFFs

Regarding the relationship between the post-investment activities of VCists and the growth stage of their PFFs, Bygrave and Timmons (1992) emphasized that the VCists who invest in early stage firms should also act as "coaches" or "cheerleaders." Furthermore, it should be the objective of VCists who invest in early stage firms to add value in several ways such as identifying and evaluating business opportunities; implementing management, entry, or growth strategies; negotiating and closing investments; tracking and coaching companies; providing technical and management assistance; and attracting additional capital, directors, management, suppliers, and other key stakeholders and resources (Bygrave and Timmons, 1992). Gorman and Sahlman (1989) and Sapienza (1992) found that monitoring is heaviest in early stage firms. According to these studies, it appears that the growth stage of PFFs is influenced by the level of the involvement of VCists in the management of PFFs, communication frequency, and the breadth of managerial supporting experience. Thus, I offer the following hypotheses.

H1. Japanese VCists who specialize in investing in early stage firms communicate with their PFFs more frequently than general Japanese VCists do.

H2. Japanese VCists who specialize in investing in early stage firms have broader managerial support experience for their PFFs as compared to general Japanese VCists.

2. 2. Post-investment activities of Japanese VCists and the technology base of their PFFs

Previous studies have indicated that the involvement of VCists with PFFs may be linked to the PFFs' pursuit of technology. Sapienza (1992) claimed that an increasing amount of innovation pursued by the venture leads to more frequent contact between the lead investor and the CEO as well as more open communication; furthermore, less conflict of perspective between the VCist-CEO pair leads to more valuable involvement. Therefore, the firms that aspire for more groundbreaking innovations depend heavily on the involvement of VCists (Sapienza, 1992: 21–22). Baum and Silverman (2003) maintained that the VCists who invest in technology startups are likely to consistently combine both scouting

for excellent technology and the ability to coach by imparting management skills. VCists in Silicon Valley, who mainly invest in technology-based startups, appeared to be more involved in the management of their PFFs in many aspects including providing human resource policies, recruiting marketing specialists, and even replacing founders with outside CEOs (Hellmann and Puri, 2002). According to these studies, it appears that the technology base of PFFs affects the level of the involvement of VCists in the management of their PFFs, communication frequency, and the breadth of managerial support experience. Thus, I offer Hypotheses 3 and 4.

H3. Japanese VCists who specialize in investing in technology-based firms communicate with their PFFs more frequently than general Japanese VCists do.

H4. Japanese VCists who specialize in investing in technology-based firms provide broader managerial support experience for their PFFs as compared to general Japanese VCists.

The involvement of VCists in the management of their PFFs involves many levels, ranging from a very hands-off approach that almost exclusively involves only the provision of capital, to a hands-on approach that includes a belief in adding value to the PFFs. In the latter case, the VCists play an active role in the daily running of the business. The level of involvement in the management of PFFs is costly to the VCists because it is time-intensive. As a consequence, the VCists tend to invest their time only to such an extent that the perceived value of the hands-on approach toward PFFs exceeds that of the hands-off approach (Macmillan, Kulow and Khoylian, 1989). The involvement of the VCists in the management of their PFFs tends to be greater when the VCists perceive that they are capable of providing significant value-adding support (Sapienza, Manigart, and Vermeir, 1996). Therefore, in addition to Hypotheses 1−4, I put forth Hypotheses 5 and 6 on the basis of these studies.

H5. Japanese VCists who specialize in investing in early stage firms have broader and higher support abilities for their PFFs than general Japanese VCists do.

H6. Japanese VCists who mainly invest in technology-based firms have broader and higher support abilities for their PFFs than general Japanese VCists do.

3. Questionnaire Survey on Japanese VCists

3. 1. Methods

A questionnaire was administered to Japanese VCists either directly or indirectly via a total of 157 VC firms, namely, corporate members of the Japanese Venture Capital Association and companies listed in the "Japan Venture Capital

Directory in FY2005" issued by the Venture Enterprise Center in 2006. Three to 15 questionnaire forms were sent to these VC firms as per the size of their annual investments in FY2004. In total, 614 questionnaires were distributed between late July and mid-August 2006. In the survey, the VCists were asked to present their individual experiences and opinions regarding their investments. From late August to late September, following the first distribution of the questionnaire form, the non-responding VCists were contacted directly or indirectly through their VC firms by phone, fax, or e-mail to remind them that their response to the questionnaire was pending. This paper analyzes the responses submitted by 105 VCists before the end of September 2006.

3. 2. Sample Characteristics

According to the 105 responses received, each respondent VCist was in charge of an average of 28.4 PFFs. The average breakdown of PFFs by stage of development at the time of the first investment [as per the 4 stages indicated by Maison and Harrison (1999)] are as follows: (1) startup stage (from inauguration to the achievement of sales), 17.6%; (2) early stage (from the achievement of sales to the achievement of a single-year profit), 35.9%; (3) growth stage (from the achievement of a single-year profit to the elimination of cumulative loss), 22.9%; and (4) later stage (from the elimination of cumulative loss to IPO), 22.2%. In this paper, the early stage PFFs were defined as firms in their (1) startup stage and (2) early stage or those who had yet to achieve their first fiscal year profit.

The average breakdown of PFFs by business category is as follows: IT-related business, 39.7%; biotechnology, medical and healthcare service industry, 13.2%; industrial and energy services, 13.7%; products/services, 29.5%; and other, 3.6%. Among these PFFs, 33% have filed for some patents. In this paper, technology-based PFFs are defined as firms in any business category that at the very least, have successfully filed a patent.

4. Results

4. 1. Communication Frequency

4. 1. 1. General Japanese VCists

The VCists were first asked to indicate by what means and how often they communicate with the PFFs in their charge. With respect to the frequency of communication, the respondents had to choose between daily (level 1), twice a week (level 2), weekly (level 3), biweekly (level 4), monthly (level 5), quarterly (level 6), and less than quarterly (level 7). The choices for modes of communication were "face to face," "telephone and e-mail," and "letter." These items were selected on the basis of the studies of Harrison and Mason (1992) and Higashide and Birley (1999).

The scores for the frequency of face to face, telephone and e-mail, and letter modes of communication were 5.11, 4.39, and 6.32, respectively (see Table 1). The larger the frequency score, the less frequent the communication. The results

Table 1. Communication methods and frequency

		Mean	SD
Face to Face		5.11	0.89
	Higashide and Birley (1999)	4.9	1.1
Telephone (and e-mail)		4.39	1.15
	Higashide and Birley (1999)	3.6	1.3
Letters		6.32	0.95
	Higashide and Birley (1999)	4.9	1.3

a) VCists: n = 105

b) The data from Higashide and Birley (1999) were partial.

c) E-mail was not provided as an answer option in the study of Higashide and Birley (1999).

have shown that Japanese VCists communicate with PFFs face-to-face monthly or quarterly, by telephone and e-mail twice a week or monthly, and by letter quarterly or less frequently. Comparing this data with the survey conducted by Higashide and Birley (1999), it seems that Japanese VCists communicate with their PFFs less frequently than their counterparts in the U. K. do for all methods of communication[2].

4. 1. 2. Japanese VCists who invest in early stage and technology-based firms

Next, an analysis was conducted to determine whether there existed any correlative relationships between the frequency of communication with PFFs and the proportion of investments in early stage and technology-based PFFs. Pearson's correlation coefficients between the proportion of investments in the technology based PFFs and face to face, telephone and e-mail, and letter modes of communication were all statistically insignificant at -0.342, -0.283, and -0.155, respectively. Similarly, the correlation coefficient between the proportion of investments in the early stage PFFs and communication by letter was statistically insignificant at -0.117. However, statistically significant correlations were observed for communication by face to face with a correlation coefficient of -0.342 ($p<0.01$), and telephone and e-mail with a correlation coefficient of -0.283 ($p<0.01$) (see Table 2).

Another correlation analysis was conducted in order to determine how the proportion of investments in early stage and technology-based PFFs was related to the number of PFFs for which each VCist was responsible. The correlation coefficient between the proportion of investments in technology-based PFFs and the number of PFFs handled by each VCist was -0.113 (statistically not

[2] E-mail was not provided as an answer option in the study of Higashide and Birley (1999).

Table 2. Correlative relationships between VCists' frequency of communication with PFFs and the proportion of investments in early stage and technology-based PFFs

	Proportion of investment in early stage firms (PIES)	Proportion of investment in technology-based firms (PITB)
Face to face	−0.342**	−0.342
Telephone and e-mail	−0.283**	−0.283
Letters	−0.117	−0.155
Number of PFFs	−0.272**	−0.113
PITBS	0.242**	−

Pearson's correlation:
** *Significant at $p<0.001$ (two-tailed test)*
* *Significant at $p<0.005$ (two-tailed test)*

significant), while the correlation coefficient between the proportion of investments in early stage PFFs and the number of PFFs handled by each VCist was −0.272 ($p<0.01$). The proportion of investments in new technology-based PFFs was positively associated with the proportion of investments in early stage PFFs. As the proportion of early stage PFFs increased, the number of PFFs for which a VCist was responsible decreased. However, no significant correlative relationship was found between the proportion of investments in technology-based PFFs and the number of PFFs for which each VCist was responsible.

A significant correlation (correlation coefficient = 0.242; $p<0.05$) was observed between the proportion of investments by VCists in early stage and technology-based PFFs. The VCists that specialized in early stage firms tended to be in charge of fewer PFFs and have more frequent communication with their PFFs face to face and via telephone and e-mail. On the other hand, we were unable to find significant correlations between the VCists that specialized in investing in technology-based firms and the frequency of communication. Thus, these results partially support Hypothesis 1, while there is no current evidence to back Hypothesis 3.

4. 2. Managerial Support

4. 2. 1. General Japanese VCists

The VCists were asked to specify the manner in which they manage their PFFs by choosing from the following items: offering advice as a mentor/coach, adjustment of business strategies, providing professional contacts (accountant, etc.), advising on industry competition, advising on private matters, providing marketing plans, debt/equity arrangements, financial advice, advising on short-term crises, and providing recruitment assistance. These items were also selected on the basis of the studies of Harrison and Mason (1992) and Higashide and Birley

(1999).

Providing financial advice to the PFFs (91.4%) was found to be the most common type of support on average, followed by debt/equity arrangements (87.6%), and professional contacts (87.6%) (Table 3). On the other hand, the least common types of support on average were marketing plan (57.1%), advice on private matters (63.8%) and advice on short-term crises (65.7%), respectively.

In order to conduct a comparison of the three sets of data (data from this analysis and data from both Higashide and Birley and Harrison and Mason), the average values of the seven mutual items from the three studies were calculated. The result revealed that the average involvement of VCists in their PFFs in this study was 72.6% — the highest among the 3 sets of data — as compared to those in Higashide and Birley (1999) and Harrison and Mason (1992), whose averages were 68.8% and 51.1%, respectively.

4. 2. 2. Japanese VCists who invest in early stage and technology-based firms

The results of the correlation analysis between the proportion of PFFs managed by VCists that are early stage and technology-based, and the level of the VCists' involvement and recognition of value-adding abilities are displayed in Table 4. The VCists who allocated a higher proportion of their investments to early stage

Table 3. Japanese VCists' experience in supporting their PFFs (in %)

		Higashide and Birley (1999)	Harrison and Mason (1992)
Advice as a mentor/coach	72.4	92.5	41.3
Business strategies adjustment	75.2	71.3	61.5
Professional contacts (accountants, etc.)	87.6	72.5	N/A
Industry competition advice	71.4	41.3	44.2
Advice on private matters	63.8	60.0	N/A
Marketing plan	57.1	80.0	51.3
Debt/equity arrangements	87.6	72.5	49.4
Financial advice	91.4	82.5	N/A
Advice on short-term crises	65.7	70.0	70.5
Recruitment assistance	79.0	53.8	39.7
Average*	72.6	68.8	51.1

* *The average was calculated from seven mutual answer choices (Advice as a mentor/coach, Business strategies adjustment, Industry competition advice, Marketing plan, Debt/equity arrangements, Advice on short-term crises, and Recruitment assistance).*

a) VCists: n = 105.

b) The data from Higashide and Birley (1999) and Harrison and Mason (1992) were partial.

Table 4. Correlative relationships between the proportions of VCists' investments in technology-based and early stage PFFs and VCists' managerial support experience and recognized ability

	Proportion of investments in early stage firms		Proportion of investments in technology-based firms	
	Actual Support	**Recognized Ability**	**Actual Support**	**Recognized Ability**
Advice as a mentor/coach	**0.197***	**0.288****	0.151	0.152
Business strategies adjustment	**0.208***	0.195	0.023	0.127
Professional contacts (accountants, etc.)	0.072	0.084	−0.068	−0.131
Industry competition advice	0.009	−0.096	0.085	0.007
Advice on private matters	0.130	0.057	0.064	0.171
Marketing plan	0.155	0.179	0.060	0.177
Debt/equity arrangements	−0.029	−0.010	**0.212***	−0.050
Financial advice	−0.128	−0.065	0.031	−0.002
Advice on short-term crises	**0.230***	**0.227***	−0.065	0.103
Recruitment assistance	−0.027	0.094	0.005	0.011

** *Significant at $p < 0.001$ (two-tailed test)*
* *Significant at $p < 0.005$ (two-tailed test)*

PFFs were more likely to have been involved in the management of PFFs in terms of dispensing advice as a mentor/coach, business strategies adjustment, and advice on short-term crises. On the other hand, the VCists who allocated a higher proportion of their investments to technology-based PFFs were more likely to have been involved with their PFFs only in terms of debt/equity arrangements. In other words, of the 10 aforementioned items regarding managerial support experience with PFFs, 3 were found to have significant correlations with higher proportions of investments in early stage firms, but only 1 was significantly correlated with a higher proportion of investments in technology-based firms. Therefore, these results partially support Hypothesis 2, while there is little evidence to back Hypothesis 4.

4. 3. Supporting Abilities

4. 3. 1. General Japanese VCists

The VCists were asked to assess their ability in extended management support to the PFFs on a scale of 4 from "low" to "high," with 1 being the lowest score. The highest level of skill assessed was financial advice (average = 3.35), followed by debt/equity arrangements (3.15), and business strategies adjustment (2.95) (Table 4). On the other hand, the lowest average score was earned by recruitment

Table 5. VCists' managerial support and recognized ability

	Mean	S.D.
Advice as a mentor/coach	2.74	0.87
Business strategies adjustment	2.95	0.75
Professional contacts (accountant, etc.)	N/A	N/A
Industry competition advice	2.93	0.76
Advice on private matters	2.51	0.79
Marketing plan	2.76	1.01
Debt/equity arrangements	2.58	0.75
Financial advice	3.15	0.79
Advice on short-term crises	3.35	0.72
Recruitment assistance	2.78	0.81
Advice as mentor/coach	2.45	0.88

a) *VCists: n = 105*

assistance (2.45), followed by industry competition advice (2.51), and finally, marketing plan (2.58).

4. 3. 2. Japanese VCists who invest in early stage and technology-based firms

With regard to the VCists' value-adding abilities, those who allocated a higher proportion of their investments to early stage PFFs recognized that they were capable of supporting PFFs in terms of dispensing advice as a mentor/coach, and offering advice on short-term crises. However, no significant correlations were observed between VCists who allocated a higher proportion of their investments to technology-based PFFs and the recognition of their ability in value-adding management support (Table 4). Therefore, of the 10 items regarding recognition of managerial support, 2 were found to have significant correlations with a higher proportion of investments in early stage firms, while none were found to be significantly correlated with a higher proportion of investments in technology-based firms. The 2 items correlated with a higher proportion of investments in early stage firms with both managerial support experience and recognition of managerial support were dispensing advice as a mentor/coach and offering advice in crises. Therefore, an association between actual managerial support experience and the recognition of managerial support was observed. We may interpret these results as partially supporting Hypothesis 5, but not Hypothesis 6.

5. Summary and Implications

5. 1. Summary

According to the data from this analysis on the post-investment activities of

Japanese VCists and early stage PFFs, Hypothesis 1 was considerably supported, while Hypotheses 2 and 5 were supported to a lesser extent. In other words, the proportion of investments in early stage PFFs changed in the same direction as communication frequency with PFFs, not only by means of telephone and e-mail communication, but also with face-to-face communication. On the other hand, as the proportion of a VCist's investments in early stage PFFs increased, the number of PFFs that the VCist is in charge of declined. Moreover, for the VCists that invested in early stage PFFs, as the number of PFFs that the VCist was in charge of declined, the amount of personal communication with the PFFs increased.

There was a positive correlation between the proportion of investments made by VCists in early stage PFFs and the VCists' experience in managerial support in terms of dispensing advice as a mentor/coach, business strategies adjustment, and advice on short-term crises. Out of the 10 managerial support items, these 3 items were found to have statistically significant correlations.

Furthermore, the data showed a positive correlation between the proportion of investments made by VCists in early stage PFFs and the recognition of VCists' value-adding abilities in offering advice as a mentor/coach and advice on short-term crises. Out of the 10 items concerning the recognition of VCist's value-adding abilities, these 2 items were found to have statistically significant correlations.

Regarding Hypotheses 3, 4, and 6, the data from this analysis did not support Hypotheses 3 and 6, and only partially supported Hypothesis 4. Specifically, with regard to investments in technology-based PFFs, a significant correlation between the proportion of investments made by VCists in technology-based PFFs and communication frequency was not observed. Furthermore, no significant correlative relationship was found between the proportion of investments made by VCists in technology-based PFFs and the number of PFFs for which a VCist was responsible. On the other hand, the proportion of investments made by VCists in technology-based PFFs was found to have a significant correlation with only one out of ten of the actual managerial support items for the PFFs, that is, debt/equity arrangements. However, no statistically significant correlation was observed between the proportion of investments made by VCists in technology-based PFFs and the recognition of VCists' value-adding abilities.

Lastly, the proportion of investments made by VCists in technology-based PFFs was found to change in the same direction as the proportion of investments made by VCists in early stage PFFs.

6. Implications

The results of this questionnaire survey of Japanese VCists show that VCists who invested in early stage firms seemed to be partially characterized by a management style that included closer involvement, and as indicated by Hypotheses 1, 2, and 5, and that they utilize their own value-adding abilities. Moreover, while it was observed that the more VCists tended to invest in early

stage firms, the more they also invested in technology-based firms, it seemed that the value-adding abilities of these VCists that were necessary for the commercialization of technological innovation may still be at the developing stage, based on Hypotheses 3, 4, and 6.

In the Japanese VC industry, there has been an increase in the number of newcomers with the intention of investing in early stage firms since the late 1990s (Yoshikawa, Phan, and Linton, 2004). Yoshikawa et al. (2004) asserted that these newcomers actively participate in the management of their PFFs in order to add value to their investment. In contrast, the number of investments in technology-based firms such as those in biotechnology, IT, and nanotechnology has only sharply increased since the beginning of 2000. Thus, the development of the roles of VCists in assisting the commercialization of these technological innovations may progress at a slower rate as compared to their roles in early stage firms.

Continuously enhancing their value-adding abilities and providing different kinds of support may be the most effective methods for VCists to differentiate themselves and survive in the Japanese VC industry. It may be possible to expect both new investors and experienced VCists to increase their value-adding abilities in order to assist the commercialization of technological inventions. The appearance of technologically specialized VCists may then diversify and strengthen the Japanese VC industry, as well as contribute to the continued growth of NTBFs in Japan.

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