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INVESTMENT STRATEGIES OF CROSS-BORDER VENTURE CAPITAL INVESTORS



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ABSTRACT

Venture capital (VC) firms investing abroad use several strategies to mitigate liabilities of foreignness (LOF). Analyzing 1770 VC investments in young technology based companies, of which 20% by cross-border VC firms and 7% by their local branches, we confirm that cross-border VC firms invest in companies with lower information asymmetries. This effect disappears when controlling for co-investor characteristics. Cross-border VC firms have a higher probability to invest with local investors, larger investment syndicates and more experienced investors. When investing through a local branch, investors exhibit the same investment behavior as domestic VC firms. We thereby show that local co-investors or establishing a local presence mitigate LOF and enable cross-border investors to invest in the same companies as domestic VC firms.

INTRODUCTION

The venture capital (VC) industry has long been viewed as a domestic industry (Cumming and Dai, 2010), with geographic proximity to investment targets deemed as essential for efficient deal flow generation, post-investment monitoring and value adding services (Mäkelä and Maula, 2006). Driven by increased competition in their home countries, VC firms are nevertheless increasingly searching for investment opportunities in foreign markets (Madhavan and Iriyama, 2009). This shift in geographical focus, however, brings liabilities of foreignness (LOF) for VC investors (Wright, Pruthi and Lockett, 2005), which are “all additional costs a firm operating in a market overseas incurs that a local firm would not incur” (Zaheer, 1995: 343). This raises the need for academics to rethink possible solutions that cross-border VC may deploy to minimize these liabilities (Bell, Filatotchev and Rasheed, 2012; Dai, Jo and Kassicieh, 2012). The goal of the present study is to investigate investment strategies used by VC firms to mitigate LOF.

Investing across borders presents additional risks and challenges, as it increases geographical, cultural and institutional distance between portfolio companies (PCs) and VC investors. This creates larger information asymmetries between PCs and VC investors, which in turn increases information asymmetries and agency risks (Bell et al., 2012). This makes selection and monitoring more important but also more difficult. It also hinders efficient value adding by VC investors, as cultural and institutional barriers may make entrepreneurs less receptive to advice from foreign investors (Guiso, Sapienza, and Zingales, 2008). VC firms investing across borders may mitigate LOF by selecting PCs with lower levels of information asymmetries or PCs that need less advice. This restrictive strategy, however, severely reduces the array of investment opportunities that VC firms could consider. Network theory suggests an alternative strategy to mitigate information and value adding problems, which is to leverage syndicate partners (Meuleman et al., 2010). For example, local VC firms are not hindered by geographical, cultural or institutional distance,

allowing for stronger monitoring and advice. Based upon cases of nine Finnish VC backed PCs, Mäkelä and Maula (2008) show the importance of local VC firms in attracting VC from firms that operate from another country from the one in which the PC is established (hereafter: cross-border VC firms). Hence, cross-border VC firms may outsource their monitoring and value adding functions to local co-investors (Mäkelä and Maula, 2008; Chemmanur, Hull and Krishnan, 2012). The internationalization literature suggests yet another strategy to mitigate LOF, which is to set up a local branch office. This ensures proximity to entrepreneurs and thereby reduces asymmetric information problems (Pruthi, Wright and Meyer, 2009). When employing local investment professionals in the branches, cultural and institutional differences disappear, thereby further facilitating transfer of knowledge and advice to the PC (De Prijcker et al., 2012). This also allows strong organizational isomorphism with local practices. We hence expect that VC firms, investing through a local branch (hereafter: branch VC firms), will exhibit an investment strategy that is comparable to that of domestic VC firms.

The hypotheses are tested on a sample of 1770 investments in young technology-based companies in seven European countries (Belgium, Finland, France, Germany, Italy, Spain and the U.K.), of which 20% by cross-border VC firms and 7% by branch VC firms. When focusing solely on PC characteristics and controlling for various confounding effects, we confirm earlier findings that cross-border VC firms target companies with lower information asymmetries (see e.g. Dai et al., 2012; Sorenson and Stuart, 2001). More specifically, compared to domestic VC firms, cross-border VC firms have a lower probability to invest in seed stage companies and in the first VC investment round, but a higher probability to invest in companies with more patents. However, PC characteristics do not impact the probability of raising money from a cross-border rather than a domestic VC firm when accounting for co-investors. Rather, compared to domestic VC firms, cross-border VC firms have a higher probability to co-invest with a local VC firm (either a domestic or a branch VC firm), with larger investment syndicates and with a VC firm that can bring additional experience beyond that of the focal VC firm. In contrast, there are no differences between the investment strategies of domestic and branch VC firms. They invest in the same PCs and with comparable syndicate partners. Further, they are considered as equally capable of alleviating LOF faced by cross-border VC syndicate partners.

Our study shows that VC firms use different strategies to mitigate LOF. First, they invest in companies with lower information asymmetries, thereby limiting the scope of investment opportunities considered. Second, co-investing with local VC syndicate partners allows to invest in opportunities that would not be available when investing alone, thereby expanding the range of investment opportunities for cross-border VC firms. Alternatively, co-investing with larger investment syndicates or with more experienced investors further enlarges the investment opportunities of cross-border VC firms as it brings more valuable resources and capabilities to the PCs, thereby further enhancing value creation and limiting the VC firm's downside risks. Finally, setting up a local branch office also enables an international VC firm to invest in the same opportunities as domestic VC firms.

LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

Liabilities of Foreignness in VC Markets

In this study, we investigate the strategies deployed by VC firms to mitigate LOF when they pursue expansion outside their home market. Despite technological advances, financial investors

like VC firms are still prone to a “home bias”, implying that they prefer to invest close to home compared to what would be optimal from a diversification perspective (Fritsch and Schilder 2008). The reluctance to invest across borders is explained by LOF in capital markets, originating from difficulties in information gathering increasing information asymmetries and agency risk and, institutional and cultural distances between the country of origin of the investor and the target company (Bell et al., 2012). VC investors differ from “traditional” financial investors in that they provide value-enhancing services to their PCs after the investment (Sapienza, Manigart and Vermeir, 1996). This creates an additional liability of foreignness, as geographical and cultural distance hinders the efficient transfer of services (Ambos and Ambos, 2009). We expand on these antecedents hereafter.

A first antecedent of LOF in capital markets relates to increased *information costs*. Information asymmetry is present whenever one party in a transaction has more or better information than the other, which is especially the case in the VC investment process (Dai et al., 2012; Sorenson and Stuart, 2001). As there is greater potential for an unequal distribution of information between national and cross-border investors, information flows are an important determinant of cross-border equity transactions (Portes and Rey, 2005). Unawareness about the customary rules regulating the behaviour and activities of managers in foreign markets, different business practices and standards, national and corporate cultures increase information asymmetries but are essential for investors to meaningfully evaluate foreign targets (Bell et al., 2012). Compared with local VC firms, cross-border VC firms hence face higher barriers to access and interpret information when attempting to evaluate and monitor PCs (De Clercq and Sapienza, 2006). In the VC market, Cumming and Dai (2010) showed that geographic proximity leads to information advantages and reduces monitoring costs, leading to a higher successful exit probability for PCs that are close to their VC investors. Hence, cross-border VC firms have a strong information disadvantage compared to local VC firms.

A second antecedent of liability of foreignness is the *institutional distance*, or the extent to which institutions differ between the country of origin of the cross-border VC firm and that of the PC. Although formal institutional barriers in capital markets have been lowered in recent years, differences persist in national institutions that are relevant for financial markets (Chan, Covrig and Ng, 2005). This increases the risk and uncertainty with investing across borders (Bell et al., 2012). At the macro-economic level, it has been shown that well-developed legal framework including investor protection rights and well-developed stock markets increase the flow of cross-border VC (Cumming, Schmidt and Walz, 2010).

Third, *cultural distance* has an effect on VC investor behavior (Bruton, Fried and Manigart, 2005; Dai et al., 2012; Wright et al., 2005). Culture are the shared values, beliefs and attitudes that influence individual perceptions and behaviours (Bell et al., 2012). Cultural distance impacts VC investment practices, which tend to differ across countries (Bruton et al., 2005). As a result, cross-border VC firms behave differently compared to domestic VC firms (Mäkelä and Maula, 2006). These differences hamper cross-border VC firms in achieving legitimacy in the target country, reducing their deal flow and hampering syndication with local VC investors. It also makes it more challenging to adhere to the local way of doing business. This may impact the effectiveness of cross-border VC firms, as the internationalization literature has shown that cross-border firms suffer lower returns until they become accustomed to the local culture and networks (Contractor, Kundu and Hsu, 2003).

Finally, VC investors differ from other forms of financial intermediation in that they are *actively involved* after the investment in the governance of the PCs and provide value-enhancing services to the PCs through participation in the board of directors (see e.g. Sapienza, Manigart and Vermeir, 1996). This creates an additional LOF for cross-border VC firms, as they have a lower capacity to add value to their PCs due to the increased geographical, cultural and institutional distance. The ability to add value the PC, to coach the management team, and to provide introductions depends upon the ability to interact frequently with the PC. For example, VCs are less likely to serve on the boards of geographically distant companies (Lerner, 1995). The increased distance may hence impact the effectiveness of cross-border VC firms' value-added services and hence create additional LOF.

Strategies for Overcoming Liabilities of Foreignness in VC Markets

Considerable empirical research has concentrated on the question of what investors can do to overcome LOF. Attention has been given to the choice of an appropriate entry mode (Eden and Miller, 2004), the use of signalling mechanisms, endorsements by third parties and organizational isomorphism (Bell et al., 2012). VC firms operate in environments in which information asymmetries and agency risk are high (Dai et al., 2012; Sorenson and Stuart, 2001), which are compounded when investing across borders. We therefore argue that a first strategy used by cross-border VC firms to overcome LOF, is to select PCs with lower ex-ante information asymmetries which will decrease information costs. Next, in order to mitigate institutional and cultural distance, cross-border VC firms will draw upon the endorsement by local VC firms. Further, endorsement by more co-investors and more experienced co-investors will alleviate issues related to institutional and cultural distance. Finally, investing through a local branch rather than through foreign headquarters will enhance organizational isomorphism, thereby reducing legitimacy concerns. We expand upon these four distinct strategies hereafter.

Given the information opaqueness surrounding technological companies and the intangibility of most of their investments, information asymmetries in VC investments are high which are compounded for cross-border VC firms. Cross-border VC firms will therefore prefer to invest in informationally more transparent companies, as this will allow to reduce agency costs and moral hazard (Dai et al, 2012). Less developed PCs produce less and lower quality financial information increasing information asymmetry (Hand, 2005). VC firms therefore devote more time and interact more frequently with early stage PCs (Gupta and Sapienza, 1992). We hence expect that cross-border VC firms will have a lower probability to invest in early stage companies (Dai et al., 2012). Next, cross-border VC firms will prefer to invest in a subsequent VC investment round, as information asymmetries decrease after a first VC investment. The initial VC firm will install stronger management control techniques in the PCs (Silvola, 2008), leading to more and higher quality information production (Beuselinck, Deloof and Manigart, 2009). Hence, cross-border VC firms will have a lower probability to invest in a first VC investment round.

Finally, cross-border VC firms will select PCs which credibly signal their quality through salient organizational attributes which are indicators of their value. Entrepreneurial companies signal their quality to VC firms through their patents (Hsu and Ziedonis, 2007). Entrepreneurial companies with patents have a higher probability of receiving VC and receive VC earlier (Haeussler, Harhoff and Müller, 2009). As cross-border VC firms face relative informational disadvantages compared to local VC firms, patents will be a more important signal for cross-border VC firms than for domestic VC firms. Hence, we expect that cross-border VC firms will have a higher tendency to invest in PCs with more patents. Foregoing leads to our first hypothesis:

H1: Compared to domestic VC firms, cross-border VC firms have a lower probability of investing in PCs with higher information asymmetries.

H1a: Compared to domestic VC firms, cross-border VC firms have a lower probability of investing in PCs in the seed stage.

H1b: Compared to domestic VC firms, cross-border VC firms have a lower probability of investing in PCs in the first investment round.

H1c: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in PCs with more patents.

Next to applying more restrictive selection criteria and thereby limiting their range of investment opportunities they are willing to consider, cross-border VC firms may wish to mitigate information problems through syndicate partners. Syndication in VC investments is especially useful when uncertainty is higher (Casamatta and Harichabalet, 2007), as it allows gathering more information, thereby improving selection (Casamatta and Harichabalet, 2007). Especially local co-investors are attractive to cross-border VC firms to reduce information and agency problems (Sorensen and Stuart, 2001). They operate in the same institutional and cultural environment as the PC, which enables them not only to gather more information, but also to better interpret it and to understand the local rules of the game. Their fine grained knowledge about the functioning of the local market includes deal sourcing, elaborated networks and know-how on the legal requirements (Bell et al., 2012). Next to reducing information asymmetries, syndication partners are important to add value to their PCs (Manigart et al., 2006). Especially local VC firms have a higher possibility of adding value to their PCs (Hochberg, Ljungqvist and Lu, 2010). Geographical and cultural proximity benefits frequent and open communication with entrepreneur and allows obtaining a good fit, which is essential to build trust in the VC firm-entrepreneur relationship (Shepherd and Zacharakis, 2001). This, in turn, positively impacts a VC firm's value-added contribution and subsequent PC performance (De Clercq and Fried, 2005). Given the complementary skills of their investors, PCs backed by a syndicate of local and cross-border VCs outperform all other VC-backed PCs (Devigne et al., 2013). In emerging countries, it has been shown that farther away cross-border VC firms are (marginally significantly) more likely to syndicate with domestic VC firms (Chemmanur et al., 2012) and when they syndicate with domestic VC firms, cross-border VC firms invest in more informationally opaque PCs (Dai et al, 2012). In view of local VC firms' possibility to reduce information asymmetries and enhance value creation, we expect that especially cross-border VC firms will benefit from having a domestic or branch VC firm as syndicate partner. We hence hypothesize:

H2: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in a PC if a local VC firm is part of the investment syndicate.

H2a: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in a PC if a domestic VC firm is part of the investment syndicate.

H2b: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in a PC if a branch VC firm is part of the investment syndicate.

Another way in which syndicate partners may reduce LOF, is through certification. Endorsement of a PC by a third party such as another VC firm enables the PC to build a reputation (Rao, 1994), thereby reducing uncertainty surrounding the PC. The value of third-party endorsements in reducing the degree of uncertainty depends upon the number of certifying organizations and the status of the certifying organization (Bell et al., 2012; Nahata, 2008). Therefore, a PC backed by a

larger investment syndicate or by a highly experienced VC firm has a more powerful endorsement, whereby the VC firms act as a reputational source of legitimacy.

A second benefit of larger investment syndicates or highly experienced syndicate partners is that they bring more valuable resources and capabilities to the PCs, further enhancing value creation. For example, highly experienced VC firms help to find key management team members and to shape strategy (Timmons and Bygrave, 1986). As a result, PCs backed by larger investment syndicates or more experienced VC firms are more successful (Fitza, Matusik and Mosakowski 2009; Nahata, 2008). As cross-border VC firms face higher LOF, they have a higher need to mitigate these risks and may therefore rely more strongly on more syndicate partners or on more experienced syndicate partners. Foregoing leads to following hypothesis:

H3: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in a PC if more resourceful VC firms co-invest.

H3a: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in a PC if the investment syndicate is larger.

H3b: Compared to domestic VC firms, cross-border VC firms have a higher probability of investing in a PC if a more experienced VC firm is part of the investment syndicate.

Next to selecting specific PCs or relying on syndicate partners, VC firms wishing to reduce LOF may do so by investing through a local branch, as this allows to mimic or conform to the practices of local firms (Pruthi, Wright and Meyer, 2009; Zaheer, 1995). Operating from a local branch allows to become similar to domestic VC firms, as a local branch is strongly embedded in the local cultural and institutional environment and is able to strongly reduce information asymmetries. Branch VC firms thereby exhibit lower LOF compared to cross-border VC firms. When hence hypothesize that the investment policies of branch VC firms will be comparable to those of domestic VC firms:

H4: Branch VC firms invest in comparable PC and with similar co-investors as domestic VC firms.

METHOD

Sample and Data

The hypotheses are tested on a sample drawn from a novel dataset on European technology companies built by the pan-European VICO project.¹ We focus on the first investment of a VC firm in a PC. We thereby exclude investments by the focal VC firm in subsequent investment rounds, as these may be impacted by escalation of commitment (Guler, 2007). The sample contains data on 1770 first investments by 840 VC firms in 679 VC-backed companies of which 1241 are made by domestic VC firms, 356 by cross-border VC firms and 126 by branch VC firms. The PCs were founded in one of seven European countries, including Belgium, Finland, France, Germany, Italy, Spain and the United Kingdom. VC-backed companies were identified through commercial databases including VentureXpert and Zephyr, but also through VC investors' and company websites and press releases. The proprietary dataset includes companies that eventually fail and hence results are not subject to survivorship bias. The use of European data is particularly suited to test our hypotheses, as compared to the U.S. more European VC deals have international VC firm participation (Aizenman and Kendall, 2008).

The VC firms make their first investment in the sample companies between 1994 and 2011. This ensures that a variety of investment periods are included. All PCs were independent at start-up and existed for maximum 10 years at the time of the initial VC investment. Further, all PCs had to be active in high-tech industries, including aerospace, biotech, energy, ICT manufacturing, internet, nanotech, pharmaceutical, robotics, software, telecom, web publishing and other R&D. Data were retrieved from several sources. For each company we collected detailed yearly financial statement data and this for as many years as possible before and after the initial VC investment. Financial statement data is collected through the Amadeus and country specific databases. The number of patent applications which were pending and granted were retrieved for each PC from the PATSTAT database. To obtain data on VC investors, we combined multiple data sources including Thomson ONE, Zephyr, country specific databases, press releases and VC websites. The data for each VC investment include investment date, country of origin, VC firm age and VC firm experience among others.

Table 1 (Panel A) provides an overview of the PCs in which the focal VC firms invest by company industry, country, founding period and focal VC firm's first investment year. The most important industry is the software industry (34%), followed by the biotech (21%) and the ICT industry (16%). Over 25% of the sample companies come from the United Kingdom, 24% from France, 18% from Germany and 12% from Belgium. Italian companies represent 9% of the sample and Finnish and Spanish companies respectively 7 and 5%. The majority of PCs (48%) were founded between 1998 and 2000, 32% were founded between 1986 and 1997 and 20% between 2001 and 2004. The VC firms have been active over the entire time frame of our study, although most VC firm's first investments in PCs are concentrated during the dot-com bubble and subsequent years.

Variable Definitions

The dependent variables of interest are three mutually exclusive dummy variables: *Domestic VC firm*, *Cross-border VC firm* and *Branch VC firm*. *Domestic VC firm*, *Cross-border VC firm* and *Branch VC firm* respectively take the value of 1 if the focal VC is a domestic VC firm; a cross-border VC firm investing from head office and a cross-border VC firm investing through a local branch.

The key independent variables measure PC and co-investor characteristics which may mitigate LOF. First, in order to test hypotheses 1 and 4 we include measures that capture the level of information asymmetry embedded in the PC at time of the focal VC firm's first investment: (a) PC development stage (*seed stage*); (b) investor entry round (*first investment round*); and (c) PC technological transparency (*patents*). While *seed stage* and *first investment round* are dummy variables that are respectively equal to 1 if the PC is in the seed development stage and if the focal VC firm enters the PC in its first investment round, *patents* is the number of patents the PC holds. Second, to test hypotheses 2 and 4 we include three dummy variables that capture the focal VCs co-investors' origin: (a) *synd_Domestic*; (b) *synd_Branch*; and (c) *synd_Cross-Border*. While *synd_Domestic* and *synd_Branch* equal 1 when there is at least one co-investor in the investment syndicate which is respectively a domestic VC firm or a branch VC firm; *synd_Cross-Border* equals 1 when there are only cross-border VC co-investors in the investment syndicate. Finally, to test hypotheses 3 and 4 we include variables that measure the co-investors resources: (a) *syndication size*; and (b) *experience*. *Syndication size* takes into account the total amount of resources the co-investors may contribute to the focal VC and the PC, measured as the time varying cumulative count of VC investors that participated in prior financing rounds or in the focal round. *Experience* from the co-investors to the focal VC firm is computed by subtracting the focal VC firm's experience, measured as the total number of VC investments made prior to the focal VC investment, from the highest co-investors' experience. Prior to taking the natural logarithm, we truncate this

variable at 0 as only positive differences denote an experience flow, i.e. from a more experienced co-investor to the focal VC.

We control for VC firm characteristics, market conditions, industry, year and country effects. For VC firm characteristics, we include a control for the *focal VC's experience*, since the probability to have positive experience flows depends on the focal VC's own experience level. *Focal VC's experience* is measured as the total number of VC investments made by the focal VC prior to the investment in the PC. To control for the general VC investment market conditions - which may affect a VC firm's probability to invest, the yearly total *number of VC investments* worldwide is added. Finally, VC firms may exhibit different probabilities to invest depending on the timing of their first investment. Both the timeframe of our study and the focus on high-tech sectors require us to control for the *focal VC firm's first investment year*. Companies in different industries and countries may differ in the probability to be invested. To control for potential industry and country effects, *industry* and *country dummies* are added.

Method of Analysis

The differences between cross-border VC firm's and domestic VC firm's investment strategies are tested with multinomial logistic models, an extension of the binary logistic model, as our dependent variable can take more than two discrete outcomes (see e.g. Cooper, Gimeno Gascon and Woo, 1994). For each unique VC-PC pair, the focal VC's origin is represented by a set of three mutually exclusive dummy variables that capture the origin of the focal VC: *Domestic VC firm*, *Cross-border VC firm* and *Branch VC firm*. The multinomial model determines the probabilities as a function of the observed independent variables and their estimated coefficients. The estimated coefficients represent the effect of the independent variables on the logarithm of the odds-ratio of the focal outcome (cross-border VC firm or branch VC firm) compared to the normalized outcome (i.e. the reference category: domestic VC firm). Consequently, the coefficients should be interpreted as the effect of the independent variables on the probability of a particular outcome (cross-border VC firm or branch VC firm) relative to the probability of the reference category domestic VC firm. Analyses are clustered on the PC level, as multiple observations for the same PC could lead to correlations between the error structure and the independent variables and thus lead to underestimation of the standard errors.

RESULTS

Descriptive Statistics

Table 1 (Panel B) provides an overview of our sample, distinguishing between companies that raise financing from a domestic VC investor, a cross-border VC investor and a branch VC investor. Two particular observations are worth noting. First, the distributions of PC's industry, founding year and year of the focal VC's first investment are relatively similar for the different VC firm origins. Second, although the PC country distribution of the domestic VC firms' investments and cross-border VC firms' investments are similar, branch VC firms' investments mainly take place in the U.K. (48%). The fact that more branch VC firms are set up in the U.K. is, however, not surprising as the U.K. is the largest and most developed VC market in Europe and therefore the most attractive country for foreign VC firms to set up a local branch (Bottazzi and Da Rin, 2002).

Table 2 shows the description of the sample at time of first investment by the focal VC firm; Panel A records the PC information asymmetry variables. Domestic VC firms (23%) make approximately

twice as much seed investments compared to cross-border (14%) and branch VC firms (14%). While domestic VC firms enter almost two thirds of their PCs in their first investment round (62%), cross-border VC firms and branch VC firms enter their PCs in the first investment round respectively in 40% and 53% of their investments. The mean PC holds 0.46 patents at time of entry of the focal VC firm. While domestic VC firm's (0.34) and branch VC firm's (0.31) PCs hold fewer patents, cross-border VC firm's (0.87) PCs on average hold more patents. Table 2 Panel B displays the descriptive statistics of the co-investors' origin. Compared to domestic and branch VC firms who co-invest with domestic VC firms in 66% of their investments, cross-border VC firms more frequently co-invest with domestic VC firms (86%). While domestic VC firms co-invest with branch VC firms in 11% of their investments, branch VC firms (24%) and cross-border VC firms (28%) co-invest with branch VC firms approximately twice as often. Finally, branch VC firms (6%) co-invest exclusively with cross-border VC firms in twice as many of their investments compared to domestic (3%) and cross-border VC firms (2%). Table 2 Panel C records the co-investor resources. A median cross-border VC firm has twice as many co-investors (4) compared to a median domestic (2) and branch VC firm (2). While a median domestic and branch VC firm have no positive experience flow from their most experienced co-investor (mean respectively 83.09 and 105.65 investments), a median cross-border VC firm's most experienced co-investor has made 42 (mean 245.18) investments more prior to the focal investment. Finally, Table 2 Panel D describes the control variables. Branch VC firms are the most experienced (median 77 investments), followed by cross-border VC firms (17) and domestic VC firms (4). The mean total number of VC investments made in the focal investment year is equal over the different VC origins.

Main Analyses

Table 3 presents the pairwise correlation matrix. All variables have correlations below 0.60 and the maximum variance inflation factors is 4.3, which is well below the usual warning level of 10 (Rao, Greve and Davis, 2001). The mean variance inflation factor is 1.73. This indicates that problems due to multicollinearity issues are limited.

Table 4 reports the results for the multinomial models predicting the relative probability of cross-border VC firms and branch VC firms to invest in a PC compared to domestic VC firms. Model 1 includes only the control variables; subsequently in Model 2 the PC information asymmetry variables are added; finally in Model 3 the co-investor variables are included. In line with the descriptive statistics, Model 1 shows that the cross-border and branch VC firms are significantly ($p < 0.01$) more experienced at time of the focal investment. The total number of VC investments made worldwide has no significant impact on the relative probabilities of the VC firms to invest. *PC industry*, *PC country* and *focal VC firm's first investment year* dummies are significant in all models. Adding the information asymmetry variables in Model 2 allows to assess whether cross-border or branch VC firms differ from domestic VC firms in the selection of their PCs based upon the level of information asymmetry embedded in the PCs. The negative coefficients of *seed stage* ($p < 0.05$) and *first investment round* ($p < 0.01$) show that, compared to domestic VC firms, cross-border VC firms have a lower probability to invest in seed stage and first investment round PCs. Moreover, the positive coefficient on *patents* ($p < 0.05$) implies that, compared to domestic VC firms, cross-border VC firms have a higher probability to invest in PCs which hold more patents. These results are in line with our first hypothesis. When we include co-investor origin and resource variables in Model 3, however, the significant results on the *PC information asymmetry* displayed in Model 2 disappear. Instead, Model 3 shows that, compared to domestic VC firms, the probability that cross-border VC firms invest increases if domestic VC ($p < 0.01$) or branch VC firms ($p < 0.05$) co-invest, but not when only cross-border VC firms co-invest. These results are

in line with our second hypothesis. Further, the probability of cross-border VC firms to invest, relative to domestic VC firms, increases syndicates are larger ($p < 0.01$) or when more experienced co-investors ($p < 0.01$) co-invest. These results are in line with our third hypothesis. Finally, while Model 2 indicates that, compared to domestic VC firms, branch VC firms have a lower probability ($p < 0.01$) to invest in the first investment round of a PC, the significance disappears in Model 3 when including co-investor characteristics. Moreover, Model 3 further displays that branch VC firms invest in comparable PCs and with similar co-investors as domestic VC firms. These results are in line with our fourth hypothesis.

ROBUSTNESS OF RESULTS

Additional models were fitted to test for the robustness of our findings and assess the strength of alternative explanations. Alternative co-investor variables are incorporated, that could not be included in the main models due to high correlations with the *experience* variable. First, co-investors' general *experience* variable is substituted with respectively their *country specific experience*, *stage specific experience* and *IPO experience*, together with the focal VC firm's respective control variable *focal VC's country specific experience*, *focal VC's stage specific experience* and *focal VC's IPO experience* instead of its *focal VC's (general) experience*. Next the total number of VC investments worldwide is replaced by the total amount of VC money raised worldwide. The main results remained unchanged.

DISCUSSION AND CONCLUSION

While VC firms increasingly invest across borders (Cumming and Dai, 2010), this expansion confronts them with LOF (Wright et al., 2005). The goal of this paper is to study the different investment strategies cross-border VC firms use to mitigate LOF, focusing on the characteristics of the investment targets, of syndicate partners and structural strategies such as investing from a local branch office. We show that, in the European VC market, cross-border VC firms have a lower probability of investing in informationally opaque firms, consistent with VC firms' behaviour in emerging economies (Dai et al., 2012). Interestingly, having more syndicate partners or more experienced co-investors allows cross-border VC firms to broaden their investment strategy and to invest in more informationally opaque firms. The probability of cross-border VC firm investment increases when local VC firms, larger investment syndicates and more experienced VC firms co-invest.

We further extend previous literature by showing that local branches of VC firms are not prone to LOF and hence present another strategy for international VC firms to overcome LOF. First, branch VC firms invest in the same type of companies as domestic VC firms, irrespective of potential syndicate partners. Second, cross-border VC firms consider branch VC firms as equally appealing to overcome LOF, as the effects of syndicating with a domestic VC firm or a branch VC firm are the equally positive. Having a local presence is hence an effective way to overcome LOF. As such, this study provides more fine grained insights in how cross-border VC firms mitigate their LOF and expand their investment options through syndicate partners; further, it shows how setting up a local branch allows to act as a domestic VC firm.

As with all research, this study has limitations. First, although we investigate the different strategies cross-border VC firms may employ in order to mitigate LOF, we do not investigate the impact of these strategies on the investment outcome. We hence are unable to acknowledge whether these strategies are beneficial. Second, our sample is limited to the European VC market.

This may limit the generalizability of our results as the LOF faced by cross-border VC firms may differ between developed and emerging VC markets (Chemmanur et al., 2012). Nevertheless, given that large-scale studies on the investment behavior of international VC firms are limited to emerging markets (Chemmanur et al., 2012; Dai et al., 2012), our study provides an interesting extension in another environment. We show that PC information opacity is a lower concern in our setting compared to the emerging markets setting, but highlight that syndicate partners also play an important role in alleviating LOF. It would be interesting to understand whether being locally present through a branch VC firm in emerging markets allows to alleviate LOF to the same extent as in our more developed VC setting. Third, our large scale study prevents to provide a more fine grained insight in the processes used by cross-border VC firms to mitigate LOF, or in the way branch VC firms acquire intimate local knowledge and contacts. For example, understanding how the PCs' board activities are impacted when a cross-border VC firm enters – with or without local syndicate partner – or understanding the interaction between cross-border VC firms and their co-investors provide interesting avenues for future research.

Despite these limitations, the present study provides valuable insights to VC investors and high-tech entrepreneurs. Our research contributes to the VC practitioners as it shows that different geographical focuses may have a significant impact on their investment strategy. Moreover, we provide further evidence that entrepreneurs in their search for finance should carefully evaluate the potential investors and target investors that match their own and the investors' needs.

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NOTES

1. We exclude government VC firms from the sample as they have different investment patterns.

REFERENCES

- Aizenman, J., & Kendall, J. (2008). The internationalization of venture capital and private equity. SSRN eLibrary.
- Ambos, T. C., & Ambos, B. (2009). The impact of distance on knowledge transfer effectiveness in multinational corporations. *Journal of International Management*, 15(1), 1-14.
- 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.
- Beuselincx, C., Deloof, M., & Manigart, S. (2009). Private equity involvement and earnings quality. *Journal of Business Finance & Accounting*, 36(5-6), 587-615.
- Bottazzi, L., & Da Rin, M. (2002). Venture capital in Europe and the financing of innovative companies. *Economic Policy*, 17(34), 229-270.

- Bruton, G. D., Fried, V. H., & Manigart, S. (2005). Institutional influences on the worldwide expansion of venture capital. *Entrepreneurship Theory and Practice*, 29(6), 737-760.
- Casamatta, C., & Haritchabalet, C. (2007). Experience, screening and syndication in venture capital investments. *Journal of Financial Intermediation*, 16(3), 368-398.
- Chan, K., Covrig, V., & Ng, L. (2005). What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide. *Journal of Finance*, 60(3), 1495-1534.
- Chemmanur, T. J., Hull, T., & Krishnan, K. (2010). Do local and international venture capitalists play well together? A study of international venture capital investments. SSRN eLibrary.
- Contractor, F. J., Kundu, S. K., & Hsu, C. C. (2003). A three-stage theory of international expansion: the link between multinationality and performance in the service sector. *Journal of International Business Studies*, 34(1), 5-18.
- Cooper, A. C., Gimeno-gascon, F. J., & Woo, C. Y. (1994). Initial human and financial capital as predictors of new venture performance. *Journal of Business Venturing*, 9(5), 371-395.
- Cumming, D., & Dai, N. (2010). Local bias in venture capital investments. *Journal of Empirical Finance*, 17(3), 362-380.
- Cumming, D., Schmidt, D., & Walz, U. (2010). Legality and venture capital governance around the world. *Journal of Business Venturing*, 25(1), 54-72.
- Dai, N., Jo, H., & Kassicieh, S. (2012). Cross-border venture capital investments in Asia: selection and exit performance. *Journal of Business Venturing*, 27(6), 666-684.
- De Clercq, D., & Fried, V. H. (2005). How entrepreneurial company performance can be improved through venture capitalists' communication and commitment. *Venture Capital*, 7(3), 285-294.
- De Clercq, D., & Sapienza, H. J. (2006). Effects of relational capital and commitment on venture capitalists' perception of portfolio company performance. *Journal of Business Venturing*, 21(3), 326-347.
- De Prijcker, S., Manigart, S., Wright, M., & De Maeseneire, W. (2012). The influence of experiential, inherited and external knowledge on the internationalization of venture capital firms. *International Business Review*, 21(5), 929-940.
- Devigne, D., Vanacker, T., Manigart, S., & Paeleman, I. (2013). The role of domestic and cross-border venture capital investors in the growth of portfolio companies. *Small Business Economics*, 40(3), 553-573.
- Eden, L., & Miller, S. (2004). Distance matters: liabilities of foreignness, institutional distance and ownership strategy. *Advances in International Management*, 16, 187-221.
- Fitza, M., Matusik, S. F., & Mosakowski, E. (2009). Do VCs matter? The importance of owners on performance variance in start-up firms. *Strategic Management Journal*, 30(4), 387-404.
- Fritsch, M., & Schilder, D. (2008). Does venture capital investment really require spatial proximity? An empirical investigation. *Environment and Planning A*, 40(9), 2114-2131.
- Guiso, L., Sapienza, P., & Zingales, L. (2008). Trusting the stock market. *The Journal of Finance*, 63(6), 2557-2600.
- Guler, I. (2007). Throwing good money after bad? Political and institutional influences on sequential decision making in the venture capital industry. *Administrative Science Quarterly*, 52(2), 248-285.
- Gupta, A. K., & Sapienza, H. J. (1992). Determinants of venture capital firms preferences regarding the industry diversity and geographic scope of their investments. *Journal of Business Venturing*, 7(5), 347-362.
- Haeussler, C., Harhoff, D., & Mueller, E. (2009). To be financed or not... - The role of patents for venture capital financing. ZEW Discussion Paper.
- Hand, J. R. M. (2005). The value relevance of financial statements in the venture capital market. *Accounting Review*, 80(2), 613-648.

- Hochberg, Y. V., Ljungqvist, A., & Lu, Y. (2010). Networking as a barrier to entry and the competitive supply of venture capital. *Journal of Finance*, 65(3), 829-859.
- Hsu, D., & Ziedonis, R. (2007). Patents as quality signal for entrepreneurial ventures. University of Pennsylvania.
- Lerner, J. (1995). Venture Capitalists and the Oversight of Private Firms. *Journal of Finance*, 50(1), 301-318.
- Madhavan, R., & Iriyama, A. (2009). Understanding global flows of venture capital: human networks as the “carrier wave” of globalization. *Journal of International Business Studies*, 40(8), 1241-1259.
- Mäkelä, M. M., & Maula, M. V. J. (2006). Interorganizational commitment in syndicated cross-border venture capital investments. *Entrepreneurship Theory and Practice*, 30(2), 273-298.
- Mäkelä, M. M., & Maula, M. V. J. (2008). Attracting cross-border venture capital: the role of a local investor. *Entrepreneurship and Regional Development*, 20(3), 237-257.
- Manigart, S., Lockett, A., Meuleman, M., Wright, M., Landstrom, H., Bruining, H., et al. (2006). Venture capitalists’ decision to syndicate. *Entrepreneurship Theory and Practice*, 30(2), 131-153.
- Meuleman, M., Lockett, A., Manigart, S., & Wright, M. (2010). Partner selection decisions in interfirm collaborations: the paradox of relational embeddedness. *Journal of Management Studies*, 47(6), 995-1019.
- Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, 90(2), 127-151.
- Portes, R., & Rey, H. (2005). The determinants of cross-border equity flows. *Journal of International Economics*, 65(2), 269-296.
- Pruthi, S., Wright, M., & Meyer, K. (2009). Staffing venture capital firms’ international operations. *International Journal of Human Resource Management*, 20(1), 186-205.
- Rao, H. (1994). The social construction of reputation - certification contests, legitimation, and the survival of organizations in the American automobile-industry - 1895-1912. *Strategic Management Journal*, 15, 29-44.
- Rao, H., Greve, H. R., & Davis, G. F. (2001). Fool’s gold: Social proof in the initiation and abandonment of coverage by Wall Street analysts. *Administrative Science Quarterly*, 46(3), 502-526.
- Sapienza, H. J., Manigart, S., & Vermier, W. (1996). Venture capitalist governance and value added in four countries. *Journal of Business Venturing*, 11(6), 439-469.
- Shepherd, D. A., & Zacharakis, A. (2001). The venture capitalist-entrepreneur relationship: Control, trust and confidence in co-operative behaviour. *Venture Capital*, 3(2), 129-149.
- Silvola, H. (2008). Do organizational life-cycle and venture capital investors affect the management control systems used by the firm? *Advances in Accounting*, 24(1), 128-138.
- Sorenson, O., & Stuart, T. E. (2001). Syndication networks and the spatial distribution of venture capital investments. *American Journal of Sociology*, 106(6), 1546-1588.
- Timmons, J. A., & Bygrave, W. D. (1986). Venture capital’s role in financing innovation for economic growth. *Journal of Business Venturing*, 1(2), 161-176.
- Wright, M., Pruthi, S., & Lockett, A. (2005). International venture capital research: From cross-country comparisons to crossing borders. *International Journal of Management Reviews*, 7(3), 135-165.
- Zaheer, S. (1995). Overcoming the Liability of Foreignness. *Academy of Management Journal*, 38(2), 341-363.

Table 1: PCs by country, founding year and industry group

	Panel A		Panel B					
	Full Sample		Domestic VC firm		Cross-border VC firm		Branch VC firm	
<i>Sample size</i>	1170		1241		356		126	
<i>Industry</i>	Number	%	Number	%	Number	%	Number	%
Software	598	33.8	441	35.5	108	30.3	35	27.8
Biotech	367	20.7	249	20.1	90	25.3	18	14.3
ICT manufacturing	287	16.2	211	17.0	57	16.0	14	11.1
Internet	198	11.2	127	10.2	40	11.2	23	18.3
TLC	101	5.7	60	4.8	26	7.3	10	7.9
Pharmaceutical	79	4.5	51	4.1	16	4.5	9	7.1
Web publishing	76	4.3	51	4.1	10	2.8	14	11.1
Other R&D*	64	3.6	51	4.1	9	2.5	3	2.4
<i>Country</i>								
UK	456	25.8	297	23.9	96	27.0	60	47.6
France	422	23.8	324	26.1	70	19.7	20	15.9
Germany	314	17.7	211	17.0	71	19.9	5	4.0
Belgium	216	12.2	156	12.6	55	15.4	5	4.0
Italy	156	8.8	104	8.4	32	9.0	11	8.7
Finland	116	6.6	78	6.3	26	7.3	12	9.5
Spain	90	5.1	71	5.7	6	1.7	13	10.3
<i>Founding year</i>								
1986-1997	565	31.9	391	31.5	117	32.9	52	41.3
1998-2000	853	48.2	589	47.5	174	48.9	56	44.4
2001-2004	352	19.9	261	21.0	65	18.3	18	14.3
<i>Focal VC firm's first investment year</i>								
1994-1999	310	17.7	233	18.8	46	12.9	30	23.8
2000-2005	1281	73.0	895	72.1	273	76.7	84	66.7
2006-2011	164	9.3	113	9.1	37	10.4	12	9.5

*Other R&D includes PCs active in aerospace, energy, nanotech and robotics industry

Table 2: Descriptive statistics at first investment of the focal VC firm

		Full Sample	Domestic VC firm	Cross-border VC firm	Branch VC firm
<i>Sample size</i>		1770	1241	356	126
<i>Panel A: PC information asymmetry</i>					
Seed stage (D)	Mean	0.21	0.23	0.14	0.14
First investment round (D)	Mean	0.57	0.62	0.40	0.53
Patents	Mean	0.46	0.34	0.87	0.31
	Median	0.00	0.00	0.00	0.00
	S.D.	2.41	1.82	3.60	1.02
<i>Panel B: Co-investor origin</i>					
Synd_Domestic (D)	Mean	0.71	0.66	0.86	0.66
Synd_Branch (D)	Mean	0.15	0.11	0.28	0.24
Synd_Cross-Border (D)	Mean	0.03	0.03	0.02	0.06
<i>Panel C: Co-investor resources</i>					
Syndication size	Mean	3.03	2.51	4.86	2.90
	Median	2.00	2.00	4.00	2.00
	S.D.	3.24	2.82	3.92	3.42
Experience	Mean	117.41	83.09	245.18	105.65
	Median	1.00	0.00	42.00	0.00
	S.D.	252.33	206.10	355.01	218.20
<i>Panel D: Control variables</i>					
Focal VC's experience	Mean	57.66	27.89	104.36	210.82
	Median	6.00	4.00	17.00	77.00
	S.D.	157.39	95.87	207.75	289.26
Number of VC investments (x 10 ^{^3})	Mean	11.46	11.35	11.80	11.49
	Median	7.17	7.17	7.17	9.04
	S.D.	6.43	6.34	6.67	6.46

(D) marks the dummy variables

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Pairwise correlation matrix

Variable	1	2	3	4	5	6	7	8	9
<i>PC information asymmetry</i>									
1 Seed stage (D)									
2 First investment round (D)	0.26 ***								
3 Patents	-0.09 ***	-0.03							
<i>Co-investor origin</i>									
4 Synd_Domestic (D)	-0.16 ***	-0.48 ***	0.10 ***						
5 Synd_Branch (D)	-0.12 ***	-0.27 ***	0.04 *	0.11 ***					
6 Synd_Cross-Border (D)	-0.01	0.07 ***	-0.03	-0.26 ***	-0.07 ***				
<i>Co-investor resources</i>									
7 Syndication size	-0.21 ***	-0.53 ***	0.15 ***	0.53 ***	0.34 ***	-0.08 ***			
8 Focal VC's experience	-0.16 ***	-0.41 ***	0.16 ***	0.43 ***	0.43 ***	-0.01	0.59 ***		
<i>Control variables</i>									
9 Experience	-0.05 *	0.00	0.09 ***	-0.04	0.03	0.08 ***	0.00	-0.16 ***	
10 Number of VC investments (x10 ³)	0.12 ***	0.25 ***	-0.06 ***	-0.05 **	0.01	0.03	-0.05 **	-0.04	-0.04

(D) marks the dummy variables
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Results of multinomial models predicting the relative probability of cross-border VC firms and branch VC firms to invest in a PC compared to domestic VC firms

	Model 1		Model 2		Model 3	
	Cross-border VC	Branch VC	Cross-border VC	Branch VC	Cross-border VC	Branch VC
<i>PC information asymmetry</i>						
Seed stage (D)			-0.549 **	-0.383	-0.341	-0.279
First investment round (D)			-1.158 ***	-0.748 ***	-0.298	-0.311
Patents			0.061 **	-0.003	0.010	-0.040
<i>Co-investor origin</i>						
Synd_Domestic (D)					0.858 ***	0.379
Synd_Branch (D)					0.625 **	0.121
Synd_Cross-Border (D)					0.531	0.997
<i>Co-investor resources</i>						
Syndication size					0.110 ***	0.065
Experience					0.157 ***	0.091
<i>Control variables</i>						
Focal VC's experience	0.004 ***	0.006 ***	0.004 ***	0.006 ***	0.005 ***	0.006 ***
Number of VC investments (x10 ³)	0.009	-0.011	0.036	-0.003	0.030	-0.012
PC industry (D)	Included	Included	Included	Included	Included	Included
PC country (D)	Included	Included	Included	Included	Included	Included
Focal VC firm's first investment year (D)	Included	Included	Included	Included	Included	Included
<i>Constant</i>	-1.608 ***	-2.308 ***	-1.307 **	-1.871 **	-3.185 ***	-2.669 ***
Observations	1,436	1,436	1,423	1,423	1,360	1,360
Log likelihood	-945	-945	-897	-897	-826	-826
Pseudo R-squared	0.13	0.13	0.17	0.17	0.21	0.21

*** p<0.01, ** p<0.05, * p<0.1
(D) marks the dummy variables