

# The impact of liability of foreignness on international venture capital firms in Singapore

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**Abstract** This empirical study explores the impact of the liability of foreignness on international venture capital (VC) firms in Singapore as well as the response. In the stage of VC deal assessment, international VC firms are found to originate fewer unsolicited deals from networks compared to domestic ones due to the liability of foreignness. In response to such liability, international VC firms primarily use their homegrown advantages, and originate more solicited deals from networks.

**Keywords** Venture capital · Liability of foreignness · Deal assessment · Deal origination · Deal evaluation

The liability of foreignness (LOF) is an important concept in international business literature (e.g., Kindleberger, 1969; Zaheer, 1995; Zaheer & Mosakowski, 1997; Lu & Beamish, 2001; Miller & Parkhe, 2002). The existence and persistence of LOF have been reported in various industrial and geographical contexts (e.g., Zaheer, 1995; Zaheer & Mosakowski, 1997; Miller & Parkhe, 2002).

While there is no known study on LOF in the venture capital (VC) industry, there are indications that LOF may exist in this industry. First, the inclination of VC firms to invest in ventures close to their premises to improve monitoring and reduce

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information asymmetry indicates the possible existence of LOF (Lerner, 1995). Second, international VC firms are generally weak in local knowledge and lack of local network support (Hall & Tu, 2003), which may cause problems in sourcing, evaluating, and monitoring ventures. This explains why it is a common practice for international VC firms to hire local managers to execute investments (Bruton, Ahlstrom, & Yeh, 2004).

Moreover, while multinationals are found to either use their homegrown advantages (e.g., Zaheer, 1995; Miller & Parkhe, 2002) or explore local resources to overcome LOF (e.g., Lu & Beamish, 2001), it is unclear as to how international VC firms respond to LOF. On the one hand, the VC industry is global in the institution norm as most VC firms in the world largely follow the practice of US VC firms (Bruton, Fried, & Manigart, 2005). On the other hand, the VC industry is localized in the investment decision and monitoring as they are essentially competing on a local-to-local basis in their investment management (Lockett & Wright, 2002). International VC firms could thus either put emphases on their homegrown advantage to fully utilize their investment experiences or build the local responsiveness by following the local practice. An empirical investigation would improve our understanding on the adaptation process of international VC firms in emerging markets. Such an understanding would be valuable for not only VC academia but also broad international business researchers. Practically, it is important not only for international VC firms but also for host countries as VC industry is important for the innovation commercializing and the growth of high-tech industries.

In this paper, we focus on one stage of VC investment process, the stage of deal assessment, to study the impact and response of LOF in the VC Industry. In this stage, thousands of business proposals are screened but only a few promising companies are chosen (Fenn, Liang, & Prowse, 1997), and VC firms face most severe problem of information asymmetry (Amit, Glosten, & Muller, 1990). LOF could be prominent and may significantly affect international VC firms in deal origination and evaluation. Singapore is chosen as the empirical setting for our study as there is significant presence of international VC firms, attracted by its open economy and regional center status in Southeast Asia. Though the GDP level of Singapore is similar to developed countries, its market infrastructure is still lagging a bit behind that of developed economies. Furthermore, most VCs there are mainly investing in their neighboring less developed countries.

The rest of the paper is organized as follows. We first review studies on LOF in the international business literature, apply them to the context of VC industry in Singapore, and develop three testable hypotheses in VC deal origination and evaluation. These hypotheses are then tested with empirical data from Singapore market. Finally, we summarize and discuss our findings.

## Literature review and hypotheses

The international business literature has long established that firms operating in foreign markets incur additional cost compared to domestic firms (Kindleberger, 1969; Johanson & Vahlne, 1977), generally referred to as “the liability of foreignness

(LOF)" (Zaheer, 1995). It refers to all additional costs incurred by a firm operating in an overseas market, which arises from the unfamiliarity of the environment as well as the geographical, cultural, economic, and political differences (Zaheer, 1995: 343). In the context of VC industry, LOF mainly refers to additional costs in VC investments due to the knowledge and network disadvantage VC firms experience in overseas market.

The existence and persistence of LOF have been reported in various industrial and geographical contexts such as the currency trading industry (Zaheer, 1995; Zaheer & Mosakowski, 1997) and the global banking industry (Miller & Parkhe, 2002). Lu and Beamish (2001) have investigated LOF faced by Japanese SMEs going internationally. Mezas (2002) has shown the evidence of LOF by much more labor lawsuits faced by foreign firms in the US. Nachum (2003), however, reported the non-existence of LOF among financial service firms in London.

Literature has reported two approaches to overcome LOF by international firms. The first is to use the homegrown firm-specific advantages, an approach suggested by the resource-based view of firm (Wernerfelt, 1984; Barney, 1991). Such firm-specific advantages can be derived from cost savings through economies of scale or scope, the brand name, superior technology or organizational capabilities (Zaheer, 1995). In the VC context, the homegrown advantage can be significant. VC industry in its short history of development is unbalanced across countries. Most VC firms in Europe (Sapienza, Manigart, & Vermeir, 1996) and Asia (Bruton et al., 2005) largely follow the practice of US VC firms (e.g., significant minority shareholding, board sitting, and various protective contracts) given the success of VC industry in the US. A well-known international VC firm can easily obtain local funding and attract local entrepreneurs when it enters a new region. Thus international VC firms, particularly US firms enjoy advantages over domestic VC firms that often lack investment experiences in comparison. Furthermore, international VC firms are capable of raising funds in multiple capital markets around the globe, an added advantage over domestic firms. Thus international VC firms normally enjoy advantages of fund raising, brand name, and investment experience.

The second approach is to mimic the advantages of successful local firms, an approach suggested by the institutional theory (DiMaggio & Powell, 1983; Rosenzweig & Singh, 1991). One major difficulty in the VC operation is severe information asymmetry in the private equity market, where VC firms often experience great difficulty to screen entrepreneurs seeking for funding as well as to monitor the venture growth after making the investment (Amit et al., 1990). It requires extensive efforts to overcome such information asymmetry, and VC firms often have to invest in ventures close to their premises (Lerner, 1995), and it is even more so in emerging markets (Bruton et al., 2004). In response to information asymmetry, most local branches of international VC firms are given much autonomy in deal searching and investment decision. Since the level of integration across different branches tends to be low, VC firms are essentially competing on a local-to-local basis in their investment management (Lockett & Wright, 2002).

Singapore offers an interesting context for the study of LOF in the VC industry. It is a global city with significant presence of foreign financial firms and particularly VC firms. Being a small city-state in Southeast Asia, Singapore is one of the regional financial centers. It is classified as a newly industrialized economy with a

GDP level similar to developed economies (e.g., Lockett & Wright, 2002). Singapore VC industry started in 1983 and the size of the VC pool had reached US\$16b in 2004 with more than 100 VC firms, 500 VC-supported companies and more than 100 IPOs, ranking the third in Asia Pacific region. The VC industry has been viewed highly by the Singapore government and is given many incentives for its development due to its role in supporting high-tech SMEs (Gibbons, Tan, Zutshi, & Alampalli, 1998). There are more international VC firms than domestic ones in both number and fund size. Furthermore, Singapore government is very supportive to the entry of international VC firms and even provides funding for new entries (Bruton, Ahlstrom, & Singh, 2002).

As international VC firms typically go overseas after the success in their home markets, they possess relatively rich investment experience and good industry knowledge about technology trends as well as some management knowledge (Hall & Tu, 2003). Such knowledge helps them contribute more to the venture strategy compared to domestic ones (Pruthi, Wright, & Lockett, 2003). However, international firms may also have knowledge disadvantages related to the local market (Johanson & Vahlne, 1977; Eriksson, Johanson, Majkard, & Sharma, 1997), and are generally weak in local networks compared to domestic firms (Li, Lin, & Arya, 2008). In the context of Singapore VC firms, though Singapore is a country with the open economy, there are still significant differences between international and domestic VC firms. Since communication and networks are essential for VC investments in Asia Pacific (Bruton et al., 2004), international VC firms are disadvantaged compared to domestic ones. Even if international VC firms hire local venture capitalists to alleviate the network problem, they are still weak in institutional networks with fewer and weaker local connections. On the contrary, domestic VC firms enjoy not only personal networks from local staff, but also institutional networks through years of business dealings by both themselves and their parent institutions, which may enhance their performances (Zhang & Li, 2008). Their local networks would be stronger and denser compared to that of international VCs. Such knowledge and network deficiency of international VC firms would affect their ability to overcome such information asymmetry, and result in LOF.

In this study, we focus on one stage of VC investment process, the stage of deal assessment, to study the impact and response of LOF in the VC Industry. Wright and Robbie (1998) divided VC investment process into four stages, fund raising, assessment, monitoring, and investment realization. In the assessment stage, a VC firm seeks possible investment opportunities, values them through initial screening and further due diligence, makes investment decisions, and structures deals by legal contracts (e.g., Tyebjee & Bruno, 1984; Harvey & Lusch, 1995). In this stage, VC firms arguably face severe information asymmetry, especially in the human capital evaluation on entrepreneurs (Smart, 1999). Here we focus our enquiry on the phase of VC deal origination and evaluation in the assessment stage.

#### Hypotheses on VC deal origination

In the phase of deal origination, a VC firm can either proactively search for deals (solicited deals) or passively wait for deals approaching (unsolicited deals) through

three channels, namely, entrepreneur, network, and intermediary.<sup>1</sup> An entrepreneur refers to someone who manages a promising but risky venture and approaches VCs for funding (De Clercq, Fried, Lehtonen, & Sapienza, 2006). Networks refer to individuals or companies connected to the VC firm in various ways, such as parent corporations of the VC firm, portfolio companies supported by the VC firm, and other VC firms being syndication partners before. Deals introduced by network members are generally based on trust and goodwill rather than profits.<sup>2</sup> Intermediaries refer to local consulting firms and individual brokers which introduce deals to VC firms for profits.

On the impact of LOF on unsolicited deals, we argue that unsolicited deals from networks are more difficult for international VC firms to obtain compared to domestic ones even though deals from networks are most reliable among the three deal channels as the VC firm can spend less effort in the due diligence (De Clercq et al., 2006). This is because international VC firms are not close to local networks and often lack mutual trust due to short acquaintance time and long cultural distance (Ahlstrom, Bruton, & Yeh, 2007). Their local networks are relatively weaker and less dense. Introducing deals to international VC firms could be risky for network members since gains from a successful deal only signal goodwill but the loss from a failed deal may be the end of the relationship due to the lack of mutual trust. Knowing most ventures would eventually fail (Gompers & Lerner, 1999), local networks would be hesitant to introduce deals to international VC firms compared to some domestic VC firms who enjoy stronger ties. Therefore, we expect international VC firms would originate fewer unsolicited deals from networks.

For deals from entrepreneurs and intermediaries, we contend that the impact of LOF would be less significant. As intermediaries and entrepreneurs can share investment profits from VC investments, they are eager to introduce deals to VCs regardless of their nationality. Thus we do not expect to see significant differences between international and domestic VC firms on deals from entrepreneurs and intermediaries. Summarizing the above discussion, we have following hypothesis.

**Hypothesis 1** An international VC firm originates fewer unsolicited deals from networks but comparable number of unsolicited deals from intermediaries and entrepreneurs, in comparison of domestic ones.

On the VC response to LOF, here we focus on solicited deals as unsolicited deals are beyond their control in the short-term though VC firms could build their networks to originate more unsolicited deals in the long-term. We contend that networks would be the best deal source. In our field study, one venture capitalist in a corporate VC firm described the process of soliciting deals:

Solicited deal is an important deal source. If I plan to invest in Thailand (a neighboring country of Singapore), then I will consult the manager in Thailand's subsidiary of our parent corporation. I work with the local team to

<sup>1</sup> Thus there are a total six types of deal sources, namely, solicited deals from entrepreneurs, solicited deals from networks, solicited deals from intermediaries, unsolicited deals from entrepreneurs, unsolicited deals from networks, and unsolicited deals from intermediaries.

<sup>2</sup> Even in the case of syndication when VC firms do share profits, goodwill and trust play the essential role in forming the syndication partnership (Bygrave, 1987).

scan the market, find the potential, and work with government there to find out industries that both they are interested in and we are knowledgeable about.

In this case, the venture capitalist seeks solicited deals in a new market using firm networks. Similar to unsolicited deals, the quality of solicited deals from networks is generally higher. However, different from unsolicited deals, VC firms need to use their industry knowledge also as the above quotation shows. Compared to domestic ones, International VC firms thus are more capable to solicit deals from networks given their industry knowledge advantages. In Singapore context, many high-tech ventures target the market of developed countries, which gives international VC firms a further edge since they understand the industry and market of these ventures better by their rich experiences at home (AVCJ, 1999).

While international VC firms are generally weak in local network strength, their network members could be a valuable source for deal information. When international VC firms take a proactive approach, their network members may respond positively as they bear less risk to solicitation requests. Sociology literature has highlighted the role of weak ties in information searching (e.g., Granovetter, 1973; Hansen, 1999). Brown and Konrad (2001) have further shown that even when job seekers relied more on strong ties, those who could use weak ties reaped more benefits. Similarly, weak ties of international VC firms could be used effectively to originate solicited deals.

Among the other two channels, deals from entrepreneurs are more risky without the certification of referrals (De Clercq et al., 2006). For international VC firms, their weakness in local knowledge particularly affects their ability to conduct due diligence on entrepreneurs. Their reliance on entrepreneurs for solicited deals would be minimal. In our field study, some international VC firms even claim they would not consider any deals without referrals. On the other hand, the disadvantage of deals from intermediary is the high cost. As most VC investments would turn out to be only break even or at loss, VC firms heavily rely on a few successful deals to keep them profitable (Gompers & Lerner, 1999). The profit sharing by intermediaries for successful deals would significantly lower VCs' total earning. Therefore, intermediary tends to be the last resort for international VC firms only when other deal sources are insufficient to support their operations. They would seldom solicit deals from intermediaries. The above argument on solicited deals from entrepreneurs and intermediaries would also be valid for domestic firms. Summarizing the above discussion, we have the following hypothesis.

**Hypothesis 2** An international VC firm seeks more solicited deals from networks but comparable number of solicited deals from intermediaries and entrepreneurs, in comparison of domestic ones.

Here we take soliciting deals from network for international VC firms as a means of using homegrown advantage since it requires the usage of their industry knowledge. Soliciting deals from intermediary can be seen as a means of following local practice since international VC firms in a new market without any advantage tend to seek the help of intermediaries as what Bruton and Ahlstrom (2003) reported in China.

## Hypotheses on VC deal evaluation

Previous literature (e.g., Harvey & Lusch, 1995; Smart, 1999) has shown great effort VC spent in deal evaluation to reduce the possibility of investment failure. The criteria used by VC firms in the process generally include management criteria, product/market criteria, and finance criteria (e.g., MacMillan, Siegel, & Subbanarasimha, 1985; MacMillan, Zemann, & Subbanarasimha, 1987; Muzyka, Birley, & Leleux, 1996). Management criteria refer to the capability of entrepreneur and management team, such as their characters, vision, and strategy for venture growth. Product/market criteria refer to the product prospects such as its quality, market potential, competitor strength, and customer base. Finance criteria refer to the financial status and value of the venture.

International VC firms would experience both cognitive and behavioral difficulties in evaluating due diligence criteria than domestic firms due to LOF. We contend that such difficulties vary across management, product/market, and finance criteria in that finance criteria are least difficult and management criteria are most difficult to evaluate with product/market criteria in between. Most finance criteria are relatively easy to evaluate from accounting reports (Smart, 1999). Evaluating product/market criteria is more difficult as information tends to be localized and hardly objective such as the expected market acceptance for a new product and the severity of potential competition after the initial success. The evaluation of management criteria is most difficult as it is elusive and there is no proven method of evaluation (Smart, 1999).

Marketing literature has shown that customer's experiential knowledge with the product would reduce difficulty in evaluation (Laroche, Cleveland, Bergeron, & Goutaland, 2003). Knowing the knowledge differences between international and domestic VC firms, we thus contend that LOF resulting from such differences would affect the deal evaluation of international VC firms. We thus expect they have greater difficulty in the evaluation of management and product/market criteria but similar difficulty in that of finance criteria, which results in differences in investment risk evaluation. International VC firms would see higher management risk and product/market risk in their investments compared to domestic VC firms, but similar in finance risk, resulting in following hypothesis.

**Hypothesis 3** An international VC firm would expect higher management and product/market risk but similar finance risk in its investments compared to a domestic VC firm.

## Methodology

For the study of VC investment decision process in Singapore, we conducted surveys to collect the relevant information in 1999. While the data is a bit old, we still see its relevance. 1999 was just one year after Asia Financial Crisis when VC firms in the region suffered great loss. They would thus be more concerned about investment risk in the investment process. Findings from that period may be applicable to VC firms in India and China currently where they face greater investment risk.



Information on a population of 83 local VC firms was obtained from EDB (Economic Development Board) (1999) as well as AVCJ (Asia Venture Capital Journal) (1999), the two primary sources of VC information in Singapore. Through initial contacts and checking record with the Registry of Companies and Businesses (a government agency responsible for company registration in Singapore), among the 83 VC firms, some were merged, moved, or closed down. Thus the actual VC population in Singapore was 67 at the end of 1999 (excluding newly established VC firms in that year not reported by EDB or AVCJ). Between August and October 1999, we managed to conduct pre-survey interviews with 30 VC firms to fine-tune our questionnaire on VC investment decision process based on literature such as MacMillan et al. (1985) and Muzyka et al. (1996). In November 1999, the finalized questionnaire survey was sent to each of the 67 VC firms, targeting senior venture capitalists (such as Investment Director, Managing Director, Vice President, or Managing Partner). We received 34 responses with a response rate of 51%, which is considered high for an empirical VC study.<sup>3</sup>

We compared the firm specific characteristics of respondents with non-respondents reported in AVCJ (1999), including the firm size, firm age, firm nationality, i.e., whether domestic or international, and firm type, i.e., whether independent or non-independent. Non-parametric Mann–Whitney–Wilcoxon test is used to measure the significance of non-respondent bias. The results are presented in Table 1.

Table 1 shows that there are no significant differences between respondents and non-respondents in all these firm specific characteristics. The overall high response rates thus provide a fairly representative view on the VC investment behaviors in Singapore.

Among the 34 participant VC firms, 17 are international VC firms, and the rest are domestic ones. The average age of the 34 VC firms is 7.9 years. Among the 34 responses, three responses lacked information on investment deal source (one international and two domestic) and thus not suitable for the test of Hypothesis 1 and 2. Similarly, one response lacked the information on criteria for due diligence (domestic), which is not suitable for the test of Hypothesis 3. Thus the useable sample size for hypothesis testing is 31 (for H1 & H2), and 33 (for H3) respectively.

#### Measures for VC deal sources

Previous literature mentioned deal sources such as referrals and self search (e.g., Silva, 2004). We further fine tune them based on the interview feedback, and seven categories are used in the survey. They are (1) directly from entrepreneurs, (2) intermediaries, (3) VC's parent organizations or shareholders, (4) ventures supported by the VC firm, (5) active searching using VC's contacts,<sup>4</sup> (6) entrepreneurs known by the VC firm, and (7) invited for syndication. Each VC firm is asked to give the percentage of deals from each category. In the survey VCs are asked to give sources

<sup>3</sup> Response rates of similar studies like MacMillan et al. (1985) and (1987) are 68% and 30% respectively.

<sup>4</sup> Here VC's contacts include VC's parent organizations, past supported ventures, known entrepreneurs. This category is different from category 3, 4, and 6 by the adjectival phase "active," meaning the VC takes the initiative to solicit deals from these contacts.



**Table 1** Test for non-respondent bias of sample on VC investment decision process.

Firm specific characteristics		N	Mean	SD	Z-score
Firm size (\$ million)	Respondents	34	154.5	196	1.01
	Non-respondents	33	216.3	271	
Firm age (year)	Respondents	34	7.9	4.8	0.35
	Non-respondents	25	7.4	4.2	
Firm nationality (international 1, domestic 0)	Respondents	34	0.50	0.51	0.87
	Non-respondents	33	0.61	0.50	
Firm type (independent 1, others 0)	Respondents	34	0.32	0.47	0.34
	Non-respondents	33	0.36	0.49	

This table compares some firm-specific characteristics from our sample with those from the whole Singapore set to test the non-respondent bias. Z-scores are derived from two-sided non-parametric Mann–Whitney–Wilcoxon test to measure the median differences between two groups, and all are non-significant ( $p$ -value > 0.10).

other than the seven categories, but only four VCs provides the percentage, at most 10%, and only one named the category.<sup>5</sup> Thus we believe the seven categories include most deal sources.

The above seven categories are not identical to the six theoretical types we mentioned before, and thus we need to match them carefully. The first category, deals directly from entrepreneurs, would include both solicited and unsolicited deals from entrepreneurs. It can be a measure of VC reputation since a reputable VC firm may attract more entrepreneurs seeking for funding.

The second category intermediary would include both solicited and unsolicited deals from intermediaries. The third, fourth, sixth and seventh can be classified as unsolicited deals from networks due to the presence of VC's related parties, i.e., companies within networks of the VC firm. They can be VC's parent organizations, ventures/entrepreneurs known by the VC, or other VC firms within the VC network. The fifth category would be solicited deals from networks according to its wording. We thus define four variables, *Entrepreneur* for first category, *Intermediary* for second category, *Unsolicited\_NW* for the combination of third, fourth, sixth and seventh categories, and *Solicited\_NW* for the fifth category.

### Measures for investment risks

In the survey, respondents were asked to evaluate various investment risks. For the evaluation of investment risk in management, we have one item “management risk.” For product/market risk, three items “demand fluctuation,” “unforeseen competition,” and “product/technology risk” are relevant. For finance risk, two items “input price volatility” and “unforeseen wage burden” describe two important risks affecting venture financial status. Thus we derive three variables *Man\_risk*, *Pro\_risk*, and *Fin\_risk* to measure investment risks in the three aspects.

<sup>5</sup> It is advisory, which can be classified as one type of intermediaries.

## Results

### Descriptive analysis

We first conduct the descriptive analysis. We need to study one VC characteristic variables, VC nationality (differentiating international VC firms from domestic ones), four variables related to VC deal source (Solicited\_NW, Intermediary, Entrepreneur, and Unsolicited\_NW), and three variables related to VC deal evaluation (Man\_risk, Pro\_risk, and Fin\_risk). We further add three more VC characteristic variables, VC age, VC size and VC type. VC age reflects firm experience and thus older international firm may be less subject to LOF. VC size is one important measure of VC characteristics (Hall & Tu, 2003), and VC type has been studied extensively (e.g., Wright & Robbie, 1996; Gompers & Lerner, 1999). The descriptive result is presented in Table 2. Here VC nationality and VC type are binary variables. VC nationality is coded one if the respondent is an international VC firm, and zero if the respondent is a domestic one. VC type is coded one if the respondent is an independent VC firm, and zero if the respondent is affiliated with other institutions. Independent VC firms rely on funding from public investors while the funding sources of affiliated ones are mainly internal ones through parent institutions. VC age is defined as the operating years of the VC firm in the local market, i.e., local age. VC size is measured by the monetary size of managed VC funds.

Table 2 shows the correlation among our variables. Among VC characteristic variables, most of them are not related except VC nationality and VC type, indicating that most international VC firms in the sample are independent. The means of four variables on VC deal sources are quite close, within the range of 20% to 30%. Among these variables, while naturally we expect some negative correlations, it is interesting to notice that variable Intermediary is not related to most other variables except Solicited\_NW. On deal evaluation variables, variables Man\_risk and Pro\_risk are not related to VC nationality, different from the prediction of Hypothesis 3.

### Testing for Hypothesis 1 and 2

Hypothesis 1 predicts that fewer unsolicited deals from networks for international VC firms but similar unsolicited deals from other sources. Hypothesis 2 predicts more solicited deals from networks for international ones but similar solicited deals from other sources. As VC nationality is binary, we use a two-tailed *t*-test (*t*-statistics) and a non-parametric Mann–Whitney–Wilcoxon test (*Z*-scores) to measure the significance level of international–domestic differences in deal sources, measured by variables Solicited\_NW, Intermediary, Entrepreneur, and Unsolicited\_NW. The result is presented in Table 3.

Table 3 shows supports for Hypothesis 1 and 2. While international and domestic VC firms are similar in originating deals from intermediaries and entrepreneurs, there are significant differences in both unsolicited and solicited deals from networks. International VC firms solicit more deals from networks than domestic ones (H2) and originate fewer unsolicited deals from networks (H1). As variables Intermediary and

**Table 2** Descriptive statistics of variables in the study.

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. VC nationality	0.50	0.51										
2. VC type	0.29	0.46	0.39**									
3. VC age (year)	7.9	4.8	-0.19	0.05								
4. VC size (\$ million)	150	194	0.06	0.24	0.12							
5. Entrepreneur (%)	27.3	23.5	-0.05	0.04	-0.14	-0.20						
6. Unsolicited_NW (%)	25.3	20.4	-0.37**	-0.22	-0.05	0.05	-0.48***					
7. Intermediary (%)	22.3	14.1	-0.08	-0.01	-0.11	-0.28	-0.15	-0.09				
8. Solicited_NW (%)	23.3	23.5	0.40**	0.14	0.23	0.35**	-0.48***	-0.33*	-0.39**			
9. Man_risk	4.24	0.87	0.20	0.04	0.17	0.01	-0.22	0.17	-0.26	0.21		
10. Pro_risk	3.61	0.58	-0.11	0.02	0.13	0.09	-0.05	0.08	-0.22	0.13	0.35**	
11. Fin_risk	3.27	0.71	-0.00	-0.11	0.06	0.20	0.07	-0.20	-0.31*	0.12	0.38**	

This table presents means, standard deviations, and correlations among variables used in our study. The sample comprises 34 Singapore VC firms. Correlations reported are two-tailed Pearson correlations.

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

**Table 3** VC deal resource differences between international and domestic VC firms.

	International mean (median)	Domestic mean (median)	<i>t</i> -statistics	Z-scores
Entrepreneur (%)	26.3 (17.5)	28.3 (25.0)	-0.24	-1.19
Unsolicited_NW (%)	18.1 (20.0)	33.0 (30.0)	-2.15**	-1.75*
Intermediary (%)	21.3 (20.0)	23.3 (25.0)	-0.40	-0.54
Solicited_NW (%)	32.5 (35.0)	15.0 (10.0)	2.20**	-2.36**

This table compares international and domestic VC firms by their deal source differences, measured by four different types of deal sources. The sample comprises 31 Singapore VC firms (16 international and 15 domestic). The *t*-statistics and non-parametric Mann–Whitney–Wilcoxon Z-scores compare the mean and median differences between international and domestic VC firms, respectively. We calculate the two-tailed *t*-statistics based on an *F*-test for equal variance assumption.

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

Entrepreneur include deals both solicited and unsolicited, we cannot prove the other part of Hypothesis 1 and 2 directly. However, for deals from both intermediaries and entrepreneurs, international VC firms actually obtained slightly fewer deals compared to domestic ones. As discussed in the hypothesis section, solicited deals from intermediaries and entrepreneurs would be minimal for both international and domestic ones, thus we can reasonably reject that international VC firms originate more unsolicited deals from either intermediaries or entrepreneurs.

Besides binary comparison between international and domestic VC firms, we further conduct hierarchical regression analysis to control possible impacts of other variables. We particularly look at one control variable, logarithm of VC age,<sup>6</sup> as the small sample size does not allow for more control variables. VC age would be related to LOF as older international VC firms would build stronger local networks and alleviate LOF. They may behave more like domestic ones in deal origination. Thus a hierarchical regression analysis may exclude the age factor and provides further support to Hypothesis 1 and 2.

The hierarchical regression analyses are conducted in two steps. First we have the independent variable, VC nationality only. In the second step, we add the control variable, VC age (log), to test its influence on the significance of the regression. The regression analyses are conducted for both dependent variables Unsolicited\_NW and Solicited\_NW. The results are presented in Table 4.

Table 4 shows adding variable VC age causes minimal impact on the regression results. For unsolicited deals from networks, the impact of adding VC age is also minor. The change of  $R^2$  is only 0.015. The significant level of VC nationality also changes little, and VC age is not related. For solicited deals from networks, VC age's impact is slightly greater with the increase of  $R^2$  at 0.06. However, the significance level still varies little. Hypothesis 1 and 2 are further supported in the regression analysis, and we can thus accept H1 and H2.

### Testing for Hypothesis 3

Hypothesis 3 predicts higher management and product/market risk for international VC firms but similar finance risk. To test H3, we similarly conduct two-tailed *t*-test

<sup>6</sup> We use the logarithm of age instead of age itself due to its better normality.

**Table 4** Results of hierarchical regression on VC deal sources.

Dependent variable	Unsolicited_NW		Solicited_NW	
	Model 1	Model 2	Model 1	Model 2
VC age (log)		-4.43 (6.4)		10.3 (7.1)
VC nationality	-14.9** (6.9)	-15.9** (7.1)	17.5** (8.0)	19.9** (8.0)
Change of $R^2$		0.015		0.06
$F$ -value	4.63**	2.52*	4.83**	3.57**
Model $R^2$	0.138	0.152	0.143	0.203

This table reports result of hierarchical regressions with Unsolicited\_NW and Solicited\_NW as the dependent variable respectively. We report the coefficient and standard error (in parentheses) for each independent variable in both models, as well as the  $R^2$  and  $F$ -value in each step of regression. Change of  $R^2$  is reported to show the model fit improvement. The sample comprises 31 Singapore VC firms.

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

and non-parametric Mann–Whitney–Wilcoxon test to measure the significance level of international–domestic differences in investment risk, measured by variables  $Man\_risk$ ,  $Pro\_risk$ , and  $Fin\_risk$ . The result is presented in Table 5.

Table 5 does not support Hypothesis 3 in general. As expected, management risk is highest, and finance risk is the lowest with product/market risk in between. However, the differences between international and domestic VC firms are not significant for all three categories. As expected, finance risk is similar for both international and domestic firms, but product/market risk is even higher for domestic ones though not significant, opposite to our prediction. Management risk is higher for international ones as expected but not significant.

## Discussion

We have investigated LOF faced by international VC firms in Singapore and found evidences for LOF in the VC investment decision process as international VC firms

**Table 5** VC investment risk differences between international and domestic VC firms.

	International mean (median)	Domestic mean (median)	$t$ -statistics	$Z$ -scores
$Man\_risk$ (management risk)	4.41 (5.00)	4.06 (4.00)	1.16	-1.52
$Pro\_risk$ (product/market risk)	3.54 (3.50)	3.67 (3.63)	-0.63	-0.27
$Fin\_risk$ (finance risk)	3.27 (3.40)	3.28 (3.40)	-0.02	-0.09

This table compares international and domestic VC firms by investment risk in management, product/market, and finance, measured by variables  $Man\_risk$ ,  $Pro\_risk$ , and  $Fin\_risk$ . The sample comprises 33 Singapore VC firms (17 international and 16 domestic). The  $t$ -statistics and non-parametric Mann–Whitney–Wilcoxon  $Z$ -scores compare the mean and median differences between international and domestic VC firms, respectively. We calculate the two-tailed  $t$ -statistics based on an  $F$ -test for equal variance assumption.

originate fewer unsolicited deals from networks. In response, international VC firms primarily rely on their homegrown advantages by attempting to originate more solicited deals from networks.

We explain these empirical findings by knowledge and network strength differences between international and domestic VC firms. In phase of deal origination, obtaining fewer unsolicited deals from networks by international firms is attributed to their weak local networks. We further contend that international firms manage to solicit more deals from networks in response to LOF by taking advantages of their homegrown industry related knowledge.

First we discuss possible biases in this study. One possible bias is the unit level of this study. Our study stays at the firm level. We differentiate international from domestic VC firms by ownership and don't ask for the nationality of individual respondents, but practically it is individual venture capitalists that conduct investments and answer surveys. A local venture capitalist working in an international VC firm may respond more similarly to local venture capitalists in other domestic firms, and a foreign venture capitalist working in a domestic firm may respond more similarly to foreign venture capitalists in other international firms. However, possible bias here is likely to reduce the difference between international and domestic VC firms, and reported differences between them would have been stronger if this bias were controlled. Thus we don't expect this bias affects the result of this study.

Additional bias may come from the location of deals. Some domestic VC firms may invest heavily in overseas, and their deal source may be affected by these overseas deals. Thus they may behave more similarly to international ones. Similar to the above, such bias is likely to reduce the difference between international and domestic VC firms, and thus we don't expect this bias affects the result of this study.

Second we look at alternative interpretation of our results, i.e., whether the reported international and domestic VC differences can be attributed to other reasons instead of their knowledge differences. The heterogeneity of international VC firms can actually help us to exclude many alternative explanations. It would be difficult to argue for inherited practical or cultural differences between international and domestic VC firms given the diversified backgrounds of international firms. International VC firms are consistently higher in solicited deals from networks even if we divide them into several groups according to their original continents. It points to the common characteristics of international firms, i.e., their industry related knowledge advantage over domestic ones and LOF in the local knowledge and local networks.

Another alternative explanation would be standard operating systems in international VC firms which lead to fewer network deals. They may rely more on formal procedures and originate more deals from intermediaries and other channels instead of networks. While this explanation goes well with the finding of fewer unsolicited deals from networks (Hypothesis 1), it fails to explain more solicited deals from networks by international VC firms (Hypothesis 2). If it were true, we would have expected to observe more deals from intermediaries instead, which is not supported in our empirical study.

It would be helpful to discuss our finding in the context of LOF literature. Nachum (2003) reported the non-existence of LOF in the London foreign exchange trading industry, and highlighted the specific position of London as a global city as

the main reason. Though Singapore is similar to London as a global city with significant presence of international firms, we found the existence of LOF in the VC industry. We contend that, such a liability may be caused by the fact that the VC industry relies much more on specific local knowledge and related networks than the foreign exchange trading industry studied in Nachum (2003).

Moreover, the overwhelming reliance on homegrown advantages of international VC firms in Singapore market is somewhat surprising given that the VC industry is partly global in the institution norm and partly local in the low level of integration. Zaheer (1995) predicted that when the source of competitive advantage is knowledge-based, it will lead to the imitation of local practices. Our finding seems to be contradictory to such a prediction and further investigation may be needed.

This study contributes to the literature on VC investment decision process by taking a knowledge perspective which links VC deal origination and VC evaluation to VC knowledge differences. While Bliss (1999) and Silva (2004) found VC investment behavioral differences across markets in various development stages, we found such differences exist in one market. This study also contributes to the less explored field of the investment decision process of international VC firms in overseas markets (Lockett & Wright, 2002).

Practically, for public policy makers with an aim of promoting local high-tech entrepreneurship and VC industry, this study highlights that international VC firms would need help to accumulate their local knowledge and build networks. Policy makers could then formulate relevant policies to help them. For example, incentives for domestic VC firms, particularly government-linked VC firms, to co-invest with international ones may be initiated.

The main weakness of this study is the small sample size. Our study on VC deal evaluation is less conclusive. Future studies can measure some concepts such as difficulty in evaluation directly for each criterion, and investigate their relationship with VC knowledge and nationality directly. It would enrich our understanding on VC evaluation criteria as well as the impact of LOF on VC industry. Moreover, further studies can be carried on to see whether findings here are applicable to other aspects of VC investment process such as monitoring and syndication as well as to other emerging markets, especially less developed ones.

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