Overcoming Distances via Syndication with Local Friends: The Case of Venture Capital

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Abstract: Using a novel dataset of worldwide venture capital deals, we show that geographical and institutional distances shape investor decisions. Venture capitalists invest primarily in companies located in their home country. When crossing borders, they are much more likely to invest in companies in geographically and institutionally proximate countries than in distant countries. These results indicate that information asymmetry, monitoring and contract costs faced by foreign and more distant venture capital investors are crucial. Our findings suggest that these costs are mitigated when foreign venture capital investors syndicate with local partners from the country of the portfolio company. However, such syndication may give rise to new incentive problems and information asymmetries between the syndicate partners. Our results indicate that these problems are reduced if the syndicate is based on previous relationships between the participating venture capital investors. This finding is consistent with models of contract cost reduction through repeated relationships.

Keywords: Venture Capital, Internationalization, Distance, Syndication, Repeated Relationships
JEL Classification: F21, G24.

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"Venture capital is not about the people you know but rather where you are: FIBRE networks cross the world. Data bits move at light speed. The globe has been flattened, and national boundaries obliterated. Yet…physical distance is very much on the minds of the investors who provide venture capital."
Source: Stross, Randall, "It's not the people you know. It's where you are." The New York Times, 10/22/2006; cited in: Cumming and Johan (2009), Chapter 15, p. 454

1 Introduction

Venture capital investors (VCs) are very actively involved in the pre-investment screening, management and monitoring of their portfolio companies. These portfolio companies are usually young, opaque and risky. This forces VCs to collect and evaluate soft information on these companies and their management, which gives rise to information and incentive problems (Ueda 2004, Kaplan and Strömberg 2003). To mitigate these problems, VCs make use of complex and sophisticated contractual forms (Kaplan and Strömberg 2003, 2004, Allen and Song 2005). The contract design plays a crucial role for the success of venture capital investments (e.g., Cumming *et al.* 2006, Hege *et al.* 2009).

Within this business model, VCs profit from geographical and institutional proximity to their portfolio companies. The *geographical* proximity is helpful because physical distance increases VCs' information costs. The literature suggests that it is less costly to find (Wright *et al.* 2005) and to screen (Cumming and Johan 2006) close investment opportunities than distant ones. Moreover, it is easier to manage and to monitor close companies than distant ones (Lerner 1995, Sorenson and Stuart 2001). The reason for this is that closely located VCs are familiar with local practices and the market situation, have regional business experience and access to soft information through the interactions of their managers in social, civic and business meetings and their participation in formal as well as in informal networks. Moreover, travel costs play a non-negligible role because venture capital investments require onsite evaluation and face-to-face meetings with the companies both before and after the funding decision has been made (Gorman and Sahlman 1989).

The *institutional* proximity also matters since similar institutions in the country of the portfolio company make it easier for VCs to transfer and enforce the contractual mechanisms they use in their home country to their foreign portfolio companies. The design of venture capital contracts is strongly influenced by the country's legal traditions (e.g., Bottazzi *et al.* 2009, Schoar and Lerner 2004). If the foreign country has the same legal traditions as the VC country, the VC's contract costs will decrease and its willingness to invest in portfolio companies located in this country will increase. In conjunction with geographical proximity, institutional proximity provides an alternative means of reducing information asymmetry, monitoring and contract costs.

Our data strongly support the importance of geographical and institutional proximity for venture capital investments. Venture capitalists invest primarily in companies located in their home country, which are geographically and institutionally proximate. Two thirds of all worldwide venture capital transactions are domestic transactions. Therefore, it is not astonishing that the vast majority of the academic literature studies domestic venture capital investments. Research that goes beyond making

cross-country comparisons of the domestic venture capital investments and domestic fund raising (starting with a study by Jeng and Wells 2000) or of valuation methods (e.g., Manigart *et al.* 2000) towards studying the geographical investment patterns of venture capital firms and motives behind their internationalization efforts is still very rare (see Wright *et al.* 2005).[1]

However, there is a non-negligible fraction of cross-border transactions, even at long geographical and institutional distance. The internationalization is by far not only an issue for a handful of large global investors. More than 30% of all VCs worldwide invest abroad. Moreover, as the world economy becomes increasingly integrated, cross-border venture capital investments are likely to become even more important in the future. Understanding the patterns, motivations and obstacles for cross-border venture capital flows is consequently an important (but understudied) research topic. In this paper, we place particular focus on the question of how geographical and institutional distance to potential target companies influence VC decisions on where to invest the entrusted capital.

We start our analysis at the aggregate level of *bilateral-country* cross-border flows. Our results from this analysis suggest that venture capital flows are much larger between countries that are geographically and institutionally close to each other than between distant countries. This finding corresponds with outcomes from previous studies on cross-border venture capital and private equity (Aizenman and Kendal 2008) and other types of international capital flows (e.g., Portes *et al.* 2001, Portes and Rey 2005, di Giovanni 2005, de Ménil 1999) which use gravity-type models and document the discouraging impact of geographical and institutional distance. We can also confirm this discouraging impact on the *deal* level, where we find that foreign VCs are much more likely to invest in closely located firms than in distant companies. These findings indicate that information asymmetry, monitoring and contract costs faced by foreign VCs are important.

We continue by taking into account that more than 65 percent of all cross-border deals are made up of several VCs collaborating with each other. A prevalent pattern in such syndicated cross-border investments is the joint participation of a foreign VC and a domestic VC from the portfolio company's country; it emerges that a domestic VC is a foreign VC's partner in a remarkable 88 percent of all syndicated cross-border deals. From this perspective it is astonishing that, with the exception of a few case studies and investigations within small samples, a systematic examination of the motives behind this widespread phenomenon of worldwide cross-border syndication between foreign and domestic VCs has not yet taken place.[2] We conjecture that a cooperation between foreign and domestic VCs may yield several advantages. While foreign VCs may help implement the company's internationalization strategy, domestic VCs may contribute to a reduction in the transaction costs,

[1] In this paper, we focus on the internationalization at the level of venture capital investors and not at the level of their original capital providers (as do e.g., Cumming and Johan (2007a, 2007b), who investigate institutional investors' allocation of funds to domestic and foreign venture capital and private equity investors, which constitutes another dimension of internationalization within venture capital and private equity industries).

[2] An interesting contribution by Meuleman and Wright (2009) looks at cross-border syndication of later-stage UK PE investors.

which arise from long distances, since they are placed in the vicinity of the company, have a superior knowledge of the local market, the technology and legal environment, and possess beneficial linguistic skills and valuable contacts. On both the aggregate bilateral country level and the deal level, our result suggest that geographical and institutional distance between countries has a less deterrent impact on the foreign VC if a domestic VC is involved in the deal. Forming syndicates with domestic partners – a widely observed phenomenon within venture capital industries – may help overcome the complexity of investing in geographically and institutionally distant regions.

To the best of our knowledge, we are the first to offer a joint empirical investigation of the internationalization and cross-border syndication within worldwide venture capital industries. Our study extends previous discussions in literature, which mainly focus on syndication among domestic VCs and ignore the cross-border component, by pointing out an additional advantage of syndication: the facilitation of cross-border investments. Forming a syndicate with domestic VCs may enable foreign VCs to better diversify their portfolios and exploit return differentials across countries.

However, syndication is a multifaceted process involving specific agency costs, which are a consequence of informational frictions within the syndicate (e.g., Casamatta and Haritchabalet 2007, Cestone *et al.* 2007). Our results from the deal-level analysis indicate that syndication is easier when it is based on experience from joint syndicates in the past, i.e. on a repeated relationship. This finding is consistent with models of contract cost reduction through repeated relationships (e.g., Pichler and Wilhelm 2001, Cai 2009, Chemmanur and Tian 2009, Tykvová 2007) and with empirical evidence from syndicated loans (Cai 2009, Gopalan *et al.* 2008, Panyagometh and Roberts 2009) or private equity (Meuleman *et al.* 2009). Repeated relationships are frequently observed in venture capital investments (Hochberg *et al.* 2007, Chemmanur and Tian 2009); in our sample, 59% of all syndicated deals are based on repeated relationships.

The remainder of the paper is organized as follows. In Section 2 we discuss the importance of geographical and institutional distance for international venture capital flows, as well as for cross-border venture capital syndication. In addition, we highlight the role of repeated relationships. Section 3 describes the dataset and offers some descriptive statistics on internationalization, syndication, geographical and institutional distance, as well as on repeated relationships. In Section 4 we present our empirical results on how geographical and institutional distance affects aggregate bilateral-country cross-border flows. In Section 5 we model the single cross-border VC's probability of participation on a given deal and how this is affected by the geographical and institutional distance and by repeated relationships. Section 6 concludes.

2 Background and related literature

2.1 Geographical and institutional distance and cross-border flows

Venture capital investments are characterized by multiple incentive problems and asymmetric information between the VCs and the portfolio companies (PCs) during all phases of the investment process (Ueda 2004, Kaplan and Strömberg 2003): selection, screening and evaluation before an investment is made, monitoring and management after an investment is made, as well as during the exiting phase. The information asymmetry problems are aggravated by the typical characteristics of the PCs: low age, high opacity, high risk, and a high fraction of intangible assets. Therefore, the collection and evaluation of soft information, i.e. information which is difficult to codify, transmit and interpret, is crucial for the success of venture capital investments. Moreover, to mitigate the remaining information problems, VCs make use of complex and sophisticated contractual forms that influence the incentives of their PCs' managers (Kaplan and Strömberg 2003, 2004, Allen and Song 2005). In particular, they select an appropriate type and structure of financing and specify the rights, as well as the duties of both parties. Empirical studies demonstrate that the contract design plays a decisive role for the success of venture capital investments (e.g., Cumming *et al.* 2006, Hege *et al.* 2009).

For this type of investment, the geographical and institutional proximity is crucial. Recent evidence indicates that geographically close investors possess an information advantage over distant investors, especially when financing opaque companies for which soft information is relevant (e.g., Petersen and Rajan (2002) or Degryse and Ongena (2005) for bank lending, Butler (2008) for municipal bond underwriting by investment banks, Teo (2009) for hedge fund investments, Uysal *et al.* (2008) for firm acquisitions). In the VC context, Bengtsson and Ravid (2009) demonstrate that contracts between VCs and PCs are more high-powered as geographic distance increases, indicating that soft information availability decreases with distance. But even for assets, for which hard information – information that is tangible and can easily be coded, transmitted, and interpreted – is prevalent, several studies argue that close investors have an information advantage over their distant counterparts: Coval and Moskowitz (1999 and 2001) and Ivkovich and Weisbenner (2005) provide evidence that mutual fund managers and individual investors, respectively, earn significant abnormal returns on geographically proximate investments; Malloy (2005) demonstrates than geographically proximate analysts are more accurate than other analysts. This effect, however, is more pronounced for those assets for which information asymmetry problems are severe, such as among non-S&P 500 index stocks (Ivkovich and Weisbrenner 2005) or small, highly leveraged firms (Coval and Moskowitz 1999) or firms located in small cities or remote areas (Malloy 2005).

Institutional proximity, which refers to the presence of similar institutions, such as similar laws, a common language, shared habits, etc. (Boschma 2005) renders the VCs familiar with the PCs' institutional environment and, thus, provides support for economic coordination. Similar institutions in the PC country decrease the VCs' information, monitoring and contract costs because VCs may

transfer and enforce contractual forms they are familiar with (from their home country investments) to PCs located abroad.

In the empirical literature, geographical and institutional distances are widely recognized as measures of information, monitoring and contract costs (e.g., Buch and DeLong 2004, Buch *et al.* 2009). These costs can influence the investment decisions of foreign investors at least in two major ways. First, the information disadvantage gives rise to an adverse selection problem (Akerlof 1970, Milgrom 1981) when investors select promising investment opportunities in foreign countries. Second, once an investment is made, companies may engage in moral hazard behavior (Holmström 1979, Grossman and Hart 1983) and thus make appropriate contracting and monitoring necessary, which is likely to be more costly for geographically and institutionally distant investors.

Investors may realize substantial gains when they diversify their portfolios across countries and thereby exploit existing return differentials. However, a considerable number of studies demonstrate that investors overinvest in their home country. Moreover, a vast amount of literature suggests that different types of international financial activities are inversely related to the geographical and institutional distance between countries. These studies typically rely on gravity models framework, which has originally been employed to analyze trade flows. For example, geographical and institutional proximity between two countries positively affects their bilateral equity and debt flows (Portes *et al.* 2001, Portes and Rey 2005), foreign direct investments (de Ménil 1999), international bank asset holdings (Buch 2003) and, finally, venture capital and private equity flows (Aizenman and Kendall 2008). In addition, geographical and institutional proximity influences positively cross-border mergers and acquisitions of companies (di Giovanni 2005) as well as banks (Buch and DeLong 2004) and the likelihood of cross listings (Fernandes and Giannetti 2008).

Based on this discussion, we conjecture that VCs exhibit a home bias. At the bilateral-country level, we expect the intensity of cross-border venture capital flows to decrease with an increasing geographical and institutional distance between the two countries. At the deal level we conjecture that the likelihood of a foreign VC participating in a given deal decreases as its geographical and institutional distance from the potential PC increases.

2.2 Syndication between foreign and domestic VCs

Instead of investing alone, foreign VCs often syndicate with domestic VCs from the portfolio companies countries. In a syndicate between a foreign and a domestic VC, the domestic VC will often take the lead in the syndicate (Sorenson and Stuart 2001) or the foreign VC delegates some responsibilities to its domestic partner. In addition, the domestic VC may serve as a signal for the PC's quality to the foreign, less informed VC. In this way, syndication with a domestic VC may reduce the foreign VC's costs for information gathering and processing as well as for monitoring and support. An effect found in the market for syndicated loans provides support to this conjecture: loans to emerging market borrowers have lower spreads when domestic banks participate in the syndicate, indicating that

domestic banks in these markets possess a better access to information and a superior monitoring ability (Nini 2004).

Several authors argue that syndication between VCs raises PCs' value (Cumming and Walz 2009, Brander *et al.* 2002). Cross-border syndication may generate additional benefits. Foreign VCs may play a key role in the PCs' internationalization efforts because the PCs may profit from the VCs' knowledge of their respective home country product and capital markets. In addition, the domestic VC may benefit from cross-border syndication, especially when, due to the reciprocal nature of relationships in the venture capital industry, the domestic VC becomes a foreigner in the home country of the foreign VC it partnered with. In countries with small venture capital industries, including a foreign VC might be inevitable when large deals are to be financed. For both domestic and foreign VCs, syndication strengthens portfolio diversification.

To sum up, we conjecture that besides the benefits from syndication identified in the literature so far, syndication might help in overcoming geographical and institutional distances. At the bilateral country level, we expect the intensity of cross-border venture capital flows to be less strongly affected by the geographical and institutional distance between the two countries when deals are syndicated with domestic VCs. At the deal level, we expect the geographical and institutional distance between the foreign VC and the PC to affect this VC's participation probability less strongly when a domestic VC is involved in the deal.

2.3 Repeated relationships

However, syndication is a complex process that gives rise to new agency costs, which emerge from the informational frictions within the syndicate. First, the domestic VC, who possesses more information about the deal, may be inclined to take a less informed foreigner on board only for low quality deals, which induces an adverse selection problem. Second, delegated monitoring may result in a moral hazard problem and free riding since the foreign VC cannot observe the domestic VC's efforts. These costs are potentially aggravated when VCs come from different countries. Moreover, finding appropriate partners abroad might substantially raise search costs whereas local syndication is much easier (Hochberg *et al.* (2007) for venture capital, Champagne and Kryzanowski (2007) for syndicated loans). Thus, whether or not a foreign VC syndicates with a domestic VC depends on the trade-off between the advantages of the cross-border syndication and its costs.

One important mechanism that helps reduce information asymmetry and monitoring costs within a syndicate is reputation (e.g., Pichler and Wilhelm 2001, Cai 2009, Chemmanur and Tian 2009 or Tykvová 2007 for theoretical models; empirical investigations include e.g., Cai 2009, Gopalan *et al.* 2008, and Panyagometh and Roberts 2009 for syndicated loans). In the venture capital industry, reputational and reciprocity mechanisms are important since VCs are repeated players who are incessantly in search of syndication partners. Empirical literature demonstrates that the fact that two

VCs invested together in the past positively affects their propensity to syndicate again in future deals (e.g., Hochberg *et al.* 2007, Chemmanur and Tian 2009).

To sum up, we conjecture that the existence of a previous relationship between VCs may become an important determinant of their investments decisions, which may decrease locational constraints in venture capital investments. Trust based on experience from a joint syndicate in the past, i.e., a repeated relationship, may reduce syndication costs. At the deal level, we expect a previous relationship with any of the participating VCs to increase the potential VC's participation probability in a given deal.

3 Data and some descriptive statistics

3.1 Internationalization and syndication patterns

We identify worldwide venture capital deals in our study from the Bureau van Dijk Zephyr database. Our dataset contains 23,826 *deals* completed between the beginning of 2000 and the end of 2008. Appendix 1 offers details on how we extracted our dataset from this database and transformed it for our purposes. The majority (57%) of these deals are financed by a syndicate of several VCs. For the purpose of this paper, we define syndication as a joint investment of several VCs in one PC in one investment round. A syndicated deal consists of several connections between single VCs and the PC. In a potential deal the number of these connections, which we will henceforth refer to as *links*, thus equals the number of VCs involved in this deal. In total, we count 58,377 VC-PC *links* in our final dataset.

Since little is known about the geography of venture capital and syndication patterns, we devote this section to describing our dataset. Figure 1 aggregates the number of domestic, intra- and intercontinental links between VCs and PCs by continents. With more than 34,000 links in the period 2000-2008, domestic links of Northern American VCs (including the United States and Canada) constitute by far the largest figure, followed by European VCs with nearly 11,200 links to domestic PCs. Intracontinental connections are intensive within Europe, with more than 3,400 cross-border VC-PC links. The bulk of intercontinental links take place between Europe and the United States in both directions, with more than 2,600 links of European VCs to PCs in the United States and nearly 1,600 links in the opposite direction.

Nearly two thirds of all worldwide deals are financed solely by domestic VCs pointing towards a possible home bias. Table 1 shows the number (Panel A) and the volume (Panel B) of domestic (i.e., all VCs are domestic) and foreign (i.e., at least one foreign VC is involved) deals carried out in each country as well as each country's internationalization share. The by far highest number of venture-backed PCs is located in the United States, where we count 9,370 domestic and 2,854 cross-border deals. The United States have a rather low internationalization share with more than 76% of deals

financed exclusively by domestic VCs. The second largest VC country, the United Kingdom, with 1,214 cross-border and 1,540 domestic deals, has an above-average internationalization share of 44.1 %. While the worldwide internationalization share based on number of deals amounts to 33.5%, it reaches 49.8% when looking at the investment volumes. The reason for this discrepancy is that cross-border deals are larger on average (see also Table 2). Panel C of Table 1 depicts the number of bilateral-country cross-border VC-PC links for selected countries with the largest cross-border venture capital investments from abroad. The most intensive connection is between the United States and the United Kingdom, with 663 links between US VCs and PCs in the United Kingdom, and 923 links in the opposite direction.

Table 2 provides information on aggregated internationalization and syndication patterns. In total, we count 15,789 domestic deals, from which 8,405 are syndicated (among domestic VCs). From the total of 7,947 cross-border deals, 2,779 are financed by a single foreign VC and 645 cross-border deals are investments by syndicates consisting of foreign VCs. The remaining 4,523 deals (nearly 57% of all cross-border deals) are financed by a syndicate of foreign and domestic VCs. Apparently, foreign VCs are in many cases only willing to invest abroad when they can join a domestic VC from the PC country.

Taken together, 31.4% of all worldwide deals are stand-alone deals of domestic VCs, 35.3% are syndicated exclusively among domestic VCs, 11.7% are stand-alone deals of foreign VCs, 19.0% are syndicated among foreign and domestic VCs and, finally, only 2.7% are financed via a syndicate of foreign VCs. Syndicated deals are typically larger than stand-alone deals, and cross-border deals are larger than domestic deals.

The median syndicate size is 3 VCs for syndicated deals with solely domestic VCs, 4 for foreign-domestic syndicates, and 2 for syndicates consisting of foreign VCs only. The foreign-domestic syndicates typically contain more domestic than foreign VCs (1 cross-border and 2 domestic VCs in the median deal). In the median deal syndicated between foreign VCs, the cross-border VCs come from two different countries. Unfortunately, we cannot go deeper into detail regarding the syndicate structure since our data lacks the necessary information, such as the fraction each single VC holds or who the lead investor is.

3.2 Geographical and institutional distance

To measure geographical distance between the VC and the PC, we obtain the latitude and longitude data for the center of each zip code–city–country combination from http://www.batchgeocode.com/ and calculate the distance between centers of two zip code–city–country combinations employing the Vincenty's (1975) formula for calculating geodesic distances between a pair of points on the surface of the Earth using an accurate ellipsoidal model of the Earth. Table 3 indicates that an average foreign VC is located approximately 2,700 miles from the PC. When we distinguish between different types of cross-border deals, we observe that a median foreign VC in is located 1,200 miles from its PC when it

invests alone whereas the median distance between the foreign VC and the PC amounts to more than 3,200 miles when a domestic VC participates on the deal. This observation supports the view that foreign VCs overcome distance costs by syndicating with domestic partners. In deals in which domestic and foreign VCs form a syndicate, the median distance between the closest (the domestic) VC, who in many cases probably will take the lead, and the portfolio company is 22 miles. Throughout the empirical analysis, we use the logarithm of the geographical distance to capture the non-linearity of the effect documented in earlier studies (e.g., Grinblatt and Keloharju 2001).

The institutional proximity is reflected in the same legal tradition between the VC and the PC country as categorized by La Porta *et al.* (1998). If both countries share the same legal tradition then the VCs can implement contractual mechanisms they use in their home country in the PC country. Table 4 depicts the percentages of links between different combinations of legal traditions in the VC country and PC country. Panel A considers all links, Panel B counts only cross-border links. Obviously, for all domestic investments the country legal tradition of the VC and the PC is identical. Given the dominance of the US VC industry, the fraction of nearly 74% links between companies from English legal tradition countries and VCs from English legal tradition countries is not surprising (see Panel A). The percentage of links between countries with English legal traditions remains very large with nearly 39% even in the cross-border context (see Panel B), mainly reflecting strong connections between the United States and the United Kingdom, the United States and Canada, as well as the United States and Israel. However, we can also observe intensive linkages across different legal traditions. As an example, 17% of all cross-border links are those between VCs from German legal tradition countries to companies in English legal tradition countries, consisting mainly of German VCs investing in the United Kingdom and the United States as well as Japanese and Swiss VCs investing in the United States.

3.3. Syndication and repeated relationships

Figure 2 depicts all links within venture capital syndicates distinguishing between domestic, intra- und intercontinental links. Each connection between any two VCs counts as one link. As an example, a syndicate consisting of three venture capital investors (A, B, and C) contains three links: between A and B, between B and C, between A and C. From Figure 2 we infer that VCs syndicate very actively, not only across borders, but also across continents. Cross-border syndication is much stronger in Europe than in North America. In Europe, 75% of all syndicates consist of VCs from different countries, many of them even being intercontinental syndicates, in particular with North American VCs (6,808 links).

VCs tend to syndicate across countries, across continents and across legal traditions. These geographical and institutional distances may aggravate informational frictions within the syndicate, which might be reduced when the VCs trust each other. Table 5 suggests that previous relationships are important in building syndicates. This table contains all 8,842 syndicated deals between the

beginning of 2003 and the end of 2008. The reason why we exclude the first three sample years (2000-2002) is that we need this data to establish whether or not the VCs invested together in the past. Table 5 reveals that 59% of all syndicates in this period are formed on the basis of previous relationships, this fraction being the largest (67%) in syndicates consisting of domestic and foreign VCs. The remaining 41% of all syndicates consist of VCs who invest together for the first time. As many syndicates include more than two VCs, some syndicates may contain both new and repeated relationships. In total, 46% of VCs join a syndicate without any previous connection to any of the other syndicate members (i.e., they form a new relationship). This fraction is the lowest within syndicates consisting of domestic and foreign VCs (42%). These numbers suggest that previous relationships are an important factor when building syndicates and that these relationships play the most important role in domestic-foreign syndicates.

4 Bilateral-country cross-border flows

4.1 Tobit model and RHS variables

In this section, we estimate Tobit models (Tobin 1958, Amemiya 1973) to determine the amounts of annual bilateral-country cross-border venture capital flows. We aggregate the number of links on the one hand and on the other hand their Euro volume for each country pair in both directions, i.e., transactions of venture capital investors from country A (= VC country) to country B (= PC country) and transactions of venture capital investors from country B to country A, which we normalize by the GDP. We use both PC and VC countries' GDP since large countries evidently both attract and source more transactions than small ones. Our sample period 2001-2008 (we use the transactions from the year 2000 to create a RHS variable) and our 38 sample countries result in 11,248 country-pair-year observations. Since for some of the country-pair-years we do not observe any cross-border transactions, we use a one-side censored Tobit model.

The central RHS variables of interest are the geographical distance in miles between the VC and the PC country (*distance*) as well as the institutional proximity between those two countries, proxied by their same vs. different legal traditions (*same law*).

We start our analysis by pooling all cross-border deals irrespective of the deal type. Based on the discussion in Section 2.1, we expect a negative impact of geographical and institutional distance on bilateral-country cross-border venture capital flows.

We continue by distinguishing between two main types of cross-border deals (stand-alone deals and deals syndicated with a domestic VC) and test whether geographical and institutional distance affects foreigners' stand-alone transactions more strongly than transactions syndicated with domestic VCs as suggested in Section 2.2. For this purpose, we run bilateral-country Tobit regressions for each category in a seemingly unrelated regression framework.

We control for the domestic venture capital industry size (*VCsize*). Concerning its impact on the cross-border venture capital flows, one could argue that a strong venture capital industry in the PC country diminishes cross-border inflows. However, it is possible that the opposite might be true, namely that countries with relatively higher developed venture capital industries attract more foreign venture capital investments due to a large number of (potential) syndication partners.

We employ several measures that capture expected return differences between the PC and the VC country to account for the differences in the profitability of investment opportunities in both countries. We conjecture that venture capital moves from the countries with relatively few profitable investment opportunities to countries with relatively many profitable investment opportunities. Our first measure related to the investment opportunities' and their profitability traditionally used in the literature (e.g., Focarelli and Pozzolo 2000, Goldberg 2005 in the banking literature) is the expected growth rate, *growth*. We conjecture that venture capital flows from low-growth to high-growth countries because the latter offer a higher return potential. We include the expected real growth rate for the next 3–5 years in our regressions. This time period corresponds to the average investment horizon of VCs. Our second variable, the venture capital index (*VCindex*), captures the legal environment pertinent to venture capital activities, which is an important determinant for VC returns (e.g., Armour and Cumming 2006). Our third variable is market capitalization (*marketcap*) since a developed stock market encourages venture capital investments (Jeng and Wells 2000, Black and Gilson 1998, Bascha and Walz 2002) because it offers a profitable exit route and supports VCs' reputation building and fund raising (Gompers 1996). Our fourth variable is the innovativeness of countries (*innov*) since not only do venture capital investments stimulate innovation (e.g., Kortum and Lerner 2000), but innovations also attract VCs' investments (e.g., Ueda and Hirukawa 2008). Our fifth variable accounts for the difference in the economic development of both countries. We expect countries with low levels of GDP per capita (*GDPcap*) to have a higher growth potential and a higher demand for external capital, and to thus be more likely to attract VCs from highly developed economies (e.g., Focarelli and Pozzolo 2000 in the banking context, Hochberg *et al.* 2006 in the venture capital context on the level of regions within the United States). Appendix 2 provides more detailed definitions and sources of all variables used in the paper.

These measures are used in differences between the PC and the VC country on the one hand and on the other hand we include their values for the VC country and the PC country separately. We employ their lagged values; the only exception is the expected real growth rate because this variable accounts for expectations and does not include realized values.

We take into account the fact that our controls cannot measure all characteristics of the PC and the VC countries that determine cross-border venture capital flows. These characteristics (that may be correlated with one or more of our regressors) include, for example, the sophistication of the countries' financial markets, the degree of competition among domestic VCs and the local companies' attitude towards venture capital financing. To account for this unobserved heterogeneity, we use the

classical remedy, namely, we include the PC and the VC country fixed effects in our regressions. Moreover, we include year dummies to filter out time-varying unobservable effects, such as world market developments. By doing so, our outcomes are less likely to be subject to criticism about an omitted variable bias or model misspecification.

4.2 Findings

Table 6 reports the results of these estimations. This table lists marginal effects and their standard errors in parentheses below. Panel A reveals that the geographical and institutional distance between the PC and the VC country is significantly and negatively related to the intensity of bilateral cross-border venture capital transactions between these two countries. This outcome holds true for both the number and the volume of cross-border transactions. Thus, geographical and institutional distances discourage VCs from financing firms abroad. The high z-values on the distance coefficients might raise concerns. However, fairly high values are hardly an uncommon occurrence in literature on other types of international cross-border flows. For example, in their basis table, Portes and Rey (2005) present seven different models with an average t-value on the distance coefficient of minus 20.

Distance also proves to have significant economic effects. For instance, a one-standard-deviation increase in log geographical distance (starting from the mean values of all variables and assuming that the number of transactions is positive) goes hand-in-hand with a decrease in the number of bilateral cross-border transactions by 3.6 per year. A switch from a different to the same legal tradition increases the number of bilateral cross-border transactions by 18.5 per year. These effects might seem small at first sight. However, their magnitude becomes apparent when we compare them to the mean number of bilateral cross-border transactions, which is 6.4 (provided that bilateral cross-border transactions are positive).

After having identified geographical and institutional distance as crucial obstacles for bilateral cross-border venture capital transactions, we investigate whether syndication with a domestic VC diminishes foreign VC's distance costs. We test whether stand-alone cross-border transactions are more strongly affected by geographical and institutional distance than transactions syndicated with domestic VCs. We present our regression results for both subsamples and the Chow-test on the equality of the coefficients in Panel B. The difference between the *distance* coefficients as well as the difference between the *same law* coefficients on these two types of transactions is highly statistically significant and goes in the expected direction. Our results suggest that foreign VC's costs arising from geographical and institutional distances might be reduced when a domestic VC is involved in the deal.

Table 6 gives interesting insights into several other determinants of the VCs' decisions that are worth mentioning. First, our regression results indicate that foreign VCs strive for countries with a relatively high number of domestic VCs. Second, the difference in the expected growth rate between the PC and the VC country has a positive effect on both the number and volume of transactions and, when we split this variable, the expected growth rate in the PC country is significant and positive. Third, VCs

seem to come from countries with high GDP per capita and seem to target countries which are less developed than the countries where they come from. Fourth, VCs come from highly innovative countries and they also target highly innovative countries. Fifth, cross-border flows originate in countries with high market capitalizations.

4.3 Robustness

We carry out numerous sensitivity analyses to obtain insights into whether the results we have presented in Table 6 are robust to various sources of change.

(a) We experiment with several alternative measures of geographical distance between countries. For each country pair, we use the average distance between VCs and their PCs from realized transactions between these two countries and, additionally, weight each of these distances by the respective transaction volume. Moreover, we employ alternative dummy variables as proxies for geographical distance, such as indicators whether both countries have a *common border* or whether they are from the *same continent* (e.g., Boisso and Ferrantino 1997, Guiso *et al.* 2005).

(b) We use dummy variables *same language* or *colonial ties* as alternative or additional measures of institutional proximity (e.g., Buch and DeLong 2004, Daude and Fratzscher 2008) instead of the variable *same law*.

(c) We use alternative measures of bilateral cross-border venture capital activities. First, we employ *internationalization ratios*, defined as bilateral cross-border to total (all domestic plus all cross-border) transactions in the respective PC or VC country. This procedure accounts for the size of the domestic venture capital industries. Second, we normalize the number and volume of cross-border transactions by both countries' population instead of GDP because the GDP level might be influenced by venture capital activities and thus give rise to an endogeneity problem (see Da Rin *et al.* 2006).

(d) We dismiss concerns that our results are dominated by particular countries. The country dummies included in our analysis do control for unique country parameters, but as a robustness check, we, first, re-estimate each of our regressions 30-times removing one country at a time from the sample. Second, we test whether our findings change when we exclude the two countries with the largest and most important venture capital industries, the United States and the United Kingdom, simultaneously.

(e) We estimate the models using time-averaged variables, thus reducing the number of observations to 1406 (38 x 37 country pairs), because our variables of interest – distance and same law – do not change over time.

(f) We employ alternative econometric models. First, we employ a double hurdle (Cragg 1971, Jones 1989, Yen and Jones 1996, Su and Yen 2000) and a two-stage Heckman (Heckman 1979) model. Second, instead of normalizing the number of investments by country sizes we include

country sizes as additional regressors and estimate a count model (e.g., Agresti 2001). While the Tobit model is appropriate for censored data as ours, it has two potential limitations, which we address with these sensitivity checks. First, the Tobit model forces one parameter to determine the effect of distance on both the decision to invest and the decision regarding the amount to invest. Second, it is quite susceptible to misspecification.

Our robustness checks broadly confirm our findings (results are not reported, but are available upon request). Geographical distance (as well as its alternative measures) affects total bilateral cross-border transactions negatively, whereas institutional proximity (as well as its alternative measures) has a positive impact. Without one single exception, the coefficient on these variables always remains economically and statistically significant. Concerning the categories of cross-border transactions, we consistently find that geographical and institutional distances do matter less in domestically syndicated cross-border transactions than in stand-alone cross-border transactions.

5 Likelihood of deal participation

5.1 Conditional logit model and RHS variables

In this section, we estimate conditional logit models (e.g., Chamberlain 1980 and Andersen 1970) to determine the likelihood of a specific foreign VC participating in a specific cross-border deal. In estimating these models, we can only use data on those particular deals and those particular VCs for which our dataset provides geographical characteristics (i.e., country, city and zip code); the latter is needed to calculate the geographical distance. Moreover, we exclude deals from the period 2000-2002 since we use this data to generate the RHS variable, *repeated*. We include one observation for every potential foreign VC for each cross-border deal. In other words, we generate all possible foreign VC – cross-border deal combinations. This procedure delivers more than 4 million observations. The dependent variable equals one if a potential VC participates in the given deal and zero otherwise. The conditional logit specification provides a semi-parametric estimation of the logit model, which allows controlling for unobservable deal-specific characteristics without having to estimate the individual deal fixed effects.

Our central RHS variables of interest are, first, the geographical distance (*distance*) in miles between the (potential) foreign VC and the company, and, second, their institutional proximity, i.e. same vs. different legal tradition countries (*same law*). We expect the former to have a negative and the latter to have a positive effect on the likelihood of participation as discussed in Section 2.1 and indicated by the analyses at the bilateral country level in Section 4. In the first specification, we further include an interaction term of *distance* and a dummy variable *domestic*, which indicates whether a domestic VC

participates in this cross-border transaction.[3] This interaction term helps us to answer the question whether distance between the foreign VCs and the company has a less deterring effect when a domestic VC is present as discussed in Section 2.2 and indicated by the analyses at the bilateral country level in Section 4.

In addition, we control for the individual VC size by counting the respective VC's deals in the three years preceding the transaction (*VCdeals*) since the VC size likely affects distance costs and syndication decisions (Bruining *et al.* 2009).[4] In the second specification, we additionally include an interaction term of VC size and geographical distance to account for the possibility that distance may have a different impact on large and experienced than on small and inexperienced VCs. For this exercise, we use a separate regression since, due to problems of multicollinearity, we prefer to include only one interaction term at a time.

The third and fourth regressions add a new aspect, which was not analyzed at the bilateral country level, namely how reputation and reciprocity influence the likelihood of participation in a cross-border transaction. We use the first and the second specifications introduced above but add a dummy that measures whether the (potential) foreign VC has invested together with one of the participating VCs in the past (*repeated*). We suppose that existing previous relationships with one of the participating VCs will have a positive impact on the likelihood of this VC's participation as suggested in Section 2.3.

In all four regressions, we add dummy variables for the VC countries to account for a potential unobserved heterogeneity among them. PC country characteristics and year dummies are implicitly included in the individual deal fixed effects.

5.2 Findings

Table 7 (Panel A) reports the results of our estimations. In the upper part of Panel A, we list the coefficients and their standard errors in parentheses below. Given the large sample size, it is not surprising that nearly all of the estimates are highly statistically significant. However, in non-linear models it is not possible to infer from the coefficient estimates how much an increase in a variable increases or decreases the probability that a VC participates. Especially if interaction terms are included, calculating marginal effects is crucial. As Ai and Norton (2003) demonstrate, the marginal effect of the interaction term in these models may even have a different sign from that of the coefficient. Therefore, the lower part of Panel A shows the marginal effects evaluated at the sample means (if not indicated otherwise). In order to infer how, e.g., geographical distance affects the

[3] It is not possible to include a domestic dummy as a separate variable since we employ individual deal fixed effects.

[4] Our measure of size relies on transaction data from the sample since, unfortunately, Zephyr offers no information on the characteristics of each single venture capital investor (such as funds under management). Some authors (e.g., Cumming and Dai 2009) interpret similar measures as an experience measure. Moreover, the VC size will be positively related to the local presence of the investors in different countries and to the existence of local offices or subsidiaries. We will turn to this issue later.

probability of the VC's participation, we have to consider that *distance* appears not only as one of the regressors, but that it is also part of an interaction term. For the dummy variables the marginal effects are calculated by changing the variable from 0 to 1.

The results from the first specification are depicted in Column 1. Geographical distance between the (potential) VC and the company significantly decreases the likelihood of this VC's participation whereas institutional proximity increases this likelihood. Consistent with the previous results, we thus find a discouraging impact of geographical and institutional distance on venture capital activities. Given that all variables are at their means, the likelihood of the VC's participation decreases by 0.7 percentage points when its distance from the PC doubles.[5] A switch from a different to the same law tradition increases the likelihood of participation by 1.7 percentage points. If we evaluate these distance effects separately for *domestic*=0 and for *domestic*=1 (instead of the mean of the variable *domestic*), we find that the effect of both the geographical and the institutional distance is much larger when no domestic VC participates. In other words, geographical and institutional distances affect the probability of participation less strongly when a domestic VC is involved, as expected. Moreover, the VC size increases the likelihood of its participation. The effects of the geographical distance, institutional proximity and VC size in the second, third, and fourth columns have the same signs and similar magnitudes.

If previous relationships are an important determinant of participation, (potential) VCs who have previously invested together with one of the participating VCs are more likely to be involved. As expected, the results in columns 3 and 4 suggest that the likelihood of a (potential) VC participation increases if this VC has already invested with one of the participating VCs in the past. According to the third model, the magnitude of this effect amounts to 3.1 percentage points. Consistent with our conjectures, previous relationships seem to reduce the syndicate costs. The importance of the repeated relationship variable is consistent with ongoing relationships mitigating agency problems within the syndicate.

To gain deeper insights on how the impact of a previous relationship (between the potential VC and one of the participating VCs) changes with changing geographical distances between the (potential) VC and the PC, Figure 3 delivers the predicted probability of the VC's participation at different percentiles of distance evaluated if repeated relationships exist (*repeated*=1) and without repeated relationships (*repeated*=0). Other variables are evaluated at their means. From this figure we infer that at all levels of distance the likelihood of participation is always larger when it can be based on repeated relationships compared to a situation in which the (potential) VC has not made any investments with any of the participating VCs in the past. For example, at the median distance

[5] In the regression, we use log(distance). Doubling the mean distance results in log(2*meandistance)=log (2) + log (meandistance). Extracting the mean distance from this expression gives log(2)=0.69, which is the change in the transformed distance variable (i.e., log(2*meandistance)- log(meandistance)). The marginal effect equals -0.0103 (see Table 5, Column 1). Thus, if the distance doubles, the probability change equals: -0.0103*0.69 = 0.0071.

between the (potential) foreign VC and the PC of 3,818 miles, the likelihood of this VC's participation increases by 1.9 percentage points if said VC has made investments with one of the participating VCs in the past (predicted probability is 0.031) compared to the situation without repeated relationships (predicted probability is 0.012). The magnitude of repeated relationships' impact on the change in the predicted probability, i.e., the distance between the two lines in Figure 3, is larger for shorter than for longer geographical distances.

Finally, we are interested in whether the repeated relationships' effect depends on the institutional proximity between the (potential) VC and the PC countries. Figure 4 depicts the change in the predicted probability of the VC's participation following a switch from unrepeated to repeated relationships. In addition, we evaluate it with regard to a situation in which both countries share the same legal tradition and to a situation in which the countries differ in their legal traditions. This effect is again evaluated at different percentiles of distance. Figure 4 suggests that, for all distance deciles, the effect of repeated relationships is larger with (*same law*=1) than without (*same law*=0) institutional proximity between both countries. The difference, however, is significant only at the 10% level.

To sum up, geographical and institutional distances between a (potential) foreign VC and the PC affect the probability of this VC's participation negatively. This negative effect is stronger when no domestic VC participates in the deal. Moreover, the probability of the (potential) VC's participation increases with the existence of a repeated relationship between the (potential) VC and one of the participating VCs. The positive effect of repeated relationships is stronger for short geographical and institutional distances.

5.3 Extensions

One of the main problems with our analysis is that our measure of distance, which reflects the distance between the headquarters of the foreign VC and the PC, might not properly account for the real distance between the VC and the PC for global investors. In particular, VCs tend to open subsidiaries or local offices in foreign countries where they invest. The largest VCs are true multinationals who are familiar with investments nearly everywhere around the world. These investors are typically located very closely to their PCs, rendering the geographical and institutional distance between their headquarters and the PC irrelevant for their investment decisions. We account for this fact in the *first* extension of our models. Since we do not have information on whether, at the date of the particular investment, the (potential) VC has a subsidiary or a local office in the PC country, in this extension we consider only those (potential) foreign VCs who, at the time of the deal, have not yet invested in the country under observation. The VCs who invest in the given country for the first time have to overcome distance costs. On the contrary, foreign VCs who have already invested in the given country most likely possess valuable experience, contacts or even local offices or subsidiaries in said country, which might reduce their distance costs substantially. When looking only at "first-time" investors, the number of observations drops to 1.6 million.

Panel B of Table 7 reports the results of these estimations. Again, the coefficients are depicted in the upper part, whereas the marginal effects in the lower part. We use the same four models as in Panel A. Our previous results are broadly confirmed when we restrict the sample to those (potential) foreign VCs who have not invested in the PC country before.

The *second* extension we perform is that we add the domestic dimension to the cross-border dimension. We include all domestic transactions and domestic (participating or potential) VCs. The aim of this exercise is to check whether geographical distance at the domestic level operates similarly to the cross-border level in putting more distant investors at a relative disadvantage. Recent evidence suggests not merely that investors prefer domestic to foreign targets, but also that they demonstrate a strong preference for closely located domestic companies over other domestic companies (e.g., Coval and Moskowitz 1999, Ivkovich and Weisbenner 2005). We check whether the preference for proximate portfolio companies is tied only to the geographical distance or whether borders generate an additional obstacle. This procedure raises the number of observations (all VC – all deal combinations) to more than 18 million.

Panel C of Table 7 reports the results of these estimations. In the first and second column we take models 2 and 4 from Panel A[6] and add a dummy variable cross-border VC (*cbVC*), indicating whether the (potential) VC is located in another country than the PC. In the last two columns, we again employ models 2 and 4 from Panel A but, instead of the dummy variable *cbVC,* we distinguish whether or not the (potential) cross-border VC comes from the neighboring country by including two dummies: *bordercbVC* and *nobordercbVC*. The first dummy variable equals one if the VC country has a common border with the PC country and is zero otherwise. The second dummy variable equals one if the VC country differs from the PC country and they do not have a common border. If national borders generate additional obstacles to investments, all these dummy variables and the variable *distance* will have a negative impact on the likelihood of participation.

The first two columns of Panel C indicate that geographical distance matters and that cross-border VCs have to overcome additional obstacles compared to domestic VCs. When the (potential) VC comes from abroad, the likelihood of its participation drops by approximately 15 percentage points (controlling for geographical and institutional distance). The third and fourth columns suggest that such obstacles exist even for neighbouring countries' VCs, but that they are much larger for non-neighbours. Other variables, such as institutional proximity, repeated relationships or VC size have similar effects as in the cross-border context.

In our *third* extension, we check whether our results are driven by the syndicate size. For example, the variable repeated will be positively correlated with the number of participating VCs. The larger the number of participating VCs is, the higher the chance that a (potential) VC might have made

[6] Models 1 and 3, which include a variable indicating whether a deal is syndicated between cross-border and domestic investors, do not make much sense in this extended setting (when we add domestic deals and domestic investors).

investments with one of them in the past. Taking this into account, we run regressions for different syndicate sizes (e.g., two, three, etc.) separately. We employ exactly the same specifications as in Panel C. Our previous results are broadly confirmed for different syndicate sizes. The results for the syndicate size of two are depicted in Panel D of Table 7.

5.4 Robustness

We carry out a number of additional regressions in order to check whether our results in Table 7 are robust towards various changes.

(a) We employ a rare events logit model introduced by King and Zeng (2001), who argue that logit models can sharply underestimate the probability of rare events such as ours. However, the results are very similar to those presented above so that, at least in our context, a conditional logit model seems to be the appropriate choice.

(b) We perform sensitivity checks regarding the composition of the (potential) VCs' pool. One possible problem with our model is that some VCs may have entered or exited during the sample period for reasons other than mergers. As a result, a VC could be included in the regressions for a specific deal although it was not in business at the time. For this reason, we re-estimate the models from previous section including only those VCs that appear in the transaction data both in the first and the last year of the regression period, i.e., in 2003 and 2008. In addition, we estimate the models separately year by year.

(c) Instead of deal fixed effects we employ VC fixed effects and include several deal specific characteristics as regressors. With this check we account for a potentially unobserved heterogeneity among VCs. For instance, the degree of specialization of VCs might affect their costs of collecting and processing information on distant companies (e.g., Bodnaruk 2009).

(d) Instead of the overall VC size we consider size measures related to the extent of this VC's cross-border activities. Instead of counting all transactions, we only count this VC's cross-border transactions or, alternatively, only the transactions in a given PC country. In the likelihood of participation on a cross-border deal, the question of how much experience a VC has accumulated abroad or, even more specifically, in the specific PC country may be more relevant than simply counting the number of transactions, since some VCs may have only very few or no transactions in foreign countries despite a large number of transactions in their home country.[7]

[7] Take, on the one hand, an example of the U.S. venture capitalist *New Enterprise Associates*, who is, with 407 transactions, the fourth largest investor in our sample. However, only fifteen of these transactions are carried out outside the United States. New Enterprise Associates' experience with cross-border transactions is thus very limited and their domestic experience in the United States might be not very helpful when crossing borders since they obviously lack expertise, offices and contacts in foreign markets. On the other hand, our largest investor, *3i Group*, participates in 761 transactions, from which 467 take place abroad and 3i Group invests in most of the sample countries.

(e) As in the first econometric part of our analysis, we use alternative proxies for institutional proximity (same language, colonial links).

(f) In addition, we also exclude VCs from one country at a time as well as from the United States and the United Kingdom simultaneously.

While there are minor differences, our main results are confirmed in all these robustness analyses.

6 Summary of the main results and outlook

Our paper contributes to the existing literature on internationalization within the venture capital industries by employing a novel dataset on worldwide venture capital investments. We suggest that syndication with domestic venture capital investors may diminish information, monitoring and contracts costs, which arise from the geographical and institutional distance between foreign venture capital investors and their investees. Reducing these costs is thus an additional benefit of syndication, which has so far not explicitly been discussed in the literature. However, syndication is a very complex process, which gives rise to new information, monitoring and contract costs. Our findings give support to the conjecture that syndication is less costly when it can be based on a previous relationship between the venture capital investors. This result is consistent with models of contract cost reduction through repeated relationships.

To the best of our knowledge, this paper provides a first integrated insight into internationalization, cross-border syndication, and the role of repeated relationships within venture capital industries around the globe. Our dataset offers the huge advantage of a very broad scope with worldwide deals included in it. However, the time dimension is rather limited and the dataset does not contain much additional information on deal, company, and venture capital investors' characteristics. Thus, many interesting questions related to overcoming distance costs in cross-border venture capital transactions still remain unexplored. As an example, we are aware of the fact that cross-border syndication (with local friends) is only one of several ways of reducing information, monitoring and contract costs arising from geographical and institutional distances. Local lawyers, accountants, investment bankers and strategy consultants may substitute domestic syndication partners. In addition, foreign venture capital investors may open their own local office, establish a local subsidiary, form a joint venture with a domestic investor ("long-term" syndication), invest in local funds instead of directly in companies ("funds-of-funds") or employ investment managers with a background in the destination country (e.g., Pruthi *et al.* 2010, Manigart *et al.* 2007). It remains a very challenging task for future research to examine the motives behind the choice of the appropriate strategy (or a combination of them). Analyzing this issue requires a very rich and detailed dataset, which must, to a large part, be hand-collected. Moreover, future research could also look into each partner's motives and roles within the syndicate (initiator, lead investor, etc.).

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Table 1: Deals by countries

This table shows the internationalization patterns within the period 2000-2008 of sample countries. Panel A reveals the number, and Panel B the volume, of cross-border and domestic deals carried out in each sample country as well as in each country internationalization share. Panel C depicts the number of bilateral cross-border VC-PC links for selected country pairs. Source: Zephyr.

Panel A: Number of deals carried out in each country

Country	cb deals	dom deals	Cb/total	Country	cb deals	dom deals	Cb/total
ALL	**7,947**	**15,789**	***33.5***				
Australia	201	92	68.6	Lithuania	7	5	*58.3*
Austria	44	45	*49.4*	Luxembourg	15	2	*88.2*
Belgium	111	152	*42.2*	Malaysia	8	8	*50.0*
Brazil	12	10	*54.5*	Netherlands	146	187	*43.8*
Bulgaria	10	2	*83.3*	New Zealand	9	20	*31.0*
Canada	387	686	*36.1*	Nigeria	1	1	*50.0*
Chile	1	2	*33.3*	Norway	77	80	*49.0*
China	270	84	*76.3*	Phillippines	2	0	*100.0*
Czech Republic	7	3	*70.0*	Poland	24	13	*64.9*
Denmark	107	112	*48.9*	Portugal	26	21	*55.3*
Egypt	6	1	*85.7*	Russia	38	19	*66.7*
Estonia	6	3	*66.7*	Saudi Arabia	0	2	*0.0*
Finland	111	162	*40.7*	Singapore	32	8	*80.0*
France	503	1,140	*30.6*	South Africa	9	26	*25.7*
Germany	390	620	*38.6*	Spain	117	489	*19.3*
Greece	1	9	*10.0*	Sweden	244	380	*39.1*
Hong Kong	17	2	*89.5*	Switzerland	115	39	*74.7*
Hungary	10	6	*62.5*	Thailand	5	1	*83.3*
India	184	75	*71.0*	Turkey	7	8	*46.7*
Ireland	129	84	*60.6*	Ukraine	3	1	*75.0*
Israel	298	198	*60.1*	United Kingdom	1,214	1,540	*44.1*
Italy	155	124	*55.6*	United States	2,854	9,370	*23.3*
Japan	28	24	*53.8*	Uruguay	0	1	*0.0*
Jordan	1	1	*50.0*	Vietnam	5	21	*19.2*

Panel B: Volume of deals (bn EUR) carried out in each country

ALL	**155.432**	**156.728**	***49.8***				
Australia	1.231	0.444	*73.5*	Lithuania	0.028	0.009	*75.3*
Austria	0.396	0.125	*76.0*	Luxembourg	0.962	0.002	*99.8*
Belgium	0.923	0.523	*63.9*	Malaysia	0.600	0.016	*97.3*
Brazil	1.454	1.031	*58.5*	Netherlands	3.211	0.346	*90.3*
Bulgaria	0.133	-	-	New Zealand	0.035	0.023	*60.5*
Canada	6.543	2.142	*75.3*	Nigeria	0.033	0.009	*78.2*
Chile	0.043	-	-	Norway	0.843	0.278	*75.2*
China	4.679	0.677	*87.4*	Phillippines	0.001		*100.0*
Czech Republic	0.013	-	-	Poland	0.043	0.010	*80.7*
Denmark	1.298	0.331	*79.7*	Portugal	0.416	0.056	*88.2*
Egypt	0.234	0.030	*88.6*	Russia	1.161	0.155	*88.2*
Estonia	0.004	0.004	*53.8*	Saudi Arabia	-	-	
Finland	0.849	0.129	*86.8*	Singapore	0.297	0.028	*91.4*
France	21.483	13.553	*61.3*	South Africa	0.691	0.392	*63.8*
Germany	8.499	2.693	*75.9*	Spain	5.586	4.472	*55.5*
Greece	-	0.573	-	Sweden	3.146	0.963	*76.6*
Hong Kong	0.564	0.004	*99.3*	Switzerland	1.637	0.204	*88.9*
Hungary	0.093	0.005	*95.1*	Thailand	0.029	-	-
India	5.515	0.550	*90.9*	Turkey	0.397	0.031	*92.8*
Ireland	0.940	0.252	*78.9*	Ukraine	0.085	0.022	*79.6*
Israel	3.200	1.405	*69.5*	United Kingdom	14.157	6.904	*67.2*
Italy	4.406	0.858	*83.7*	United States	53.578	117.193	*31.4*
Japan	5.856	0.235	*96.1*	Uruguay	-	0.001	-
Jordan	0.106	-	-	Vietnam	0.033	0.051	*39.0*

Table 1 – cont.

Panel C: Number of cross-border links

No. of bilateral cross-border links between VCs and portfolio companies for selected country pairs

	VC countries									
PC countries	Canada	China	France	Germany	Israel	Sweden	United Kingdom	United States	Other	Total
Canada		4	7	4	6	4	43	492	70	630
China	0		5	2	3	4	38	226	169	447
France	16	0		49	6	12	232	199	271	785
Germany	1	0	49		0	7	208	137	252	654
Israel	9	0	14	47		3	49	289	55	466
Sweden	2	0	14	9	1		89	45	150	310
United Kingdom	14	8	86	82	21	18		663	445	1,337
United States	515	28	226	397	508	125	923		1,543	4,265
Other	17	3	159	196	8	111	492	742	648	2,376
Total	574	43	560	786	553	284	2,074	2,793	3,603	

Table 2: Internationalization and syndication

This table depicts the aggregated internationalization and syndication patterns within the period 2000-2008. It shows the number and the fraction of different deal types (stand-alone domestic deals, syndicated domestic deals, stand-alone cross-border deals, syndicated foreign-domestic deals, deals syndicated among foreign VCs), their mean and median *volume*, mean and median *number of VCs* and *VC countries* per deal. Source: Zephyr.

	No. of domestic deals (all VCs are domestic) **15,879**		No. of cross-border deals (at least one foreign VC) **7,947**		
	Stand-alone **7,474**	Syndicated **8,405**	Stand-alone **2,779**	Syndicated 5,168	
				Syndicated with domestic VCs **4,523**	Syndicated among foreign VCs **645**
In %	*31.4*	*35.3*	*11.7*	*19.0*	*2.7*
Mean (median) deal volume, in mil. EUR	11	15	31	25	34
	(3)	(9)	(5)	(15)	(11)
NUMBER OF VCs					
Mean (median) number of VCs	1	3.2	1	4.3	2.7
	(1)	(3)	(1)	(4)	(2)
Mean (median) number of *foreign* VCs	0	0	1	1.6	2.7
	(0)	(0)	(1)	(1)	(2)
Mean (median) number of *domestic* VCs	1	3.2	0	2.7	0
	(1)	(3)	(0)	(2)	(0)
NUMBER OF COUNTRIES					
Mean (median) number of countries	1	1	1	2.5	1.9
	(1)	(1)	(1)	(2)	(2)

Table 3: Geographical distance

This table depicts the mean and median geographical distance between the (cross-border, domestic and closest) VC and the portfolio company for different deal types (stand-alone domestic deals, syndicated domestic deals, stand-alone cross-border deals, syndicated foreign-domestic deals, deals syndicated among foreign VCs) within the period 2000-2008. Source: Zephyr.

	No. of domestic deals (all VCs are domestic) **15,879**		No. of cross-border deals (at least one foreign VC) **7,947**		
	Stand-alone **7,474**	Syndicated **8,405**	Stand-alone **2,779**	Syndicated with domestic VCs **4,523**	Syndicated among foreign VCs **645**
GEOGRAPHICAL DISTANCE BETWEEN VC and PORTFOLIO COMPANY					
Mean (median) distance of the *foreign* VC in miles	-	-	2,724	2,774	2,702
			(1,205)	(3,272)	(2,431)
Mean (median) distance of the *domestic* VC in miles	487	727	-	741	-
	(79)	(251)		(207)	
Mean (median) distance of the *closest* VC in miles*	487	215	2,724	266	2,168
	(79)	(18)	(1,205)	(22)	(851)

** only for deals for which each VC's geographical location (latitude and longitude) is available*

Table 4: Institutional distance

This table depicts the percentage of links for all possible combinations of legal traditions in the VC country and the PC country within the period 2000-2008. Panel A includes all links, Panel B includes cross-border links only. Source: Zephyr and La Porta *et al.* (1998).

Percentage of links between legal traditions

Panel A – All links

	Legal tradition of the VC country					
	English	French	German	Scandinavian	Socialist	**ALL**
Legal tradition of the PC country						
English	73.8%	1.5%	3.4%	0.6%	0.1%	*79.5%*
French	1.5%	8.4%	0.5%	0.0%	0.0%	*10.4%*
German	0.8%	0.4%	3.5%	0.1%	0.0%	*4.8%*
Scandinavian	0.6%	0.1%	0.1%	3.0%	0.0%	*3.8%*
Socialist	0.8%	0.0%	0.1%	0.0%	0.5%	*1.4%*
ALL	*77.6%*	*10.5%*	*7.6%*	*3.7%*	*0.6%*	*100%*

Panel B – Cross-border links

	Legal tradition of the VC country					
	English	French	German	Scandinavian	Socialist	**ALL**
Legal tradition of the PC country						
English	38.6%	7.7%	17.0%	2.7%	0.6%	*66.5%*
French	7.7%	3.5%	2.4%	0.2%	0.0%	*13.8%*
German	4.2%	1.8%	2.0%	0.4%	0.0%	*8.4%*
Scandinavian	2.9%	0.7%	0.7%	1.9%	0.1%	*6.4%*
Socialist	3.9%	0.2%	0.5%	0.2%	0.1%	*4.8%*
ALL	*57.2%*	*13.9%*	*22.6%*	*5.5%*	*0.8%*	*100%*

Table 5: Repeated relationships

This table shows the number of syndicated deals and the fractions of these deals with and without repeated relationships in the first three lines. In the last three lines, it depicts the number of participating VCs in syndicated deals (each link between a VC and a portfolio company is counted once), the fraction of these VC – portfolio company links with and without repeated relationships with any of the other syndicate members. These figures are reported for all syndicates (1st column) and for different syndicate types: domestic syndicates (2nd column), syndicates between foreign and domestic VCs (3rd column), syndicates between foreign VCs (4th column). The table includes all syndicated deals within the period 2003-2008. Source: Zephyr.

	All syndicated deals	Deals syndicated between domestic VCs only	Deals syndicated between domestic and foreign VCs	Deals syndicated between foreign VCs only
Number of syndicated deals (2003-2008)*	**8,842**	**5,667**	**2,730**	**445**
… fraction of syndicated deals *with* repeated relationships	**59%**	56%	67%	41%
… fraction of syndicated deals *without* repeated relationships	**41%**	44%	33%	59%
Number of VCs participating in syndicated deals (2003-2008)**	**30,380**	17,610	11,597	1,173
… fraction of participating VCs *with* repeated relationships	**54%**	52%	58%	36%
… fraction of participating VCs *without* any repeated relationships	**46%**	48%	42%	64%

** each deal counts once*
*** each VC link to a portfolio company counts once*

Table 6: Distance between countries and bilateral cross-border transactions

This table reports the marginal effects (for the unconditional expected value) of left-censored Tobit estimations. Censoring value is 0. The sample includes 11,248 country-pair-years from the period 2001-2008. Panel A includes all transactions and is based on number and volume of cross-border transactions. Panel B refers to subsamples of deals syndicated between foreign and domestic VCs on the one hand and of stand-alone cross-border transactions on the other hand and is based on transaction volume only; the Chow test reveals whether the coefficient estimates from both subsamples are equal. The linear part of the model is as follows: $CB_{ijt} = \beta' x_{ijt} + u_{ijt}$, with either $x_{ijt} = (1,\ log\ distance_{ij},\ same\ law_{ij},\ D\_VCsize_{ijt-1},\ D\_growth_{ijt},\ D\_marketcap_{ijt-1},\ D\_VCindex_{ijt-1},\ D\_innov_{ijt-1},\ D\_GDPcap_{ijt-1},\ dummies)$ or with $x_{ijt} = (1,\ log\ distance_{ij},\ same\ law_{ij},\ VCsize_{it-1},\ VCsize_{jt-1},\ growth_{it},\ growth_{jt}\ marketcap_{it-1},\ marketcap_{jt-1},\ VCindex_{it-1},\ VCindex_{jt-1},\ innov_{it-1},\ innov_{jt-1},\ GDPcap_{it-1},\ GDPcap_{jt-1},\ dummies)$, with *i* indicating VC-country, *j* indicating PC country and *t* indicating time. Year, VC and PC country dummies are included. Marginal effects are evaluated at the sample means. For the variable *law* the marginal effects are calculated by changing the variable from 0 to 1. White-heteroscedasticity-consistent standard errors are given in parentheses below. ***, **, * denote significance at the 1, 5, and 10 percent level. For data definitions and sources see Appendix 2.

Panel A – All cross-border transactions	Number		Volume	
	CB_{ijt}	**CB_{ijt}**	**CB_{ijt}**	**CB_{ijt}**
log distance$_{ij}$	-0.1370***	-0.0999***	-0.1939***	-0.1890***
	(0.0164)	(0.015)	(0.0291)	(0.03)
same law$_{ij}$	0.5146***	0.2267***	0.4941***	0.2687***
	(0.0716)	(0.0435)	(0.0751)	(0.0513)
D_VCsize $_{ijt-1}$	0.0218**		0.0377**	
	(0.0086)		(0.0153)	
D_growth$_{ijt}$	0.0231***		0.0396***	
	(0.0084)		(0.0149)	
D_marketcap$_{ijt-1}$	-0.0365		-0.0364	
	(0.0224)		(0.0379)	
D_VCindex$_{ijt-1}$	-0.0036		-0.019	
	(0.0092)		(0.0189)	
D_innov$_{ijt-1}$	-0.0955*		-0.1924**	
	(0.0534)		(0.0919)	
D_GDPcap$_{ijt-1}$	-0.0833***		-0.1215***	
	(0.0239)		(0.0416)	
VCsize $_{jt-1}$		0.0164**		0.0354**
		(0.0069)		(0.0153)
VCsize $_{it-1}$		-0.0091		-0.0217
		(0.0067)		(0.0151)
growth$_{jt}$		0.0241***		0.0461***
		(0.0072)		(0.0157)
growth$_{it}$		-0.0014		-0.0131
		(0.0069)		(0.015)
marketcap$_{jt-1}$		0.0123		0.0409
		(0.017)		(0.0422)
marketcap$_{it-1}$		0.0684***		0.1186***
		(0.0198)		(0.0396)
VCindex$_{jt-1}$		-0.0056		-0.0329
		(0.0072)		(0.0214)
VCindex$_{it-1}$		0.0112		0.0192
		(0.0086)		(0.0189)
innov$_{jt-1}$		0.1881***		0.3824***
		(0.0397)		(0.0918)
innov$_{it-1}$		0.1238***		0.3035***
		(0.034)		(0.0748)
GDPcap$_{jt-1}$		0.0222		0.0576
		(0.0175)		(0.0433)
GDPcap$_{it-1}$		0.1765***		0.3211***
		(0.0271)		(0.06)
VC country dummies	yes	yes	yes	yes
PC country dummies	yes	yes	yes	yes
year dummies	yes	yes	yes	yes
χ^2	515.5321	549.3244	218.306	249.6016
Number of obs. (country-pair-years)	11,248	11,248	11,248	11,248

Table 6 – cont.

Panel B – Transactions syndicated between foreign and domestic VCs vs. stand-alone cross-border transactions

	Foreign-dom synd. **$CBDD_{ijt}$**	Stand-alone cb **CBA_{ijt}**	Chow-test	Foreign-dom synd. **$CBDD_{ijt}$**	Stand-alone cb **CBA_{ijt}**	Chow-test
log distance$_{ij}$	-0.0251***	-0.1999***	14.54***	-0.0207***	-0.1839***	18.23***
	(0.0036)	(0.0197)		(0.0032)	(0.0186)	
same law$_{ij}$	0.0787***	0.3926***	9.66***	0.0566***	0.2537***	6.53***
	(0.0137)	(0.0638)		(0.0109)	(0.0497)	
D_VCsize $_{ijt-1}$	0.0017	0.0250*	2.25			
	(0.0017)	(0.0139)				
D_growth$_{ijt}$	0.0166***	0.0656***	1			
	(0.0026)	(0.0142)				
D_marketcap$_{ijt-1}$	-0.0138***	-0.1048***	8.83***			
	(0.0029)	(0.0201)				
D_VCindex$_{ijt-1}$	-0.0107***	-0.0594***	2.92*			
	(0.0022)	(0.0154)				
D_innov$_{ijt-1}$	-0.0185***	-0.1035***	2.79*			
	(0.0039)	(0.0271)				
D_GDPcap$_{ijt-1}$	-0.0187***	-0.1383***	5.03**			
	(0.0044)	(0.0304)				
VCsize $_{jt-1}$				0.0013	0.0371	2.64
				(0.0026)	(0.0232)	
VCsize $_{it-1}$				-0.0031*	-0.0464***	7.63***
				(0.0016)	(0.0134)	
growth$_{jt}$				0.0058**	0.0363*	1.14
				(0.0028)	(0.0200)	
growth$_{it}$				-0.0140***	-0.0321**	0.46
				(0.0025)	(0.0138)	
marketcap$_{jt-1}$				0.0146**	0.0547	0.06
				(0.0068)	(0.0476)	
marketcap$_{it-1}$				0.0125***	0.0837***	7.00***
				(0.0026)	(0.0175)	
VCindex$_{jt-1}$				-0.0035	-0.0033	0.12
				(0.0032)	(0.0234)	
VCindex$_{it-1}$				0.0110***	0.0704***	4.78**
				(0.0022)	(0.0154)	
innov$_{jt-1}$				0.0454***	0.2563***	2.3
				(0.0127)	(0.0839)	
innov$_{it-1}$				0.0162**	0.0939***	3.62*
				(0.0034)	(0.0231)	
GDPcap$_{jt-1}$				-0.0000	0.0511	1.3
				(0.0066)	(0.0448)	
GDPcap$_{it-1}$				0.0182***	0.1977***	12.66***
				(0.0041)	(0.0300)	
VC country dummies	yes	yes		yes	yes	
PC country dummies	yes	yes		yes	yes	
year dummies	yes	yes		yes	yes	
χ^2	3,168.8005	2,180.1157		3,304.6155	2,328.6978	
Number of obs.	11,248	11,248		11,248	11,248	

Table 7: Distance between VCs and companies and the likelihood of VCs' participation

This table reports the coefficients and the marginal effects of conditional logit estimations for the dependent variable VC participation with deal fixed effects. The dependent variable equals one if the VC participates in the deal and zero otherwise. The models include one observation for each potential VC for each deal. *Log distance$_{IJ}$* refers to log (0.01+distance); *log VCdeals$_{IJ}$* refers to log (1+VCdeals$_{IJ}$). Interaction terms with these variables are based on these log values as well. Panel A reports the results for all possible cross-border deal – foreign VC combinations. Panel B restricts the potential foreign VCs to "first-time" VCs (i.e. VCs who invest in the country of the deal for the first time) only. Panel C includes all (cross-border and domestic) VC – and all (cross-border and domestic) deal combinations. Panel D considers all combinations of all (cross-border and domestic) VCs and all deals that are financed by a syndicate of two VCs. In the upper part of each Panel, we list the coefficients and indicate their standard errors in the parentheses below. The lower part of each Panel shows the marginal effects and their standard errors in parentheses below, evaluated at the sample means (if not indicated otherwise). For dummy variables, marginal effects are calculated by changing the variable from 0 to 1. Standard errors are given in parentheses below. ***, **, * denote significance at the 1, 5, and 10 percent level. For data definitions and sources see Appendix 2.

Panel A – All possible cross-border deal – foreign VC combinations				
Coefficients				
log distance$_{IJ}$	-0.3552***	-0.4241***	-0.3549***	-0.5107***
	(0.0300)	(0.0291)	(0.0298)	(0.0219)
same law$_{ij}$	0.6922***	0.6965***	0.6769***	0.6684***
	(0.0472)	(0.0474)	(0.0471)	(0.0470)
log VCdeals$_{IJ}$	1.0024***	1.2099***	0.8760***	0.8751***
	(0.0121)	(0.0611)	(0.0143)	(0.0143)
repeated$_{IJ}$			0.8885***	0.3925*
			(0.0533)	(0.2057)
distance$_{IJ}$ Xdomestic$_J$	-0.2242***		-0.2031***	
	(0.0338)		(0.0338)	
distance$_{IJ}$ XVCdeals$_{IJ}$		-0.0285***		
		(0.0082)		
distance$_{IJ}$ Xrepeated$_{IJ}$				0.0700**
				(0.0273)
VC country dummies	yes	yes	yes	yes
Marginal effects				
log distance$_{IJ}$	-0.0103***	-0.0135***	-0.0107***	-0.0081***
	(0.0011)	(0.0021)	(0.0012)	(0.0010)
...evaluated at domestic$_J$=0	*-0.0178****		*-0.01754****	
	(0.0023)		*(0.0023)*	
...evaluated at domestic$_J$=1	*-0.0056****		*-0.0062****	
	(0.0007)		*(0.0008)*	
same law$_{ij}$	0.0173***	0.0242***	0.0180***	0.0122***
	(0.0031)	(0.0057)	(0.0032)	(0.0023)
...evaluated at domestic$_J$=0	*0.0346****		*0.0334****	
	(0.0079)		*(0.0077)*	
...evaluated at domestic$_J$=1	*0.0067****		*0.0076****	
	(0.0013)		*(0.0014)*	
log VCdeals$_{IJ}$	0.0218***	0.0300***	0.0204***	0.0139***
	(0.0033)	(0.0063)	(0.0030)	(0.0023)
...evaluated at domestic$_J$=0	*0.0501****		*0.0432****	
	(0.0105)		*(0.0090)*	
...evaluated at domestic$_J$=1	*0.0097****		*0.0098****	
	(0.0016)		*(0.0017)*	
repeated$_{IJ}$			0.0312***	0.0231***
			(0.0053)	(0.0040)
...evaluated at domestic$_J$=0			*0.0362****	
			(0.0079)	
...evaluated at domestic$_J$=1			*0.0099****	
			(0.0018)	
domestic$_J$	-0.0430***		-0.0408***	
	(0.0115)		(0.0115)	
Pseudo R2	0.1897	0.1888	0.1963	0.1956
χ^2	7,714.6269	7,680.5767	7,985.5596	7,954.3679
Number of obs.	4,076,204	4,076,204	4,076,204	4,076,204

Table 7 – cont.

Panel B – All possible cross-border deal –"first-time" foreign VC combinations				
Coefficients				
log distance$_{IJ}$	-0.3391***	-0.4197***	-0.3408***	-0.5436***
	(0.0494)	(0.0393)	(0.0493)	(0.0347)
same law$_{ij}$	0.6745***	0.6643***	0.6664***	0.6493***
	(0.0778)	(0.0773)	(0.0780)	(0.0773)
log VCdeals$_{IJ}$	0.5520***	1.5890***	0.4834***	0.4833***
	(0.0256)	(0.1318)	(0.0270)	(0.0270)
repeated$_{IJ}$			1.1549***	1.8102***
			(0.1203)	(0.5466)
distance$_{IJ}$ Xdomestic$_J$	-0.3714***		-0.3642***	
	(0.0567)		(0.0567)	
distance$_{IJ}$ XVCdeals$_{IJ}$		-0.1406***		
		(0.0177)		
distance$_{IJ}$ Xrepeated$_{IJ}$				-0.0894
				(0.0750)
VC country dummies	yes	yes	yes	yes
Marginal effects				
log distance$_{IJ}$	-0.0064***	-0.0118***	-0.0063***	-0.0050***
	(0.0013)	(0.0027)	(0.0013)	(0.0010)
...evaluated at domestic$_J$=0	*-0.0141****		*-0.0138****	
	(0.0029)		*(0.0029)*	
...evaluated at domestic$_J$=1	*-0.0019****		*-0.0019****	
	(0.0005)		*(0.0005)*	
same law$_{ij}$	0.0100***	0.0174***	0.0098***	0.0069***
	(0.0033)	(0.0059)	(0.0033)	(0.0022)
...evaluated at domestic$_J$=0	*0.0281****		*0.0270***	
	(0.0110)		*(0.0110)*	
...evaluated at domestic$_J$=1	*0.0018****		*0.0018****	
	(0.0006)		*(0.0006)*	
log VCdeals$_{IJ}$	0.0071***	0.0118***	0.0061***	0.0044***
	(0.0019)	(0.0034)	(0.0017)	(0.0012)
...evaluated at domestic$_J$=0	*0.0230****		*0.0196****	
	(0.0080)		*(0.0068)*	
...evaluated at domestic$_J$=1	*0.0014****		*0.0013****	
	(0.0005)		*(0.0004)*	
repeated$_{IJ}$			0.0263***	0.0182***
			(0.0082)	(0.0056)
...evaluated at domestic$_J$=0			*0.0389****	
			(0.0141)	
...evaluated at domestic$_J$=1			*0.0031****	
			(0.0010)	
domestic$_J$	-0.0410***		-0.0396***	
	0.0157		(0.0152)	
Pseudo R2	0.0635	0.0646	0.0687	0.0659
χ^2	953.2791	969.611	1,030.8797	989.0577
Number of obs.	1,615,153	1,615,153	1,615,153	1,615,153

Table 7 – cont.

Panel C – All possible deal – VC combinations				
Coefficients				
log distance$_{IJ}$	-0.2996***	-0.2898***	-0.2997***	-0.2904***
	(0.0062)	(0.0048)	(0.0062)	(0.0048)
same law$_{ij}$	0.7825***	0.7842***	0.7875***	0.8015***
	(0.0404)	(0.0403)	(0.0436)	(0.0436)
log VCdeals$_{IJ}$	0.7705***	0.7402***	0.7705***	0.7402***
	(0.0117)	(0.0065)	(0.0117)	(0.0065)
repeated$_{IJ}$		0.3517***		0.3506***
		(0.0407)		(0.0407)
distance$_{IJ}$ XVCdeals$_{IJ}$	0.0204***		0.0204***	
	(0.0020)		(0.0020)	
distance$_{IJ}$ Xrepeated$_{IJ}$		0.1213***		0.1215***
		(0.0065)		(0.0065)
cbVC$_{IJ}$	-2.1495***	-1.9993***		
	(0.0359)	(0.0361)		
bordercbVC$_{IJ}$			-2.1587***	-2.0307***
			(0.0472)	(0.0473)
noborderbVC$_{IJ}$			-2.1426***	-1.9756***
			(0.0423)	(0.0426)
VC country dummies	yes	yes	yes	yes
Marginal effects				
log distance$_{IJ}$	-0.0049***	-0.0058***	-0.0049***	-0.0059***
	(0.0003)	(0.0004)	(0.0004)	(0.0004)
same law$_{ij}$	0.0137***	0.0163***	0.0139***	0.0170***
	(0.0015)	(0.0017)	(0.0016)	(0.0019)
log VCdeals$_{IJ}$	0.0093***	0.0150***	0.0158***	0.0153***
	(0.0070)	(0.0010)	(0.0012)	(0.0011)
repeated$_{IJ}$		0.0462***		0.0472***
		(0.0033)		(0.0035)
cbVC$_{IJ}$	-0.0709***	-0.0735***		
	(0.0044)	(0.0041)		
bordercbVC$_{IJ}$			-0.0180***	-0.0211***
			(0.0014)	(0.0015)
noborderbVC$_{IJ}$			-0.0615***	-0.0645***
			(0.0039)	(0.0037)
Pseudo R2	0.2475	0.2574	0.2475	0.2574
χ^2	52,311.78	54,405.08	52,273.21	54,353.74
Number of obs.	18,441,984	18,441,984	18,441,984	18,441,984

Table 7 – cont.

Panel D – All possible two-syndicate deal – VC combinations				
Coefficients				
log distance$_{IJ}$	-0.3008***	-0.2911***	-0.3013***	-0.2920***
	(0.0150)	(0.0114)	(0.0150)	(0.0114)
same law$_{ij}$	1.4092***	1.3979***	1.4322***	1.4289***
	(0.1138)	(0.1138)	(0.1208)	(0.1208)
log VCdeals$_{IJ}$	0.7778***	0.7722***	0.7779***	0.7722***
	(0.0261)	(0.0156)	(0.0261)	(0.0156)
repeated$_{IJ}$		0.1770*		0.1753*
		(0.0971)		(0.0971)
distance$_{IJ}$ Xrepeated$_{IJ}$		0.0746***		0.0751***
		(0.0169)		(0.0169)
cbVC$_{IJ}$	-2.1040***	-2.0404***		
	(0.0899)	(0.0904)		
bordercbVC$_{IJ}$			-2.1517***	-2.1038***
			(0.1247)	(0.1249)
noborderbVC$_{IJ}$			-2.0736***	-1.9991***
			(0.1045)	(0.1052)
VC country dummies	yes	yes	yes	yes
Marginal effects				
log distance$_{IJ}$	-0.0115***	-0.0125***	-0.0119***	-0.0130***
	(0.0021)	(0.0021)	(0.0022)	(0.0023)
same law$_{ij}$	0.0596***	0.0645***	0.0624***	0.0685***
	(0.0143)	(0.0149)	(0.0157)	(0.0165)
log VCdeals$_{IJ}$	0.0207***	0.0332***	0.0349***	0.0345***
	(0.0042)	(0.0059)	(0.0066)	(0.0063)
repeated$_{IJ}$		0.0431***		0.0045***
		(0.0090)		(0.0096)
cbVC$_{IJ}$	-0.1471***	-0.1515***		
	(0.0226)	(0.0215)		
bordercbVC$_{IJ}$			-0.0428***	-0.0469***
			(0.0086)	(0.0088)
noborderbVC$_{IJ}$			-0.1309***	-0.1354***
			(0.0207)	(0.0197)
Pseudo R2	0.2728	0.2753	0.2728	0.2753
χ^2	9,405.8129	9,491.283	9,406.1278	9,491.8474
Number of obs.	3,525,844	3,525,844	3,525,844	3,525,844

Figure 1: Domestic and cross-border (intra-continental and inter-continental) VC – portfolio company links

This figure depicts the number of domestic, cross-border intra-continental and cross-border inter-continental VC – portfolio company links within the period 2000-2008, aggregated by continents. Links refer to each connection between a VC and a portfolio company. Source: Zephyr.

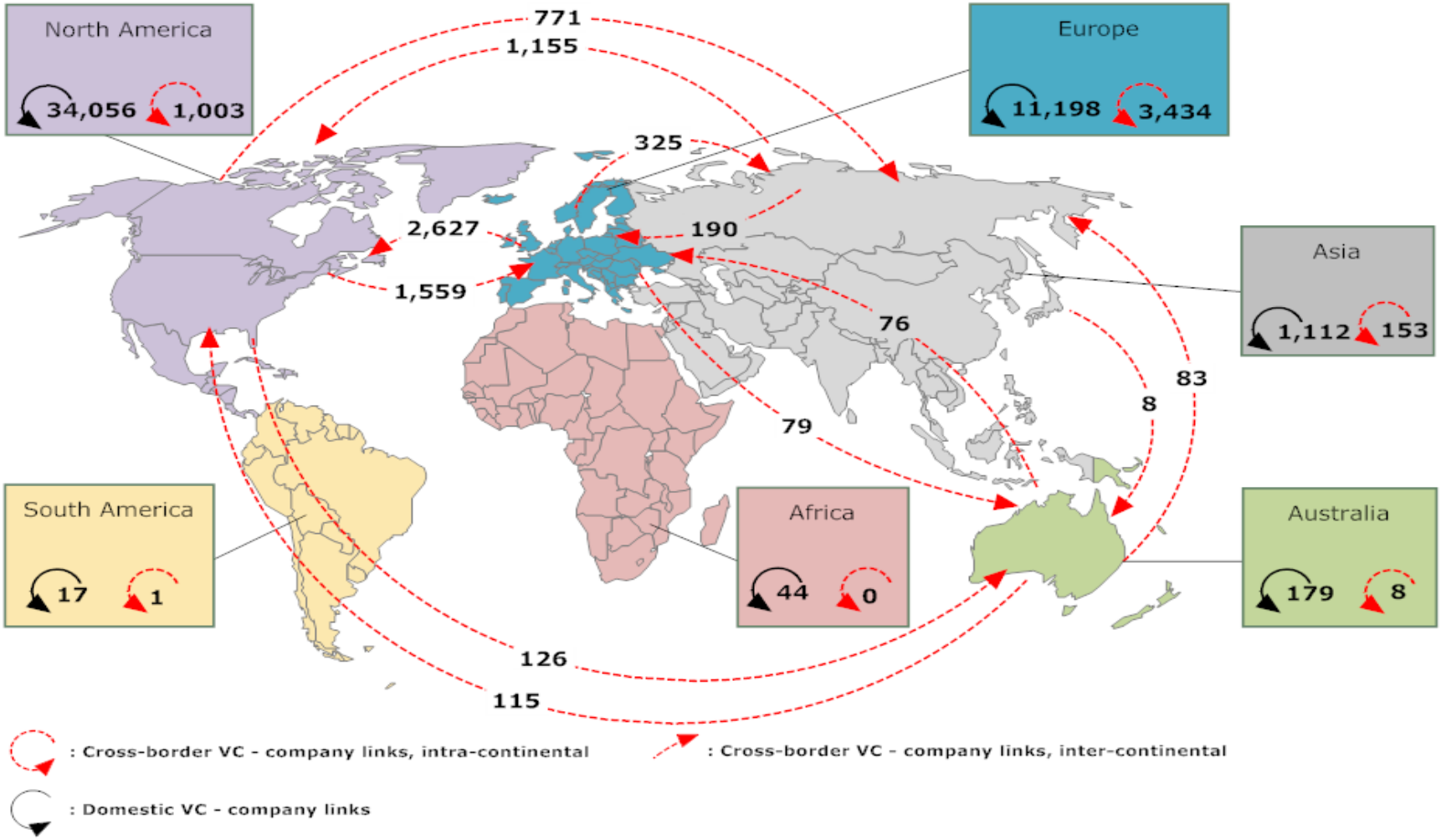


Figure 2: Domestic and cross-border (intra-continental and inter-continental) links between VCs

This figure depicts the number of domestic, cross-border intra-continental and cross-border inter-continental links between VCs and the syndicates' internationalization within the period 2000-2008, aggregated by continents. VC links refer to each connection between a VC pair. Internationalization share reflects the fraction of syndicates in which at least one foreign VC participates. Source: Zephyr.

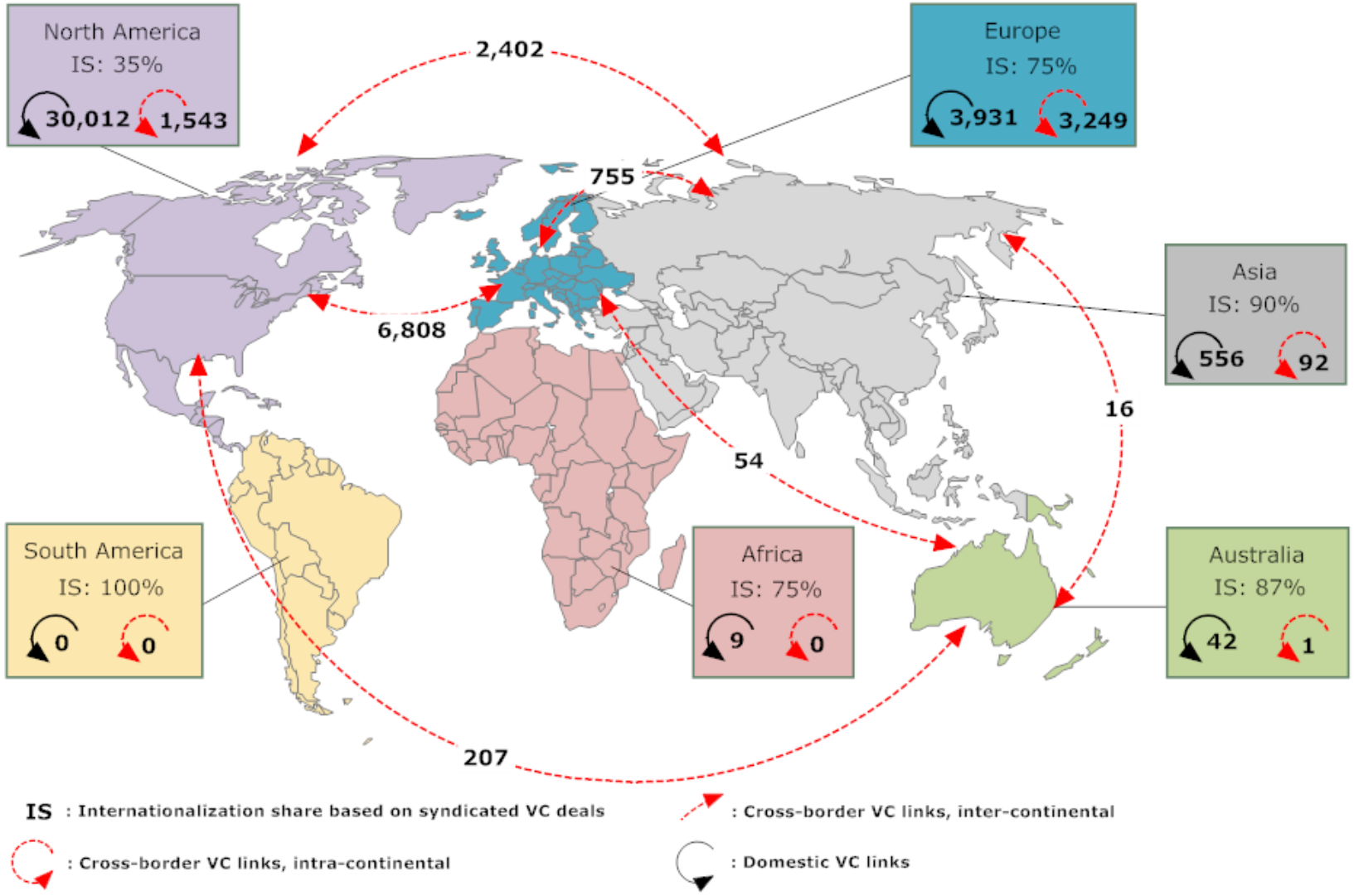


Figure 3: Predicted probability of the VC's participation with and without repeated relationships

This figure shows the predicted probability of a (potential) VC's participation in a deal with and without repeated relationship between this VC and one of the participating VCs at different distance deciles. Other variables are evaluated at their means. The results are based on the conditional logit estimations with deal fixed effects from the fourth specification in Table 7. The sample includes 4,076,204 potential VC-deal combinations from the period 2003-2008. The models include one observation for each potential foreign VC for each cross-border deal. For data definitions and sources see Appendix 2.

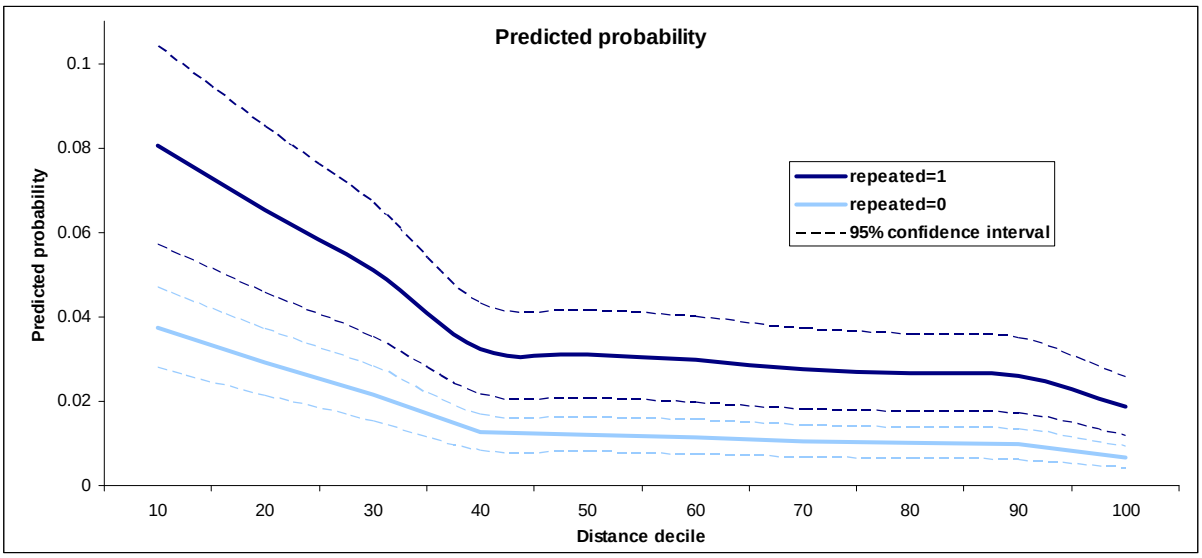
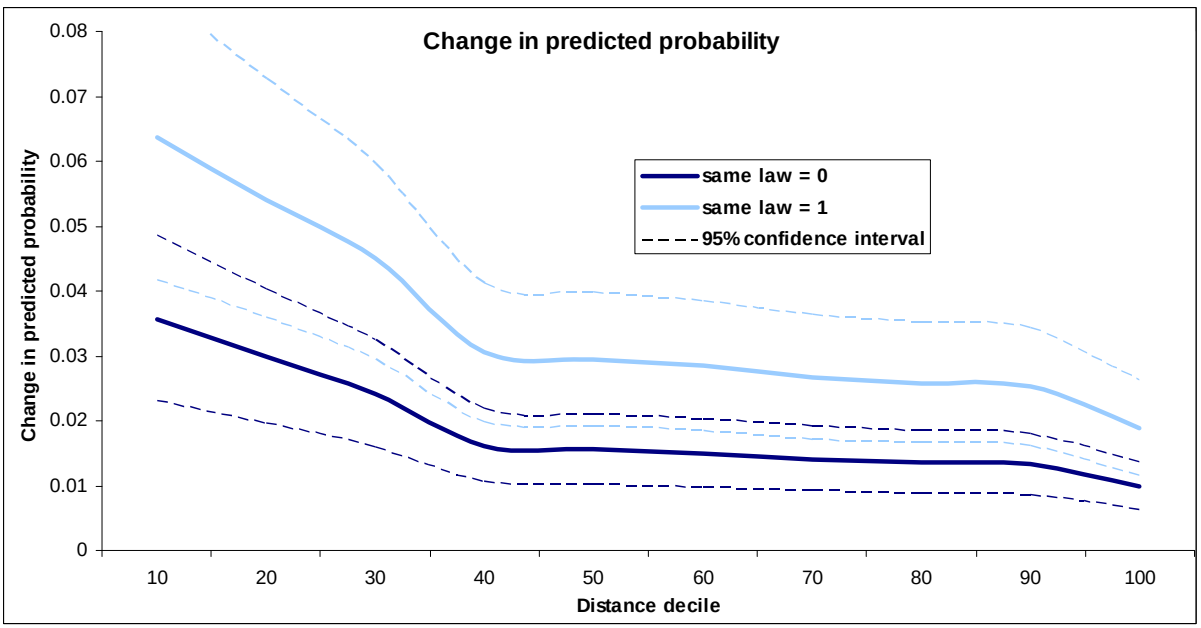


Figure 4: Marginal effect of repeated relationships with same and with different legal traditions

This figure shows the *change* in the predicted probability of a (potential) VC's participation in a deal following a switch from no repeated relationships to repeated relationships at different distance deciles. We evaluate it in terms of a situation in which both countries share the same legal tradition (same law = 1) and in another situation in which the countries differ in their legal traditions (same law = 0). Other variables are evaluated at their means. The results are based on the conditional logit estimations with deal fixed effects from the fourth specification in Table 7. The sample includes 4,076,204 potential VC-deal combinations from the period 2003-2008. The models include one observation for each potential foreign VC for each cross-border deal. For data definitions and sources see Appendix 2.



Appendix 1: Information about the Zephyr database

We use data on worldwide venture capital deals from Bureau van Dijk's Zephyr database, which offers information on mergers and acquisitions, initial public offerings, as well as private equity and venture capital deals. Researchers working in the field of venture capital and private equity (e.g., Goossens *et al.* 2008, Abdesselam *et al.* 2008, Grimpe and Hussinger 2009, Bloom *et al.* 2008, Brav *et al.* 2009, Beuselinck *et al.* 2008, Prijcker *et al.* 2009) have become aware of the existence of this database in recent times. For the purposes of this paper, we collected information on worldwide venture capital deals from the period 2000-2008, in particular on the geographical locations of the venture capitalists (VCs) and their portfolio companies (country of origin, city, zip code). We have identified venture capital deals from the Zephyr database using multiple criteria. In the first step, we searched the database for deals financed by one of the following: venture capital, private equity, angel investment, corporate venturing, or seed financing. In the second step, we considered only minority deals from this dataset. In the third step, we analyzed the business description of the investors and only retained investors whose business description included "venture capital." Fourth, we only kept non-financial companies as target portfolio companies in our sample. Fifth, we excluded corporations and governments as VCs.

The nature of this dataset has raised the need for intensive reorganization. We will describe the main steps in the next few paragraphs.

We filled in missing company (VC) information from other deals whenever the company (VC) identification number was identical. Moreover, we split deals with multiple portfolio companies into separate observations and deleted all deals with missing investor names and countries and/or company and country names, as well as deals recorded for "wealthy individuals", "institutional investors" or other non-identifiable investors (without an identification number). We also excluded all deals in which the company and its investor were identical and in which no third party was involved. We started with 38,125 total (i.e. domestic and cross-border) venture capital deals. After applying the criteria described above, the number of deals in our final dataset dropped to 23,826.

The next step required more sophistication, as we moved closer to the core of the organizational structure of the VCs. In some cases, the identity of the VC in Zephyr was indicated at the level of the venture capital fund, in other cases at the level of the venture capital company. In addition, the parent company was sometimes specified as investor, whereas in other cases it was the subsidiary. To achieve a consistent pattern, we collected data at the "highest" level, using the information on ultimate parent companies offered by Zephyr. In order to be classified as a venture capital investor for our analysis, either the subsidiary or the parent company had to be a venture capital investor. However, a noteworthy characteristic of the dataset was that parent company information in Zephyr was updated regularly, so that – relying only on the information indicated in the field "parent company" – we were not able to trace back changes in the organizational structure. What is the drawback of this feature?

Let investor A take over a share in target Z on January 1st 2004. If a different enterprise B took over investor A on January 1st 2003, we would have attributed the above-mentioned transaction to B, because B became A's parent before the transaction was conducted. However, if B took over A on January 1st 2005, the above-indicated transaction was carried out by A, because at the date of the transaction, A and B were independent. However – using the parent information offered by Zephyr – we would have falsely assigned this transaction to B since B was indicated as A's parent. To correct this "mistake", we checked whether our investors (within the Zephyr database) had been acquired or merged during the period under observation. All transactions before a potential acquisition or merger date (in the latter example: January 1st 2005) were then assigned to the original investor, all transactions after this date to its parent company.

To sum up, all venture capital funds and subsidiaries were aggregated to their parent company and inherited the characteristics of the parent company (i.e. geographic location, previous relationships, number of deals). Acquired venture capital firms were aggregated to their acquirers at the effective date of the merger. In addition, acquiring venture capital firms inherited the accumulated VC deals and the previous relationships of the acquired firm.

Given the lack of systematic research into venture capital financing outside the US, we are limited in our ability to calibrate the completeness of the *Zephyr* database. Nonetheless, we can assess its completeness by comparing it with the data in other studies and in other databases. In the Zephyr database, we count 38,125 domestic and cross-border venture capital deals in the period 2000-2008. The most recent paper by Lerner *et al.* (2009) is based on the *Capital IQ* database and includes 45,207 venture capital and growth capital deals worldwide from 1984 through to September 2008. Unfortunately, the paper does not provide information on the number of deals within the period 2000-2008, so that it is not directly comparable to our sample. The most widely used database in venture capital research, the *Thomson VentureXpert* database, covers 38,515 companies when searching for worldwide targets involved in venture-related deals in the period 2000-2008. Zephyr's significant advantage is that it offers better information on deal volume than Thomson. For our purposes, we are very much convinced that this advantage outweighs the slightly worse coverage.

Appendix 2: Data description and sources

Dependent variables (based on Zephyr data)

Bilateral-country level:

CB_{ijt} number or volume of bilateral cross-border venture capital links from the venture capitalist's country *i* to the portfolio company country *j* in year *t* calculated from individual deal data, normalized by the logarithm of the GDP product of both countries. If deals are syndicated among several VCs from different countries, then the deal volume is divided equally among these VCs, since we only have information on the total deal volume.

$CBDD_{ijt}$ subsample of CB_{ijt} that includes only those transactions that are syndicated between foreign and domestic VCs.

CBA_{ijt} subsample of CB_{ijt} that includes only stand-alone transactions.

Individual transaction level:

p_{IJ} likelihood of *I*'s participation in transaction *J*. Takes the value one if venture capitalist *I* participates in transaction *J*, and zero otherwise.

Explanatory and control variables

Bilateral-country level:

$distance_{ij}$ distance between the main city of the portfolio company country *j* and the venture capitalist's country *i* in miles. In most cases (except Australia, Brazil, Canada, Germany, and the United States), the main city is the capital of the country (*source: www.cepii.fr*).

same law_{ij} dummy variable equal to one if countries *i* and *j* have the same legal tradition based on French, German, British, Scandinavian or socialist law; zero otherwise (*source: La Porta et al. 1998*).

$growth_{it}$ *i*'s country expected real GDP growth rate in year *t* (in percent) for the next 3-5 years (*source: Datastream*).

$marketcap_{it}$ *i*'s country stock market capitalization, normalized by GDP in year *t* (*source: Worldbank*).

$GDPcap_{it}$ *i*'s country GDP per capita in year *t*, in th. USD at purchasing power parity (*source: IMD World Competitiveness Yearbook*).

$innov_{it}$ *i*'s country business R&D expenditures, normalized by GDP in year *t* (*source: IMD World Competitiveness Yearbook*).

$VCindex_{it}$ *i*'s country venture capital index in year *t*, higher value is better (*source: IMD World Competitiveness Yearbook*).

$VCsize_{it}$ *i*'s country number of domestic VCs with at least one domestic deal in year *t* (*source: Zephyr*) normalized by GDP in year *t*.

D_X_{ijt} *difference in variable X between the portfolio company country j and the VC country i in t.*

D_X_{ijt-1} *one-year lagged difference in X between the portfolio company country j and the VC country i.*

Individual transaction level (calculated from Zephyr data):

$distance_{IJ}$ distance between the venture capitalist *I* and the company *J* in miles.

$VCdeals_{IJ}$ number of transactions carried out by the venture capitalist *I* during a three-year period preceding the investment in company *J*.

$repeated_{IJ}$ dummy variable equal to one if venture capitalist *I* invested together with any of the venture capitalists participating in company *J* before the transaction date, zero otherwise.

$domestic_{J}$ dummy variable equal to one if a domestic venture capitalist participates in the cross-border deal *J*.

$cbVC_{IJ}$ dummy variable equal to one if venture capitalist *I* is from a different country than company *J*, zero otherwise.

$bordercbVC_{IJ}$ dummy variable equal to one if venture capitalist *I* is from a country that has a common border with the country of the company *J*, zero otherwise.

$nobordercbVC_{IJ}$ dummy variable equal to one if venture capitalist *I* is from a different country than company *J* and both countries do not share a common border.

Executive Summary

Venture capitalists fulfill an important intermediary function. They collect funds from institutional investors, who provide these funds for a pre-specified number of years in exchange for an appropriate promised return, and they invest these funds in opaque risky ventures. Venture capitalists are very actively involved in the pre-investment screening, management and monitoring of their ventures. They collect and evaluate hardly available information on these companies and their management, which gives rise to information asymmetries between venture capitalists and their portfolio companies and to incentive problems. To mitigate these problems, venture capitalists make use of complex and sophisticated contractual forms. The contract design plays a crucial role for the success of venture capital investments.

Within this business model, venture capitalists profit from geographical and institutional proximity to their portfolio companies since the information asymmetries are often much harder to resolve when the portfolio company is located far from the venture capitalist's home country and when both countries have different institutional setting. The *geographical* proximity is helpful because physical distance increases venture capitalists' information costs. It is less costly to find and to screen close investment opportunities than distant ones. Moreover, it is easier to manage and to monitor close companies than distant ones. The reason for this is that closely located venture capitalists are familiar with local practices and the market situation, have regional business experience and access to information through the interactions of their managers in social, civic and business meetings and their participation in formal as well as in informal networks. Moreover, travel costs play a non-negligible role for venture capitalists because their investments require onsite evaluation and face-to-face meetings with the companies both before and after the funding decision has been made.

The *institutional* proximity also matters since similar institutions in the country of the portfolio company make it easier for venture capitalists to transfer and enforce the contractual mechanisms they use in their home country to their foreign portfolio companies. The design of venture capital contracts is strongly influenced by the country's legal traditions. If the foreign country has the same legal traditions as the venture capitalist country, the venture capitalist's contract costs will decrease and its willingness to invest in portfolio companies located in this country will increase. In conjunction with geographical proximity, institutional proximity provides thus an alternative means of reducing information asymmetry, monitoring and contract costs.

Our data strongly support the importance of geographical and institutional proximity for venture capital investments. Venture capitalists invest primarily in companies located in their home country, which are geographically and institutionally proximate. Two thirds of all worldwide venture capital transactions are domestic transactions. However, there is a non-negligible fraction of cross-border transactions, even at long geographical and institutional distance. Furthermore, the internationalization is by far not only an issue for a handful of large global investors. More than 30% of all venture capitalists worldwide invest abroad. Moreover, as the world economy becomes increasingly

integrated, cross-border venture capital investments are likely to become even more important in the future. Understanding the patterns, motivations and obstacles for cross-border venture capital flows is consequently an important but understudied topic, which is highly relevant for practitioners. In our paper, we place particular focus on the question of how geographical and institutional distance to potential target companies influence venture capitalist decisions on where to invest the entrusted capital. Our results suggest that venture capital flows are much larger between countries that are geographically and institutionally close to each other than between distant countries. These findings indicate that information asymmetry, monitoring and contract costs faced by foreign venture capitalists are important.

We continue by taking into account that more than 65 percent of all cross-border deals are made up of several venture capitalists collaborating with each other. A prevalent pattern in such syndicated cross-border investments is the joint participation of a foreign venture capitalist and a domestic venture capitalist from the portfolio company's country; it emerges that a domestic venture capitalist is a foreign venture capitalist's partner in a remarkable 88 percent of all syndicated cross-border deals. A cooperation between foreign and domestic venture capitalists may yield several advantages. While foreign venture capitalists may help implement the company's internationalization strategy, domestic venture capitalists may contribute to a reduction in the transaction costs, which arise from long distances, since they are placed in the vicinity of the company, have a superior knowledge of the local market, the technology and legal environment, and possess beneficial linguistic skills and valuable contacts. Our results suggest that geographical and institutional distance between countries has a less deterrent impact on the foreign venture capitalist if a domestic venture capitalist is involved in the deal. Forming syndicates with domestic partners – a widely observed phenomenon within venture capital industries – may help overcome the complexity of investing in geographically and institutionally distant regions and enable foreign venture capitalists to better diversify their portfolios and exploit return differentials across countries.

However, syndication is a multifaceted process involving new costs. As an example, the domestic venture capitalist, who possesses more information about the deal, may be inclined to take a less informed foreigner on board only for low quality deals. Moreover, finding appropriate partners abroad might be much more difficult than finding partners at home. Our results indicate that syndication is easier when it is based on experience from joint syndicates in the past, i.e. on a repeated relationship. Repeated relationships are frequently observed in venture capital investments. In our sample, 59% of all syndicated deals are based on repeated relationships.