






THE LIABILITY OF FOREIGNNESS IN EARLY-STAGE CORPORATE VENTURE CAPITAL INVESTMENT

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ABSTRACT

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Cross-border corporate venture capital (CVC) investments are inevitable for firms outside the U.S. in order to access the emerging and disruptive technology of ventures in the U.S. In particular, investing in early-stage ventures has more strategic benefits than in later-stage ones. However, investing firms suffer from the liability of foreignness (LOF) to a greater extent in the case of CVC investments in early-stage ventures. Since establishing a local unit is a generally accepted approach to resolving the LOF, we examine whether non-U.S. firms establishing a local CVC unit in the U.S. helps to overcome the LOF. In addition, because CVC investments engender imitation risk for ventures, we also examine the moderating effect of the intellectual property protection (IPP) regime. The hypotheses are tested with 2,171 CVC investments in the U.S. between 2001 and 2010. We find that a local CVC unit is only effective in resolving LOF when the target venture is under a strong IPP regime.

Contribution/Originality: This study extends the research on the liability of foreignness from the perspective of the capital market, in particular CVC investment. Specifically, it highlights that not only the imitation risk for ventures but also the adverse selection risk for corporate investors needs to be mitigated for early-stage cross-border CVC investments to be successful.

1. INTRODUCTION

Corporate venture capital (CVC) investments are investments of minority equity stakes by established, usually large, corporations in privately-held new ventures that are seeking capital to commercialize their technological inventions and continue operation (Gompers & Lerner, 2000). Large corporations such as Intel, Microsoft, and Qualcomm employ CVC investments as a path to growth (Chesbrough & Tachau, 2002). Unlike conventional venture capital (VC) investments, CVC investments pursue not only financial gains but also strategic benefits for the parent firm. For instance, CVC investments allow the parent firm to gather information of emerging technology and business models and identify appropriate alliance partners or acquisition targets (Benson & Ziedonis, 2009; Maula, Keil, & Zahra, 2013; Wadhwa & Kotha, 2006). Cross-border CVC investments are necessary for corporations to achieve strategic objectives. Non-U.S. corporations particularly need to invest in U.S. ventures in the early stage since the U.S. is the leading country in emerging technology (Hasegawa, 2011). Yet, non-U.S. firms are confronted with the liability of foreignness in conducting early-stage cross-border CVC investments. Liability of

foreignness is the additional cost incurred by foreign firms in gathering local information from a spatially distant location and their unfamiliarity with and lack of roots in a local environment (Zaheer, 1995). Some researchers have proposed the liability of foreignness in the VC context, where foreign investors suffer from additional costs in VC investments due to the knowledge and network disadvantage in the host country (Lu & Hwang, 2010). The interview that the authors had with the manager of the CVC unit of a Korean corporation illustrates such liability of foreignness in early-stage CVC investments:

“It is really hard to identify promising ventures in the early stage in Silicon Valley when we are sitting here in Korea. And even if we identify a suitable target, it is hard to convince the business unit of the benefits of such investment, and even harder to build a successful relationship with the venture and create synergy because our core business operation is based here in Korea.”

In this study, we investigate how firms can mitigate the liability of foreignness in early-stage CVC investments. Specifically, we examine whether the liability of foreignness can be overcome by non-U.S. firms through the means of establishing a local CVC unit in the U.S. and how this effect is moderated by the intellectual property protection (IPP) regime of the target venture. To test the hypothesis, we collected information about 2,171 CVC investments in the U.S. between 2001 and 2010. We found that establishing a local CVC unit facilitates early-stage cross border CVC investments and that this relationship is enhanced when the venture is under a strong IPP regime. This article is structured as follows. In section two, we briefly review the literature on CVC investments from the perspective of investors (i.e., established firms) and investees (i.e., ventures). In section three, we build up hypotheses based on the liability of foreignness that foreign investors experience and its effect on the risks of early-stage CVC investment. Then we move on to the methodology and the results of the empirical analysis. We close with a discussion at the end.

2. LITERATURE REVIEW

External corporate venturing refers to the creation of a new business activity through various governance modes, such as CVC investment, alliance, and acquisition (Sharma & Chrisman, 1999). Established large corporations employ these modes to explore new capabilities and to exploit existing capabilities. Achieving a balance between the two is critical for sustainable growth and survival (Arzubiaga et al., 2020; He & Wong, 2004; Kang & Hwang, 2019; March, 1991). Recently, an increasing number of firms have adopted CVC investment practice as a tool for open innovation (Ma, 2020; Pinkow & Iversen, 2020). CVC investment is similar to forming an alliance with a direct minority equity investment in that a firm acquires a portion of its partner's equity in exchange for utilizing the partner's resources. What sets CVC investment apart, however, is that the firm participates in the fundraising process of a privately held venture, which seeks capital to continue its operation and growth.

2.1. Benefits of CVC Investment

Prior research suggests three benefits of CVC investment for established firms. First, CVC investment enhances the R&D productivity of the established firm by facilitating its interaction with ventures (Wadhwa & Kotha, 2006; Wadhwa, Phelps, & Kotha, 2016). Second, CVC investment may guide a firm's top management's attention to discontinuous technological change (Maula et al., 2013). Third, CVC investment is a form of the real option that established firms can exercise when technological uncertainty is reduced (Ceccagnoli, Higgins, & Kang, 2018). Prior literature also highlights the benefits of CVC investment for ventures. First, CVCs are rich sources of capital. Unlike conventional VCs, CVCs are not under the external portfolio pressure of maximizing overall financial return (Katila, Rosenberger, & Eisenhardt, 2008). Second, established firms have various complementary resources for the commercialization of ventures' technological inventions (Basu, Phelps, & Kotha, 2011). Third, CVC investments provide ventures with not only the needed resources but also a positive signal of the venture's

quality (Stuart, 1999). For instance, if a venture is funded by Intel Capital, other investors may infer that the venture has achieved the technological level required by Intel.

2.2. Early-Stage CVC Investments

Investing in early-stage ventures is particularly beneficial to established firms. First, the established firms are in a better position to access and appropriate technology from the ventures in the early stage. On the other hand, the technology of ventures in later stages is more difficult to be transferred because it is already fully embodied in a product (Katila et al., 2008). Second, the established firm may find it difficult to control the strategic agenda of the venture in later stages, because the products and strategies are fully developed. This is important because the established firm will want to influence the product development strategy of its portfolio ventures, so that the products or services are complementary to the established firm's business. Third, early-stage CVC investment helps the established firm assess the 'true' value of an acquisition target because the assets of the venture are all intangible (Benson & Ziedonis, 2009). Fourth, considering CVC investment as a real option, early-stage investments have greater value than later-stage investments because of the high levels of uncertainty in early-stage ventures (McGrath, 1997). Early-stage CVC investments may be beneficial not only to established firms but also to new ventures. Ventures can preempt the complementary assets of an established firm by forming a tie with the firm in an early stage. This preemption is particularly effective if the required complementary assets are specialized (Park & Steensma, 2012) or if the assets are critical for commercialization (Alvarez-Garrido & Dushnitsky, 2016).

Despite such benefits, early-stage CVC investments are less likely to be carried out compared to later-stage CVC investments, because, unlike later-stage CVC investments, early-stage CVC investments are associated with a high level of risk for both parties (Katila et al., 2008). Specifically, there are two types of risks involved: the adverse selection risk for corporate investors and the imitation risk for ventures. The former is the risk that the corporate investor will select a venture with limited innovation potential (Dushnitsky & Lenox, 2005a). The latter is the risk that the technological invention of the venture will be imitated by the corporate investor (Dushnitsky & Shaver, 2009; Sears, McLeod, Evert, & Payne, 2020). The adverse selection risk is created by the presence of information asymmetry between ventures and their corporate investors. Information asymmetry exists because it is the venture, and not the investor, that possesses the information about the technological innovation (Shane, 2000). In particular, early-stage ventures do not have tangible products or services, but only prototypes or technological outcomes. Hence, the information asymmetry and the adverse selection risk involved in early-stage investments are greater than later-stage ones. The imitation risk for ventures is also present in early-stage investments as ventures in the early stage are vulnerable to technology leakage (Katila et al., 2008). The technology may not yet have been fully developed and embedded in the product. When the technology is immature, corporate investors may imitate it via various channels (Dushnitsky & Lenox, 2005b).

3. HYPOTHESES

New ventures are an important source of technological innovation (Kortum & Lerner, 2000). Firms outside the U.S. are especially interested in investing in ventures in the U.S. since the U.S. is the leading country in emerging technologies (Chesbrough, 2002; Hasegawa, 2011). Likewise, cross-border CVC investment is also beneficial to ventures in the U.S. because it facilitates internationalization of the venture. Ventures require information, knowledge, and complementary assets for internationalization. They can secure the necessary resources and knowledge by forming CVC investment relationships with foreign corporations (LiPuma, 2006). Therefore, foreign firms may provide a higher ex-post payoff to U.S. ventures than U.S. firms can.

However, cross-border CVC investments of established firms suffer from the liability of foreignness. Non-U.S. firms claim that they have difficulties in executing early-stage CVC investments in the U.S. (Hasegawa, 2011; Kang & Hwang, 2019b). A CVC investment relationship is formed when the ex-post payoff is larger than the ex-ante

expected risk. Thus, if the ex-ante risk is expected to be large because of the liability of foreignness, cross-border CVC investments may not be realized. The widely accepted definition of liability of foreignness, provided by [Zaheer \(1995\)](#), is “all additional costs a firm operating in a market overseas incurs that a local firm would not incur”. The additional costs arise mainly from foreign firms’ difficulty in gathering informal information from a spatially distant location and their unfamiliarity with and lack of roots in a local environment ([Zaheer, 1995](#)). [Bell, Filatotchev, and Rasheed \(2012\)](#) elaborated this concept and proposed four sources of liability of foreignness in capital markets, including the VC market, considering their distinct characteristics. The four sources, or antecedents, of liability of foreignness in capital markets are information costs, unfamiliarity costs, institutional distance, and cultural distance ([Bell et al., 2012](#)). The additional information costs and unfamiliarity costs that foreign established firms have to bear raise the risk of adverse selection in early-stage CVC investments. [Bell et al. \(2012\)](#) note that local investors have a better network and knowledge about domestic ventures than foreign investors do. Hence, foreign firms face a higher barrier to access information when evaluating the assets of U.S. ventures. In addition, foreign firms also experience unfamiliarity costs, which stem from a preference for corporate investors that are relatively more familiar to ventures ([Bell et al., 2012](#)). Therefore, foreign firms bear higher costs in identifying innovative ventures in the host country than local firms do, increasing the risk of adverse selection. In the product market, foreign firms tend to establish wholly-owned subsidiaries in the host country to reduce the liability of foreignness ([Chen, 2006](#)). Similarly, in CVC markets, foreign firms may invest in local ventures by establishing a local CVC unit ([Chesbrough., 2002](#)). For instance, Samsung Electronics has established an investment arm in the U.S. to facilitate investment in U.S. ventures. The establishment of a local CVC unit may provide several advantages to a foreign firm. First, it helps to build up a local network to gather informal information which reduces the information asymmetry involved in the investment. As early-stage CVC deals involve a high level of information asymmetry, social ties with local VCs are particularly important when a limited amount of information is provided by the target venture ([Shane. & Cable, 2002](#); [Tyebjee & Bruno, 1984](#)). Second, establishing a local CVC unit helps a firm to obtain legitimacy in the host country, because the local unit, separated from the parent firm, has autonomy in conducting CVC investments and can mimic local CVCs ([Lu & Hwang, 2010](#)). Thus, we posit:

H1: An early-stage CVC-venture investment relationship is more likely to be materialized when the foreign (i.e., non-U.S.) firm has a local (i.e., U.S.) CVC unit.

Foreign (i.e., non-U.S.) firms experience higher institutional and cultural distance from local (U.S.) ventures than local (i.e., U.S.) firms do. This raises the risk of imitation for the ventures. Institutional distance creates higher legal costs in the case of litigation, because the regularity dimension, which consists of the rules and laws, is different ([Bell et al., 2012](#)). Since the ventures lack legal resources and legitimacy in the foreign countries involved, they are less likely to win intellectual property litigations against foreign corporations. Similarly, cultural distance incurs additional monitoring costs for ventures, as culture affects the level of trust between firms ([Bell et al., 2012](#)). Since the level of trust is low with foreign firms, ventures must be more cautious in designing contracts and maintaining exchange relationships with foreign firms. The imitation risk for ventures cannot be resolved by the foreign firm establishing a local CVC unit in the U.S. Although establishing a local CVC in the U.S. may enhance more unsolicited deals from networks ([Lu & Hwang, 2010](#)) thus reducing the adverse selection risk for the corporate investor, yet, the imitation risk for ventures is not mitigated by building a local CVC unit because the parent firm, the imitating entity, is still outside the U.S. Ventures obtain the required resources, skills or knowledge from the parent firm. Hence, although ventures are financed by the investment unit in the U.S., the institutional and cultural distance remains high because the actual collaboration must be carried out with the parent entity outside the U.S. Consequently, we argue that the intellectual property protection (IPP) regime of ventures moderates the effect of having a local CVC unit on early-stage CVC investment. Under a weak IPP regime, the technological invention of a new venture is not well protected. The imitation risk engendered by institutional and cultural distance is greater for ventures under a weak IPP regime than for those under a strong IPP regime. On the other

hand, under a strong IPP, more comprehensive protection is available (Cohen, Nelson, & Walsh, 2001). The effect of institutional and cultural distance becomes marginal. Considering the ex-post payoff of foreign (i.e., non-U.S.) firms to local (i.e., U.S.) ventures is greater than that of local (i.e., U.S.) firms, we expect more early-stage CVC investments when the IPP regime is strong.

H2: Under a strong IPP regime, an early-stage CVC-venture investment relationship is more likely to be materialized when the foreign (i.e., non-U.S.) firm has a local (i.e., U.S.) CVC unit.

4. METHODOLOGY

4.1. Sample

The unit of analysis of this research is the formation of an investment relationship between an established firm and a venture. For this study, all corporate venture capital investment transactions with high-tech U.S.-based ventures between Jan. 1st 2001 and Dec. 31st 2010 were collected from the Thomson ONE database. To identify corporate venture capital (CVC), we selected 'corporate PE' as the fund investor type in the database.

The original sample numbered 7,685 corporate venture capital investments in U.S. ventures between 2001 and 2010. We removed 3,072 'follow' investments since they do not suffer from the issue of information asymmetry. We further removed 1,404 investments with undisclosed fund names. In addition, we excluded CVC investments of established firms that were either financial firms (e.g., Royal Bank of Canada, AIG Private Equity) or non-profit organizations (e.g., Kaiser Permanente), and that did not have information in COMPUSTAT. After removing the CVC investments with omitted variables, 2,171 CVC investments remained to be used in the analysis.

4.2. Variable Definitions

4.2.1. Dependent Variable

VC investment is categorized into series A, B, C and D, with each letter referring to the life cycle stage of the new venture at the time of the investment. Series A refers to ventures that have not yet fully established commercial operations and may also involve continued research and product development. Series B refers to ventures that already have product development, initial marketing, manufacturing, and sales activities in testing or production. They have just assembled key management teams and have started conducting business but are not yet generating profit. Series C refers to ventures that are under operation and rapidly growing. They are developing new products or marketing existing ones, strengthening management teams, and have just begun to generate some revenue. Series D refers to ventures that have an established product or service and have already generated revenue.

In this study, investments in series A and B ventures were categorized as 'early-stage investment' and investments in series C and D ventures were considered 'later-stage investment' because it is from series C onward that the technological invention of a venture is fully commercialized and sold in the market. Therefore, the value one was assigned if a corporate investor participated in either series A or B investment, the early-stage investment, and the value zero otherwise. Econometrically, using a logit model, we assessed the probability that the investment relationship between a CVC investor i and a venture j would be formed in the early stage.

4.2.2. Independent Variable

Non-U.S. parent firm. The Thomson ONE database does not provide the names of CVCs' parent firms. We identified them manually using LexisNexis and Google. Once the name had been identified, the financial data, headquarters location, and industry code were collected from the COMPUSTAT database. A dichotomous variable was formulated for whether the headquarters of CVC's parent was located outside the U.S. (one), or zero if it was located in the U.S.

Non-U.S. parent firm with/without local CVC. Some foreign (i.e., non-U.S.) firms choose to establish an investment unit in the U.S. To study the effect of foreign firms having a local unit, we need to consider three cases

in which two dummy variables are needed. The base case is a U.S. firm having a CVC unit in the U.S. (all dummies have zero value). A foreign firm may invest in ventures in the U.S. from a CVC unit located outside the U.S. ('Non-U.S. parent firm without local CVC' has a value of one and zero otherwise). A foreign firm may establish a local CVC unit in the U.S. and invest in ventures in the U.S. ('Non-U.S. parent firm with local CVC' has a value of one, and zero otherwise).

IPP regime of venture. This variable was extended from the Carnegie Mellon Survey (CMS) of R&D (Cohen et al., 2001), which gauged the effectiveness of patents and other mechanisms in protecting profits due to inventions in their industry. Based on CMS, Dushnitsky and Shaver (2009) used the Venture Economics Industry Codes (VEIC)¹ provided by Thomson ONE. Following Dushnitsky & Shaver (2009) we assigned the value one for ventures in VEIC 4000's (strong IPP regime) and zero for ventures in VEIC 1000's (weak IPP regime).

4.2.3. Control Variables

4.2.3.1. CVC Investor Characteristics

Several variables were employed to control for CVC investor characteristics. First, the larger the CVC parent is, the better its position is to provide a higher level of support (Dushnitsky & Shaver, 2009). We measured 'the size of CVC's parent firm' as the logarithmic transformation of assets (in millions USD) in the year prior to the focal transaction (t-1) following Yang, Narayanan, and Zahra (2009). Second, experienced CVC investors are more capable of selecting appropriate target ventures (Yang et al., 2009). We operationalized 'investment experience of CVC' as the number of years at the focal investment from the first investment year of each CVC program. Third, 'investment focus of CVC fund' was added. This variable denotes the value one if the stated or derived investment focus of the fund is 'early-stage' and zero otherwise. In the fourth place, a dummy variable 'CVC structure' was added, denoting the value one if the CVC program is a wholly-owned subsidiary and zero otherwise. The level of potential imitation risk perceived by ventures may be more pronounced when CVCs employ tighter structures because there would be more frequent interaction with corporate business units (Dushnitsky, 2006).

4.3. Venture Characteristics

We also controlled for venture characteristics. First, 'industry relatedness between CVC's parent and venture' was added. If a venture is in the same industry as the CVC's parent firm, the parent firm is capable of imitating the venture's technological invention (Dushnitsky & Shaver, 2009). The variable was constructed based on the Standard Industry Codes (SICs) of both parties. We assigned the value one if the first two digits of SICs were matched, 0.5 if the first digit was matched, and zero if none was matched. Second, 'venture quality' was added. The variable equals one if the venture went public or was acquired since 2012, zero otherwise. Ventures with poor quality are prone to CVC investments (Huang & Madhavan, 2020). Finally, we added the year dummies to control the year fixed effect. Table 1 presents the descriptive statistics and correlations between variables. The average asset of the firms that invest in U.S. ventures in the early stage is 25.8 billion US dollars, showing that the firms are generally large corporations. They have around 11 years of CVC investment experience on average. Of the CVC investments 66% have been made by dedicated CVC units such as Intel Capital. These large corporations generally invest in ventures in unrelated industries, considering that the average industry relatedness is quite low (0.295). In addition, 35% of CVC investments in the U.S. are conducted by non-U.S. firms and 45% of these non-U.S. firms have a local CVC unit in the U.S. Lastly, 'Non-U.S. parent firm' has high correlations with 'Non-U.S. parent firm without local CVC' and 'Non-U.S. parent firm with local CVC' variables. But they are not used in the same model. Thus, we conclude that multicollinearity is not present in the sample.

¹The primary category of VEIC is composed of information technology (1000's), health/life/medical science (4000's) and non-high technology (6000's). VEIC 6000's were excluded from the sample and were not the focus of this research.

Table-1. Correlation matrix of variables and descriptive statistics

Variable	Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11
1. Stage of new venture at investment date (1=seed or early stage)	0.274	0.446	1.000										
2. Size of parent firm of CVC (ln asset)	10.158	1.452	-0.042†	1.000									
3. Investment experience of CVC (no. of years from the first investment till t-1)	10.757	6.921	-0.018	0.303***	1.000								
4. Investment focus of CVC fund (1=seed or early stage focused)	0.208	0.406	0.111***	-0.082***	-0.211***	1.000							
5. CVC structure (1=dedicated CVC unit (e.g., Intel Capital))	0.665	0.472	0.030	0.332***	0.061**	0.121***	1.000						
6. Industry relatedness between parent firm and new venture (1=first 2 digits, 0.5=first 1 digit, 0=otherwise)	0.295	0.439	0.041†	-0.196***	-0.062**	-0.002	-0.038†	1.000					
7. Quality of new venture (1=IPO or acquired)	0.461	0.499	-0.152***	-0.028	-0.085***	-0.018	-0.046†	-0.043*	1.000				
8. Geographic base of CVC's parent firm (1=HQ of parent firm is non-U.S.)	0.355	0.479	-0.013	0.089***	-0.195***	0.031	0.070**	0.014	-0.012	1.000			
9. Geographic base of parent firm and CVC 1 (1=parent firm of CVC is non-U.S. based with non-U.S. CVC)	0.193	0.395	-0.058**	0.089***	-0.204***	0.008	-0.102***	-0.115***	0.010	0.661***	1.000		
10. Geographic base of parent firm and CVC 2 (1=parent firm is non-U.S. based but CVC is U.S. based)	0.161	0.368	0.045*	0.021	-0.034	0.032	0.200***	0.141***	-0.026	0.591***	-0.215***	1.000	
11. IPP regime of new venture (1=VEIC 4000's)	0.229	0.420	0.104***	-0.004	0.105***	0.016	-0.022	0.206***	-0.103***	0.092***	-0.022	0.143***	1.000
N = 2171													
† p<0.1 * p<0.05 ** p<0.01 *** p<0.001													
	0.544												
	25797												

5. RESULTS

We performed a logit regression analysis with 'robust' option in STATA. The result of the analysis is presented in Table 2 and 3.

Table-2. Logit regression analysis (full sample)

Dependent variable: Stage of new venture at investment date (1= seed or early stage)			
	Full Sample		
Variable	Model 1	Model 2	Model 3
Year dummy variables (year 2001 as base)	Year effects have been considered with year dummy variables		
Size of parent firm of CVC (ln asset)	-0.086* (0.038)	-0.078* (0.039)	-0.068 (0.039)
Investment experience of CVC (no. of years from the first investment till t-1)	-0.008 (0.008)	-0.012 (0.008)	-0.014 (0.008)
Investment focus of CVC fund (1=seed or early stage focused)	0.464*** (0.120)	0.458*** (0.120)	0.462*** (0.120)
CVC structure (1=dedicated CVC unit (e.g., Intel Capital))	0.117 (0.115)	0.128 (0.116)	0.069 (0.118)
Industry relatedness between parent firm and new venture	0.015 (0.115)	0.018 (0.115)	-0.024 (0.116)
Quality of new venture (1=IPO or acquired)	-0.522*** (0.110)	-0.522*** (0.110)	-0.527*** (0.111)
IPP Regime (1=Strong IPP regime, VEIC 4000's)	0.425*** (0.115)	0.446*** (0.116)	0.430*** (0.116)
Constant	-0.324 (0.370)	-0.333 (0.371)	-0.349 (0.374)
Geographic base of CVC's parent firm (1=HQ of parent firm is non-U.S.)		-0.172 (0.111)	
Geographic base of parent firm and CVC 1 (1=parent firm of CVC is non-U.S. based with non-U.S. CVC)			-0.374** (0.144)
Geographic base of parent firm and CVC 2 (1=parent firm is non-U.S. based but CVC is U.S. based)			0.037 (0.139)
Number of observations	2171	2171	2171
Wald chi-square	113.85***	116.63***	120.90***
Log pseudo likelihood	-1214.04	-1212.81	-1210.13
Pseudo R ²	0.048	0.049	0.051
† p<0.1 * p<0.05 **p<0.01 *** p<0.001			
※ The base case of 'Geographic base of established firm 1 & 2' variables are U.S. based established firms with U.S. based CVC (U.S. based established firms with non-U.S. based CVC are negligible, thus excluded from the analysis)			
H1: An early-stage CVC-entrepreneur investment relationship is less likely to materialize when the parent of CVC is non-U.S. based			

Model 1 in Table 2 presents the base model, only with control variables. The coefficient of 'Size of CVC's parent firm' is negative and significant (-0.086, p<0.05), implying that larger firms with their abundant financial resources are less likely to invest in early-stage ventures. The variable 'Investment focus of CVC fund' is positive and significant (0.464, p<0.001), meaning that established firms invest in early-stage ventures with a purpose. Yet, 'Venture quality' is negative and significant (-0.522, p<0.001). This represents the fact that that high-quality ventures are less attractive to CVC investment in the early stage than they are in the later stage, consistent with

the perspective that considers CVC to be ‘dumb money’ (Huang & Madhavan, 2020). Lastly, the coefficient of ‘IPP Regime’ is positive and strongly significant (0.425, p<0.001). This implies that ventures under a strong IPP regime are more likely to receive CVC investment in the early stage because they have an effective defense against technology imitation (Dushnitsky & Shaver, 2009).

Table-3. Logit regression analysis (split sample)

Dependent variable: Stage of new venture at investment date (1= seed or early stage)							
	Weak IPP Regime (VEIC=1000's)			Strong IPP Regime (VEIC=4000's)			
Variable	Model 4	Model 5	Model 6		Model 7	Model 8	Model 9
Year dummy variables (year 2001 as base)	Year effects have been considered with year dummy variables						
Size of parent firm of CVC (ln asset)	-0.088* (0.044)	-0.078† (0.045)	-0.076† (0.045)		-0.102 (0.084)	-0.136 (0.090)	-0.097 (0.092)
Investment experience of CVC (no. of years from the first investment till t-1)	0.001 (0.011)	-0.005 (0.012)	-0.006 (0.012)		-0.019 (0.013)	-0.012 (0.014)	-0.016 (0.015)
Investment focus of CVC fund (1=seed or early stage focused)	0.423** (0.141)	0.381** (0.145)	0.379** (0.145)		0.674** (0.245)	0.601* (0.252)	0.755** (0.259)
CVC structure (1=dedicated CVC unit (e.g., Intel Capital))	0.135 (0.136)	0.141 (0.137)	0.134 (0.138)		0.132 (0.230)	0.091 (0.229)	-0.266 (0.254)
Industry relatedness between parent firm and new venture	0.039 (0.141)	0.038 (0.141)	0.032 (0.141)		-0.075 (0.214)	-0.064 (0.216)	-0.236 (0.229)
Quality of new venture (1=IPO or acquired)	-0.442*** (0.126)	-0.435** (0.127)	-0.434** (0.127)		-0.768** (0.244)	-0.767** (0.245)	-0.834** (0.249)
Constant	-0.399 (0.430)	-0.358 (0.431)	-0.365 (0.432)		0.280 (0.821)	0.411 (0.840)	0.430 (0.853)
Geographic base of CVC's parent firm (1=HQ of parent firm is non-U.S.)		-0.353** (0.135)				0.308 (0.244)	
Geographic base of parent firm and CVC 1 (1=parent firm of CVC is non-U.S. based with non-U.S. CVC)			-0.387* (0.167)				-0.422 (0.323)
Geographic base of parent firm and CVC 2 (1=parent firm is non-U.S. based but CVC is U.S. based)			-0.309† (0.181)				0.798** (0.287)
Number of observations	1675	1675	1675		496	496	496
Wald chi-square	47.95***	54.80***	54.91***		59.96***	59.95***	62.47***
Log pseudolikelihood	-915.09	-911.4	-911.34		-287.16	-286.33	-292.86
Pseudo R2	0.027	0.030	0.031		0.113	0.116	0.134
† p<0.1 * p<0.05 **p<0.01 *** p<0.001							
※ The base case of 'Geographic base of established firm 1 & 2' variables are U.S. based established firms with U.S. based CVC (U.S. based established firms with non-U.S. based CVC are negligible, thus excluded from the analysis)							

Model 2 and 3 present the test for Hypothesis 1. Although insignificant, the negative coefficient of the variable ‘Non-U.S. parent firm’ in Model 2 shows the possibility that non-U.S. firms are less likely to invest in early-stage ventures than U.S. firms are. However, if you divide the foreign firms into those with a local CVC unit (Non-U.S. parent firm with local CVC) and without a local CVC unit (Non-U.S. parent firm without local CVC), it is clear and statistically significant that early stage CVC investments are less likely to be materialized when the foreign firm

does not have a local (U.S.) CVC unit (-0.374, $p < 0.01$), but the likelihood becomes similar to the base case (U.S. firms investing in U.S. ventures) when non-U.S. firms have a CVC unit in the U.S. (0.037, $p > 0.1$). Therefore, having a local CVC unit mitigates the liability of foreignness in cross-border CVC investment in early-stage ventures, supporting hypothesis 1.

To test whether the IPP regime moderates the effect of establishing a local CVC unit on mitigating the liability of foreignness, we divided the sample by IPP regime and performed separate logit regression analyses. The results are shown in Models 4 to 9 in Table 3. The negative and significant coefficient of 'Non-U.S. parent firm' (-0.353, $p < 0.01$) in Model 5 shows the presence of the liability of foreignness under a weak IPP regime. Moreover, in this case foreign firms suffer from the liability of foreignness regardless of having a local CVC unit. The negative and significant coefficient of 'Non-U.S. parent firm without local CVC' (-0.387, $p < 0.05$) in Model 6 presents the same result as in Model 3. Unlike Model 3 in Table 1, 'Non-U.S. parent firm with local CVC' in Model 6 is negative and weakly significant (-0.309, $p < 0.1$), showing the liability of foreignness is not compensated for by the presence of a local CVC unit. However, as shown in Models 7 to 9, the effect of establishing a local CVC unit to overcome the liability of foreignness is different in the case of ventures under a strong IPP regime. In Model 8, the coefficient of 'Non-U.S. parent firm' is not significant but has a positive value (0.308). This implies that early-stage CVC investments may not suffer from the liability of foreignness when the target ventures' IPP regime is strong. Specifically, in Model 9, 'Non-U.S. parent firm without local CVC' is negative but not significant (-0.422, $p > 0.1$), and 'Non-U.S. parent firm with local CVC' is positive and significant (0.798, $p < 0.01$). This shows that the liability of foreignness is not present with ventures under a strong IPP regime. Having a local CVC unit facilitates early-stage CVC investments for foreign firms when target ventures are under a strong IPP regime. Hypothesis 2 is thus statistically supported.

6. DISCUSSION

Traditionally, technological acquisition has been proposed as an important mechanism for obtaining new technological knowledge (Ahuja & Katila, 2001). In the late 1990s and early 2000s, having observed successful stories of many ventures, large firms began to pay attention to corporate venture capital (CVC) programs. However, the burst of the IT bubble in the early 2000s discouraged many firms and significantly damaged the CVC market as well. Despite the bubble burst, some firms continued to operate CVC programs and in 2019 CVC still accounts for around 24% of the whole VC industry, according to the National Venture Capital Association.

Established firms engage in CVC programs for the purposes of knowledge acquisition, gathering information on emerging technologies and market needs, and obtaining a real option for future business opportunities. Ventures favor CVC over other sources of capital because it allows them form a close bond with a large corporation. Ventures can obtain complementary assets needed for commercialization of their inventions and CVC funding provides an endorsement effect, which facilitates securing other resources in the future.

Despite the benefits of early-stage CVC investment, it involves two types of risks. First, corporations can suffer from adverse selection – the risk of investing in less innovative firms (Dushnitsky & Lenox, 2005a). Second, ventures can suffer from imitation – the risk of the large corporation imitating and expropriating the entrepreneur's inventions (Dushnitsky & Shaver, 2009). Therefore, if these risks are not mitigated, early-stage CVC investment is less likely to be materialized. However, due to the liability of foreignness, foreign large corporations suffer from these risks to a greater extent than local (U.S.) firms do. Bell et al. (2012) identify four sources of the liability of foreignness in the capital market. Information and unfamiliarity costs for foreign corporations exacerbate the adverse selection risk as they have to bear more costs than local players do. Larger institutional and cultural distances between foreign firms and local ventures exacerbate the costs for ventures in mitigating the imitation risk. As a result, early-stage CVC investment is less likely in the cross border context.

To overcome the liability of foreignness, foreign firms usually establish a local CVC unit (Lu & Hwang, 2010). However, this mechanism reduces only the information and unfamiliarity costs, hence the adverse selection risk, but not the institutional and cultural distances, because the operating entity is still outside the U.S. Therefore, having a local CVC unit does not reduce the imitation risk to ventures.

To mitigate the imitation risk, it is necessary to weaken the effect of institutional and cultural distances. This can be done by increasing the protection surrounding the venture's invention. Under a strong IPP regime, the venture's invention is more comprehensively protected by patent (Cohen et al., 2001). Considering international CVC investment is more beneficial to the internalization of ventures, early-stage CVC investment is more likely to be materialized under a strong IPP regime. This study advances prior research in several ways. First, based on the propositions of Bell et al. (2012), it extends the research on the liability of foreignness from the perspective of CVC investment. Previous liability of foreignness research focused on the global expansion of manufacturing industries; few had focused on the capital market, and none on CVC investment. Second, this combines the studies of Dushnitsky and Lenox (2005a) and (Dushnitsky & Shaver, 2009) by considering the ex-ante expected risk of investors and investees. The extant literature focuses on the imitation risk that ventures would suffer from receiving CVC investments. This study, however, highlights not only the imitation risk for ventures but also the adverse selection risk for corporate investors. Unless the adverse selection risk is mitigated, CVC investments would not be materialized. This research is not without limitations. In the first place, following Dushnitsky and Shaver (2009), we used VEIC to measure the overall IPP regime of the ventures. Yet, this may not represent the actual level of IP protection of each venture. Second, there are some cases in which the headquarters of a corporation are located outside the U.S. but their major operation is in the U.S. For example, Tyco International was originally incorporated in Massachusetts and has its operations in the U.S., but the headquarters are in Switzerland. However, the proportion of these cases is not large enough to affect the results.

Contrary to conventional suggestions from the liability of foreignness literature, the establishment of a local unit by a foreign corporation only reduces the risk for the investor, specifically, their adverse selection risk. Considering the fact that CVC investment is a seller's market (Graebner & Eisenhardt, 2004), the investee's side, i.e., the imitation risk for ventures, has to be taken into account.

This is why the likelihood of early-stage CVC investment is moderated by the IPP regime when the foreign corporations have a local CVC unit. Therefore, to overcome the liability of foreignness, foreign firms must consider not only building up social connections in the U.S. but also how they might protect the technological inventions of ventures or how they could give the ventures confidence that they would not expropriate the technology. Hence, apart from building up social ties with other VC investors, building up social ties and trust-based relationships with ventures seems to be important. In this vein, future research should focus more on the bilateral aspect of CVC investment in overcoming the liability of foreignness. Building a reputation of being a good investor, not expropriating the technology, and creating a win-win relationship with investees could be an example.

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REFERENCES

- Ahuja, G., & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal*, 22(3), 197-220. Available at: <https://doi.org/10.1002/smj.157>.

- Alvarez-Garrido, E., & Dushnitsky, G. (2016). Are entrepreneurial venture's innovation rates sensitive to investor complementary assets? Comparing biotech ventures backed by corporate and independent VCs. *Strategic Management Journal*, 37(5), 819-834.
- Arzubiaga, U., Castillo-Aprajiz, J., & Palma-Ruiz, J. M. (2020). Organisational learning as a mediator in the host-home country similarity–international firm performance link: The role of exploration and exploitation. *European Business Review*.
- Basu, S., Phelps, C., & Kotha, S. (2011). Towards understanding who makes corporate venture capital investments and why. *Journal of Business Venturing*, 26(2), 153-171. Available at: <https://doi.org/10.1016/j.jbusvent.2009.07.001>.
- Bell, R. G., Filatotchev, I., & Rasheed, A. A. (2012). The liability of foreignness in capital markets: Sources and remedies. *Journal of International Business Studies*, 43(2), 107-122. Available at: <https://doi.org/10.1057/jibs.2011.55>.
- Benson, D., & Ziedonis, R. H. (2009). Corporate venture capital as a window on new technologies: Implications for the performance of corporate investors when acquiring startups. *Organization Science* 20(2), 329-351. Available at: <https://doi.org/10.1287/orsc.1080.0386>.
- Castillo-Aprajiz, J., De Palma, M., & Arzubiaga, U. (2020). *Is the impact of sustainability exploration on firm economic return so obvious? The case of internationalized Spanish firms operating in high-tech and low-tech industries*. In V. Ratten, M. Ramírez-Pasillas, & H. Lundberg (Eds.), *Sustainable Innovation: Advocating and Organizing Enterprises Consciously*: Routledge.
- Ceccagnoli, M., Higgins, M. J., & Kang, H. D. (2018). Corporate venture capital as a real option in the markets for technology. *Strategic Management Journal*, 39(13), 3355-3381.
- Chen, T. J. (2006). Liability of foreignness and entry mode choice: Taiwanese firms in Europe. *Journal of Business Research*, 59(2), 288-294. Available at: <https://doi.org/10.1016/j.jbusres.2005.04.009>.
- Chesbrough, H., & Tachau, J. (2002). *Innovating an outsourced R&D process for Matsushita Electric (MEI): Launching the Panasonic Digital Concepts Center: HBS No. 602-120*. Boston: Harvard Business School Publishing.
- Chesbrough, H. W. (2002). Making sense of corporate venture capital. *Harvard Business Review*, 80(3), 90-99.
- Cohen, W., Nelson, R., & Walsh, J. (2001). Protecting their intellectual assets: Appropriability conditions and why U.S. manufacturing firms patent (or not). National Bureau of Economic Research, Working Paper No 7552.
- Dushnitsky, G. (2006). Corporate venture capital: past evidence and future directions. In Y. B. Casson M, Basu A, Wadeson N (Ed.), *Oxford Handbook of Entrepreneurship* (pp. 387-431). Oxford, UK: Oxford University Press.
- Dushnitsky, G., & Lenox, M. J. (2005a). When do firms undertake R&D by investing in new ventures? *Strategic Management Journal*, 26(10), 947-965. Available at: <https://doi.org/10.1002/smj.488>.
- Dushnitsky, G., & Lenox, M. J. (2005b). When do incumbents learn from entrepreneurial ventures? Corporate venture capital and investing firm innovation rates. *Research Policy*, 34(5), 615-639. Available at: <https://doi.org/10.1016/j.respol.2005.01.017>.
- Dushnitsky, G., & Shaver, J. M. (2009). Limitations to interorganizational knowledge acquisition: The paradox of corporate venture capital. *Strategic Management Journal*, 30(10), 1045-1064. Available at: <https://doi.org/10.1002/smj.781>.
- Gompers, P., & Lerner, J. (2000). The determinants of corporate venture capital success: Organizational structure, incentives, and complementarities. In *Concentrated corporate ownership* (pp. 17-54): University of Chicago Press.
- Graebner, M. E., & Eisenhardt, K. M. (2004). The seller's side of the story: Acquisition as courtship and governance as syndicate in entrepreneurial firms. *Administrative Science Quarterly*, 49(3), 366-403.
- Hasegawa, K. (2011). *Evolution of the corporate venture capital operations of Japanese electronics companies*. Paper presented at the IEEE International Technology Management Conference.

- He, Z.-L., & Wong, P.-K. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization Science*, 15(4), 481-494.
- Huang, P., & Madhavan, R. (2020). Dumb money or smart money? Meta-analytically unpacking corporate venture capital. *Strategic Entrepreneurship Journal*.
- Kang, S., & Hwang, J. (2019). An investigation into the performance of an ambidextrously balanced innovator and Its relatedness to open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(2), 1-12. Available at: <https://doi.org/10.3390/joitmc5020023>.
- Kang, S., & Hwang, J. (2019b). Moderating factors in distant investment of corporate venture capital. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(1), 1-13. Available at: <https://doi.org/10.3390/joitmc5010019>.
- Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. (2008). Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly*, 53(2), 295-332. Available at: <https://doi.org/10.2189/asqu.53.2.295>.
- Kortum, S., & Lerner, J. (2000). Assessing the contribution of venture capital to innovation *Rand Journal of Economics*, 31(4), 674-692. Available at: <https://doi.org/10.2307/2696354>.
- LiPuma, J. A. (2006). Independent venture capital, corporate venture capital, and the internationalisation intensity of technology-based portfolio firms. *International Entrepreneurship and Management Journal*, 2(2), 245-260.
- Lu, Q., & Hwang, P. (2010). The impact of liability of foreignness on international venture capital firms in Singapore. *Asia Pacific Journal of Management*, 27(1), 81-97. Available at: <https://doi.org/10.1007/s10490-008-9125-0>.
- Ma, S. (2020). The life cycle of corporate venture capital. *The Review of Financial Studies*, 33(1), 358-394.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71-87.
- Maula, M. V., Keil, T., & Zahra, S. A. (2013). Top management's attention to discontinuous technological change: Corporate venture capital as an alert mechanism. *Organization Science*, 24(3), 926-947.
- McGrath, R. G. (1997). A real options logic for initiating technology positioning investments *Academy of Management Review*, 22(4), 974-996. Available at: <https://doi.org/10.2307/259251>.
- Park, H. D., & Steensma, H. K. (2012). When does corporate venture capital add value for new ventures? *Strategic Management Journal*, 33(1), 1-22.
- Pinkow, F., & Iversen, J. (2020). Strategic objectives of corporate venture capital as a tool for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 1-21. Available at: <https://doi.org/10.3390/joitmc6040157>.
- Sears, J. B., McLeod, M. S., Evert, R. E., & Payne, G. T. (2020). Alleviating concerns of misappropriation in corporate venture capital: Creating credible commitments and calculative trust. *Strategic Organization*, 1476127020926174.
- Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, 11(4), 448-469. Available at: <https://doi.org/10.1287/orsc.11.4.448.14602>.
- Shane, S., & Cable, D. (2002). Network ties, reputation, and the financing of new ventures. *Management Science*, 48(3), 364-381. Available at: <https://doi.org/10.1287/mnsc.48.3.364.7731>.
- Sharma, P., & Chrisman, J. (1999). Toward a reconciliation of the definition in the field of corporate entrepreneurship. *Entrepreneurship Theory and Practice*, 23(3), 11-27.
- Stuart, T. E. (1999). Interorganizational alliances and the performance of firms. *Administrative Science Quarterly*, 44, 315-349. Available at: <https://doi.org/10.2307/2666998>.

- Tyebjee, T. T., & Bruno, A. V. (1984). A model of venture capitalist investment activity. *Management Science*, 30(9), 1051-1066. Available at: <https://doi.org/10.1287/mnsc.30.9.1051>.
- Wadhwa, A., & Kotha, S. (2006). Knowledge creation through external venturing: Evidence from the telecommunications equipment manufacturing industry. *Academy of Management Journal*, 49(4), 819-835.
- Wadhwa, A., Phelps, C., & Kotha, S. (2016). Corporate venture capital portfolios and firm innovation. *Journal of Business Venturing*, 31(1), 95-112.
- Yang, Y., Narayanan, V. K., & Zahra, S. (2009). Developing the selection and valuation capabilities through learning: The case of corporate venture capital. *Journal of Business Venturing*, 24(3), 261-273.
- Zaheer, S. (1995). Overcoming the liability of foreignness. *Academy of Management journal*, 38(2), 341-363. Available at: <https://doi.org/10.2307/256683>.

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