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Do networks of financial intermediaries help reduce local bias? Evidence from cross-border venture capital exits

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Abstract

Contributing to the literature on local bias and financial networks, we examine how direct and indirect network ties of financial intermediaries mitigate the effects of distance and preference for local investments. In our analysis of cross-border venture capital exits, we find that proximity within networks facilitates cross-border transactions, which suggests that network distance is an important dimension of distance in addition to its geographical and cultural dimensions. The results also suggest that network distance affects the reach and quality of mediated information: indirect ties to partners' partners, with their broad reach, facilitate the identification of investment opportunities, whereas direct ties, which have certification effects, facilitate quality assessment.

1. Introduction

The observation that not all investors are equal in acquiring the information that they require to make informed investment decisions has long been present in the financial literature. The basic problems related to the identification of investment opportunities (Merton 1987, Stigler 1961) and the evaluation of their quality (Akerlof 1970, Megginson and Weiss 1991) affect investors differently, resulting in demonstrated effects such as bias towards local investments and market segmentation. Although the variation in information endowments has mostly been examined in relation to investor-specific factors such as geographical location, resources, and search costs, the recently recognized role of networks in the financial markets suggests that investors are also affected by their relative positioning in interorganizational or interpersonal networks.

Focusing on cross-border venture capital exits as our focal phenomenon, we examine the effect of network distance on information distribution in financial markets by combining the well-documented bias of investors towards local investment targets (Coval and Moskowitz 1999)[1] with insights from the emergent literature on financial networks (Hochberg et al. 2007, Kogut et al. 2007). More specifically, we examine whether network distance affects the distribution and acquisition of information in financial markets in the way that geographical

[1] This preference is illustrated, for example, by investors' tendency to overemphasize domestic stocks in their portfolios (Ahearne et al. 2004, Cooper and Kaplanis 1994, French and Poterba 1991, Tesar and Werner 1995), to invest in geographically close markets (Portes and Rey 2005) and to use local exchanges for trading (Tse 1999). Earlier research has identified two main sources of this bias. First, the 'home bias' literature focuses on investment barriers between national markets, such as governance practices and investor protection (Dahlquist et al. 2003, Doidge et al. 2004), political risks (Stulz 2005), restrictions on capital controls (Chan et al. 2005), and taxes (Chan et al. 2005). However, many studies find that barriers to investment only partially explain the bias (e.g. Cooper and Kaplanis 1994). Consequently, the second stream, the 'local bias' literature, has focused on information concerns among local and non-local investors (Coval and Moskowitz 1999, 2001, Grinblatt and Keloharju 2001, Ivkovic and Weisbenner 2005). Short distances (Degryse and Ongena 2005, Lerner 1995) and shared language and culture between investors and investment targets (Chan et al. 2005, Grinblatt and Keloharju 2001, Hau 2001, Sarkissian and Schill 2004) have been found to facilitate greater familiarity with investment targets (Coval and Moskowitz 1999, Dvorak 2005, Huberman 2001). For reviews of the topic, see Lewis (1999) and Karolyi and Stulz (2003).

(Degryse and Ongena 2005, Lerner 1995) and cultural distance (Chan et al. 2005, Grinblatt and Keloharju 2001, Guiso et al. 2009, Hau 2001, Sarkissian and Schill 2004) do. To test this proposition, we examine how network distance in terms of the direct and indirect network ties of financial intermediaries mitigates identification and evaluation problems in international venture capital markets, in which the effects of imperfect information may be expected to be particularly pronounced.

By analyzing the effects of network distance on the likelihood of cross-border exits and exits to particular foreign markets using a sample of 4,216 European venture capital-backed companies, we observe that network proximity between the investor and the target company facilitates information acquisition through networks of financial intermediaries and attracts investments from otherwise geographically and culturally distant investors. We measure a venture's network distance to non-domestic markets and focus on first-order, direct ties and second-order, indirect ties in the VC investor network that connect the venture to non-domestic markets. We also observe that the likelihood of non-domestic IPOs is associated only with direct network ties, which suggests that the quality of the information mediated through ties deteriorates with increasing network distance. Our results indicate that network ties provide a mechanism for information distribution and that network distance affects information distribution: indirect, second-order ties to partners' partners have a broad reach, thus alleviating the identification problem, whereas direct, first-order ties also provide the certification effects that alleviate the quality evaluation problem.

The main implication of these results is that information distributed by network ties mitigates the effects of the preference for proximity: the likelihood of investment increases with respect to network proximity. By explicitly addressing network distance, the results contribute to

the current research, which has mainly examined networks using proxies such as geographical distance (e.g. Hau 2001), group membership (e.g. Duflo and Saez 2002, Hong et al. 2004), and shared location (e.g. Hong et al. 2005, Kelly and Ó Grada 2000) and which thus has not provided information regarding the actual structure of the ties. Furthermore, the few studies that explicitly address the actual ties between investors have not considered how network ties interact with and complement the often-coinciding effects of geographical and cultural distance. These studies focus solely on the direct ties of the intermediaries (Garmaise and Moskowitz 2003, Sorenson and Stuart 2001, Uzzi 1999), do not consider the effects of geographical or cultural distance (Shane and Cable 2002), or focus solely on network-level aspects such as the centrality of an intermediary in a network (Hochberg et al. 2007, Sorenson and Stuart 2001). In addition, rather than investigating how local bias affects the composition of an investor's portfolio (Cumming and Dai 2010, Sorenson and Stuart 2001), we analyze how network ties to financial intermediaries in a venture can enhance opportunities to find new, distant investors. By addressing network distance alongside other forms of distance, we generate results that indicate that the bias toward the local should be assessed in terms of network distance in addition to geographical and cultural dimensions.

The rest of the paper is structured as follows. Section 2 introduces the theoretical argument and develops the hypotheses. Section 3 presents the empirical setting, the sample, and the methods used. Section 4 presents our results concerning the effects of network ties on non-domestic exits. Section 5 concludes the paper.

2. Investor networks and local bias

2.1. Non-domestic investor ties and cross-border venture capital exits

From the perspective of firms seeking financing, investors' preference for investing in local targets is problematic. The lack of information regarding distant investment opportunities may lead either to total ignorance of investment opportunities or to reduced confidence in the completeness and trustworthiness of the information on the investment target (Hirshleifer 2001, Huberman 2001). This phenomenon creates information asymmetry between local and non-local investors (Brennan and Cao 1997, Brennan et al. 2005, Coval and Moskowitz 1999, Portes and Rey 2005), effectively restricting the set of investment targets that investors are both aware of and confident enough to consider as potential investments. Consequently, this effect reduces firms' opportunities to receive financing from non-local investors, thereby limiting the potential investor pool to those close to the investment.

To become recognized and evaluated as potential investment targets by investors outside the local context,[2] firms seeking financing must increase their visibility in general or otherwise facilitate the transmission of information to potential investors.[3] This increased visibility should be interpreted not strictly as visibility in a given medium or a marketplace but rather as an opportunity for investors to receive information about a firm through any given channel. Indeed, earlier research has demonstrated the connections of the investor to be one such channel for information acquisition (Agnes 2000, Garmaise and Moskowitz 2003, Hochberg et al. 2007, Hong et al. 2004, 2005, Sorenson and Stuart 2001). Evidence from research on group

[2] Here, a 'local' investor is defined as an investor who resides within the same region or nation (Coval and Moskowitz 1999, French and Poterba 1991), has the same cultural background (Grinblatt and Keloharju 2001), or belongs to the same social group (Hong et al. 2004) as the venture.

[3] Accordingly, when non-local investors do invest, they tend to prefer investments with higher visibility, such as investments in larger firms (Coval and Moskowitz 1999, Kang and Stulz 1997), in firms that have more exports (Dahlquist and Robertsson 2001), and in firms that have opened their financial instruments to trading in non-local markets (Foerster and Karolyi 1999).

membership (Duflo and Saez 2002, Hong et al. 2004), the effects of shared location (e.g. Hong et al. 2005, Kelly and Ó Grada 2000), and the centrality of an intermediary in an industry network (Hochberg et al. 2007, Sorenson and Stuart 2001) has demonstrated that investors' social ties affect their opportunities to receive information on potential targets and thereby influence their investment choices (Gompers and Xuan 2009, Shane and Cable 2002). Therefore, it would appear that networks of financial intermediaries and investors (Garmaise and Moskowitz 2003, Hochberg et al. 2007, Huang et al. 2008, Pollock et al. 2004) provide a channel for information distribution.

However, what is unclear is the extent to which these networks of intermediaries and investors are able to bridge geographical and cultural distances. That is, does closeness in networks compensate for distance between locations? To examine the effects of network distance on information distribution relative to those of geographical and cultural distance, we examine the network distance between targets and investors from different national markets. To measure the distance between targets and investors in networks, we draw from network analysis and use geodesic distance, a measure that indicates the shortest path between two nodes in a network (Freeman 1978). Nodes that are directly connected have a geodesic length, or distance, of one, whereas a network distance of two indicates that two nodes have no direct connection to each other but are connected through a shared tie. Accordingly, a firm and a non-domestic market have a network distance of one if the firm and the market are directly connected and have a network distance of two if they have no direct connection but are linked through one or more shared ties. In a similar vein, a network distance of three would imply that the two nodes share no common ties and that information must flow through three mediating ties to pass from one node to the other.

We expect the effectiveness of the network mechanism and the nature of the mediated information to depend on how directly the intermediaries connect the firms to non-local markets. Both direct (length: one) and indirect (length: two or more) ties offer a medium for the distribution of information, although in general, a more direct and stronger network will feature more diverse and rich information (Koka and Prescott 2002, Sorenson et al. 2006, Uzzi 1999). Although the richness of mediated information is reduced with increasing network distance, the second-order and longer ties facilitate information distribution through word of mouth beyond direct, first-order ties and thus expand the reach of the network ties exponentially (Granovetter 1973, Hong et al. 2005, Koka and Prescott 2002, Singh 2005).

Accordingly, we expect direct and indirect ties to offer a medium for the distribution of information regarding the existence and characteristics of the investment targets at various distances. Therefore, companies with more direct and indirect ties to non-domestic markets will have better visibility in these markets and will be more likely to find new investors from these markets. Accordingly, we should observe that first, companies with more non-domestic direct and indirect ties have an increased probability of finding new non-domestic investors in their exits, and second, ventures with non-domestic direct or indirect ties are more likely to exit in a foreign market they have ties to. Consequently, we hypothesize that

Hypothesis 1: A venture that has more direct and indirect ties to non-domestic markets is more likely to make a non-domestic exit.

Hypothesis 2: A venture that makes a non-domestic exit is more likely to exit to a market to which it has either direct or indirect ties.

2.2. Non-domestic investor ties mitigating local bias in cross-border venture capital exits

A vast body of literature has examined and identified a negative effect of geographic distance on investments in different contexts. This effect, known as local bias, has also been found to exist in venture capital, with recent studies documenting such effects both in local markets (Cumming and Dai 2010) and in cross-border contexts (Dai et al. 2012). However, despite the local bias, venture capital investments are increasingly made in more distant portfolio companies, including in foreign markets (Aizenman and Kendall 2008, Wright et al. 2005). Some recent studies have begun to examine the factors that allow investors to overcome the problems stemming from geographical distance (Cumming and Dai 2010). An emerging key factor appears to be the role of social networks. Investors making investments in more distant target companies rely on their connections in target markets in conducting due diligence and monitoring their portfolio companies (Dai et al. 2012). In venture capital, these connections are typically syndicate partners. More broadly, network ties appear to have a key role in mitigating the effects of geographic distance in venture capital (Sorenson and Stuart 2001). We expect this mechanism to operate also in the context of cross-border venture capital exits, and we hypothesize that

Hypothesis 3: Direct and indirect ties to non-domestic markets mitigate the negative effect of geographic distance.

2.3. Non-domestic investor ties mitigating cultural bias in cross-border venture capital exits

In addition to geographical distance, prior literature has also identified cultural distance as a factor that influences economic exchange (Guiso et al. 2009, Kogut and Singh 1988) including transactions such as cross-border joint ventures (Tihanyi et al. 2005), acquisitions (Reus and Lamont 2009), and venture capital investments (Dai et al. 2012). Similarly as local

bias stemming from geographical distance results in the selection of geographically proximate alternatives, cultural bias results in the selection of culturally proximate exchange partners (Guiso et al. 2009). Based on a rich literature on the effects of cultural distance on interaction and partnerships between organizations, cultural distance creates friction and barriers to communication and the development of trust (Lane et al. 2004, Reus and Lamont 2009) and thereby decreases economic exchange and the likelihood of partnerships. Such effects have been long observed in financial markets where shared language and culture between investors and investment targets have been found to increase likelihood of investment (Chan et al. 2005, Grinblatt and Keloharju 2001, Hau 2001, Sarkissian and Schill 2004). The same effect has recently been identified also in the context of both entrepreneurial ventures and cross-border venture capital investments (Dai et al. 2012),

Although research has begun to incorporate the effects of different types of cultural differences into models of international exchange, there remains very limited research on factors that may mitigate the friction from cultural differences in investments or partnerships (Luo and Shenkar 2011).[4] As barriers to economic exchange, local bias and cultural bias have both been argued to be based on mechanisms related to friction stemming from lack of information, understanding, and trust. Therefore, as remedies to these problems, social connections may help diminish both types of biases. Consequently, just as network ties appear to mitigate the trust and information problems stemming from geographical bias, such ties may also help make it possible to overcome similar problems stemming from cultural distance. For instance in the context of

[4] In the literatures on post-merger integration and foreign market entry there is a burgeoning literature on the effects of cultural differences. While these literatures find counteracting forces in cultural differences influencing for instance M&A performance, it is commonly acknowledged that cultural differences generally create barriers for information flows – it is just that because there are known information flow problems, due diligence is more careful and deals rejected more easily when transacting with culturally more distant partners. Therefore, while the resulting comparative performance of culturally more distant deals are hard to predict, it is more straightforward to predict that culturally more distant deals are made more cautiously.

cross-border merger integration, social integration mechanisms have been proposed to mitigate the lack of social integration stemming from cultural differences between the acquired and the acquiring company and thereby facilitate capability transfer (Björkman et al. 2007). Arguing that the negative effects of cultural distance on information acquisition and trust formation are a factor in cross-border venture capital exits and that network ties may mitigate these problems, we hypothesize the following:

Hypothesis 4: Direct and indirect ties to non-domestic markets mitigate the negative effect of cultural distance.

2.4. Direct and indirect non-domestic investor ties and cross-border venture capital exit type

Although direct and indirect network ties are both likely to increase the likelihood of non-domestic investment and mitigate the effects of geographic and cultural distance, the richness, quality, and probability of knowledge transfer are significantly reduced with each additional step through the network. In addition, a greater distance in networks leads to a more diluted connection between mediated information and the originator of the information. This relationship suggests that direct and indirect network ties differ in terms of the recipients' confidence about the information transmitted through those ties. We argue that this difference between direct and indirect ties may be consequential for different types of exits because of different information problems faced in trade sales exits and IPOs.

An association with a financial intermediary serves as a signal of the quality of the item being sold only if the intermediary has non-recoverable investments in reputational capital as a guarantee of the quality (Booth and Smith 1986, Klein and Leffler 1981). This type of certification is context-specific, and unless the financial intermediary is embedded in the context

of the investor, the association has only a limited effect (Raub and Weesie 1990, Spence 1973). Therefore, we expect direct network ties to non-local markets to facilitate the distribution of more credible information than do connections that entail greater network distance. This finding suggests that direct and indirect ties have different levels of potential to solve two information problems: the identification of investment opportunities and the evaluation of their quality. On the one hand, we expect indirect ties to non-local investors to be a sufficient mechanism to facilitate investments if the investors are ignorant of the existence of the firm but have the ability to assess its quality once they are familiar with the firm. On the other hand, we expect richer and more credible information mediated through direct ties to non-local investors to facilitate investments from investors who suffer from evaluation problems.

Consequently, we expect the number of direct and indirect ties to have a different relationship with each of the two main exit mechanisms, IPOs and trade sales. In both IPOs and trade sales, the entire company or a significant proportion of it is sold to third parties. However, an acquisition is characteristically conducted by an individual firm or a small investor group, typically from the same industry or a related one. In contrast, in an IPO, the investor base is considerably larger and less informed with regard to the specifics of the underlying business. In IPOs, the potential investors have less ability to observe, analyze, and subsequently monitor and influence the listing venture than they do in acquisitions. In trade sales exits, potential buyers are decentralized, and there is only a small number of potential candidate companies that have the capacity to perform thorough due diligence and thus become well informed as buyers. Therefore, whereas the offering is widely advertised in IPOs, making the potential acquirers knowledgeable about the existence of the investment opportunity in the context of acquisitions requires a different type of effort. Acquisitions are more about finding a match. Although both

identification and quality assessment are likely problems in both types of exit, quality concerns are more emphasized in IPOs, and the limited awareness of potential buyers regarding the existence of the acquisition target is more crucial in trade sales.

Accordingly, we should observe that direct ties to non-domestic markets are positively related to the likelihood of both stock listings and acquisitions in non-domestic markets because they mitigate recognition and confidence problems. Furthermore, we should observe that indirect ties to non-domestic investors are positively related to the likelihood of acquisitions rather than IPOs, as they provide a wide reach of information, thus mitigating the recognition problem, but are not likely to alleviate the evaluation problem.[5]

Hypothesis 5: Both direct and indirect ties are positively related to the likelihood of cross-border trade-sale exits, whereas only direct ties increase the likelihood of cross-border IPOs.

3. Data and methods

3.1. Cross-border venture capital exits

To analyze the role of direct and indirect ties in alleviating different types of information problems, we investigate the propensity and type of non-domestic exits from portfolio investments by venture capitalists (VCs). In our analysis of information problems, we focus specifically on cross-border trade sale and IPO exits to non-local markets given the heightened role of the information problems caused by distance and national boundaries.

Two important characteristics of the venture capital industry that make this context especially interesting and suitable for our analysis are frequent asset sales and the syndication of

[5] In this hypothesis we do not assume any particular order in the selection of the exit market and the exit type by the ventures and their VC investors.

investments. On the one hand, the returns to venture capital investments are generated through increases in the value of the individual investments, and they are only realized through VCs exiting their investments by selling their interests, preferably through initial public offerings or trade sales (Bygrave and Timmons 1992, Cochrane 2005). On the other hand, the frequent syndication of investments prior to exits creates a traceable network of formal connections (Hochberg et al. 2007) that we may use to track the reach of connections of VCs and thus to analyze how the extent and quality of this reach affect exit route selections. These co-operative ties connect VCs to a network of connections, providing individual VCs with an effective channel for direct and indirect communication and information transfer.

To estimate the effects of the direct and indirect ties of VCs on the distribution of information, we analyzed longitudinal venture capital investment and exit data from 14 European countries.[6] We used ThomsonReuters' VentureXpert database to acquire information on all venture capital-funded companies in these markets. This database, which contains the VC investments and detailed information on the nationalities of the investors who have invested in the ventures, is the most widely used database in international venture capital research (Dai et al. 2012, Hochberg et al. 2007, Lerner 1994, Schertler and Tykvova 2011).[7] We limit the sample to

[6] Our sample countries include 14 of the 15 nations that were EU countries in 1995: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Portugal, the Netherlands, Spain, Sweden, and the United Kingdom. As members of the EU, these countries have relatively harmonized economic conditions and legislation. We excluded Greece, the remaining member of the EU-15. A detailed analysis of Greek investments indicated that the data on these 27 investments were unreliable. For the sake of robustness, we estimated the models that also include the Greek investments and found no qualitative differences.

[7] Despite being the most comprehensive database on European-wide investment level data, VentureXpert does not contain records of all investments. At an aggregate level, the yearly statistics of the European Venture Capital Association (EVCA) provide information with almost exhaustive coverage. However, this information is not available at the investment level. A comparison between the investment volumes reported by EVCA and VentureXpert suggests that coverage is better for larger markets and later sample years. To ensure the robustness of the results, we executed auxiliary analyses in which we limited the sample to the five largest markets (France, Germany, Netherlands, Sweden, UK) and to the last four years of the sample period, i.e., 1999-2002. The results obtained from these analyses were qualitatively identical to those presented below. Although VentureXpert was found to be the best and only feasible database for this study, we also considered other potential alternative data

companies that received their first investment round between 1990 and 2002 to provide sufficient time for exits to occur. In addition, prior to 1990, there were very few investments made and recorded in the focal markets.

To ensure that the ventures were comparable in terms of how established and well known they were, we examined only ventures that were founded fewer than ten years[8] before the first investment and that did not have a history of earlier investments and exits. After the first exit, any potential subsequent investments and exits were excluded from the data. Furthermore, to ensure that the interests and investment motives of the investors were similar, we included only those ventures that had a VC or private equity investor in the investment group, identified as "Private Equity Firms Investing Own Capital" in the database. The resulting sample consists of 4,216 companies.

We augmented the VentureXpert data with data from other ThomsonReuters databases to obtain reliable information about exits. Although the VentureXpert database includes some records for exits, they generally apply only to the most recent situation. To identify the correct exits, we used the data from two other databases: SDC New Issues and Mergers and Acquisitions. We compared the records in these databases against our information about the ventures in our sample and identified the exits for the sample ventures.[9] We identified the exit

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sources, such as Zephyr. We found that Zephyr does not provide comprehensive data for our analysis period (1990-2002), and other researchers have found Zephyr not to differ significantly from VentureXpert in terms of its representativeness (Schertler and Tykvova 2011).

[8] To test the effect of this choice, we used multiple age ranges to generate the sample. The qualitative results of our analysis were not affected by this choice.

[9] Because the VentureXpert, New Issues, and Mergers and Acquisitions databases do not fully follow the same naming conventions for the companies, we constructed a matching algorithm to combine the records for the databases. We combined the records using the CUSIP codes and the company names to identify related records. For company names, we used the current, former (FKA), and alternative (AKA) names, excluding abbreviations that were common sources of errors, such as Ltd., Gmbh., and N.V. We matched the records where either the name or the CUSIP was identical. We also required the nationality information for each company to be consistent across the various records.

destinations and types for the 1,033 ventures (out of 4,216) that were listed or acquired before the end of our observation window in June 2008. We used the ThomsonReuters' VentureXpert, Merger and Acquisitions, and New Issues databases to define the nationality of each venture and its new owners and recorded the exit as non-domestic if the buyer resided in a different country than the country of origin of the venture.[10] In IPOs, we recorded the exit as non-domestic if the stock was listed in the IPO on a non-domestic stock exchange. If the venture remained in the portfolio of the VC or had gone bankrupt, we assigned it to the 'no exit' category.[11]

Panel A of Table 1 presents a yearly breakdown of our sample of 4,216 firms, describing the number of ventures, exit destinations, and exit types. The investment activity indicates that the peak of the cycle occurred in 2000; 32.9% of the investments occurred at that time. We observe a total of 1,033 exits for an exit ratio of 24.5%. The 444 cross-border exits constitute 43.0% of the 1,033 exits. Of the cross-border-exits, 92.6% were made through acquisitions, and

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To ensure that our algorithm functioned correctly, we manually assessed a random sample of 200 companies drawn from the VentureXpert database. For these companies, we searched the New Issues and Mergers and Acquisitions databases manually, assuming only that the first letters of the names were correctly recorded. The algorithm was able to identify 94% of the sample records correctly, whereas in 6% of the cases, the CUSIP was missing, and the names did not contain hints that would have made automated matching possible. The algorithm did not produce false matches.

Furthermore, to investigate whether the databases themselves contained correct records of the exits, we validated the exit histories for the 200 companies using external sources. In 9.5% of the cases either the M&A or the IPO database did not contain a record of an exit. Consequently, in combining the matching and missing records, we observe approximately 15% fewer exits than actually occurred. However, because this is a downwards bias, it tends to make our statistical tests more conservative.

[10] In our analyses, we rely on VentureXpert and Zephyr databases for information concerning the nationalities of the ventures and use several additional databases including ThomsonReuters' Mergers & Acquisitions and New Issues to gather data on the nationalities of trade sales and IPO exit markets. Although these databases are generally quite reliable, the relocation of portfolio companies to other markets may not have been perfectly captured. However, based on prior literature on this particular issue (Cumming et al. 2009, Cumming et al. 2006), it seems that this type of relocation is quite infrequent, is almost always partial (i.e., headquarters not relocated) and almost always occurs into the United States. Therefore, this potential inaccuracy should not influence our findings (or will make our findings more conservative). Furthermore, we ran a robustness test excluding all US exits with qualitatively similar findings. Therefore, we are confident that potentially undetected instances of relocation are not driving our results.

[11] Given the lack of accurate data on alternative exits such as write-offs for our sample ventures in VentureXpert or any other available database, we ran a robustness test in which we censored all observations of ventures that were not eventually exited through IPO or trade sales exit three years after the last investment round (a mean time from last round to either IPO or trade sales exit was three years in our sample). The results remained qualitatively unchanged.

the remaining 7.4% were made through IPOs. As expected, the share of IPOs is lower in non-domestic exits than in domestic exits; in the latter category, 27.8% of the exits were made through IPOs.

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Table 1 approximately here

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3.2. Direct and indirect cross-border venture capital network ties

To measure the degree to which a venture was connected to non-domestic markets, we examined the structure of its investor group in terms of both the nationalities of its investors and the nationalities of the syndication partners of its investors. To measure direct ties to specific non-domestic markets, we identified the members of the investor group of each venture. We then identified the nationalities of these VCs using the records from the VentureXpert database, counted the number of investors in the investor group that came from the specific non-domestic market, and recorded a distinct number for each venture-market pair. To measure the indirect ties of a venture to non-domestic markets, we focused on indirect ties with a network distance of two.[12] We examined the number and nationalities of the syndication partners of its investors. First, to identify these indirect ties, we formed a dynamically updated syndication network by examining all of the investments recorded in the VentureXpert database that were made between 1987 and 2002. To identify all of the existing and active cooperation relationships for each investor, we recorded the ties for a given year based on the investments that occurred within the three years prior to the date. As a result, for each VC, we had a yearly record of the identities and nationalities of its investment partners from the previous three years. We then connected these records to each sample venture by first identifying the members of its investor group and then

[12] Each additional step in distance exponentially decreases the effectiveness of the ties and exponentially increases the computational effort required. These factors render the examination of longer network distances infeasible.

recording the ties of its investors as the venture's second-order ties. We observed these ties for each date for which we had data on the venture: that is, each round date and the potential date of exit from the venture. We then counted the number of second-order ties to specific non-domestic markets.

As illustrated by the descriptive statistics in Panel C of Table 1, the number of direct, first-order ties and indirect, second-order ties to non-domestic markets shows considerable variation. Whereas sample ventures on average have 1.94 first-order and 127.70 second-order non-domestic ties, the distributions of the number of direct and indirect ties have long right-hand tails, as is typical of distributions of ties in social networks. The same type of distribution is also observed for the number of market nations the ventures reach through these ties and the number of ties to individual markets. Although we expect that the number of ties to non-domestic markets will have a positive effect on the likelihood of non-domestic exit, we also expect the marginal contribution of additional ties to decrease. Consequently, in the following regressions, we use the logarithmic transformation of the number of ties to account for this reduced contribution of additional ties in both general and market-specific measures of ties.

3.3. Variables

We examine the effect of network ties on the likelihood of a non-domestic exits in general and on the likelihood of exits to a specific market. For the analysis of domestic vs. non-domestic exits, we use the numbers of first- and second-order ties to foreign markets as the independent variables. For the analysis of exits to specific markets, we use the number of ties to each individual market. In both cases, we use the logarithmic transformation of the number of ties, as we expect the additional ties to have a decreasing marginal effect. We include the following venture-specific controls in the regressions: *the number of foreign investors in the*

venture's investor group; the number of rounds of financing received; the age of the venture at the time of the exit; the time in years from the first investment to the exit; the total number of markets the exit was made to (to account for a small number of cross-listings in the sample), and *dummy variables indicating the industry of the venture*.

In addition, in the analyses of exits to specific markets, we include controls that characterize the relationship between the home market and a potential exit market. First, we control for the *geographical and cultural distance between the home and target markets*. We measure geographical distance as the geodesic distance between the capital cities of two nations.[13] Following prior practice to enable comparison, we use Hofstede's (2001) cultural dimensions to measure the cultural difference between the two markets. We use the common method of measuring cultural distance as the norm of the vector specifying the difference between the scores of two cultures in each cultural dimension (e.g. Dai et al. 2012, Morosini et al. 1998).[14]

Second, we control for the acquisition and IPO activity in the home and target markets as well as the prevalence of cross-border acquisitions and IPOs between the two markets. The *outflow of exits from the home market* is the number of non-domestic acquisitions and IPOs divided by the number of companies that have been acquired or have made an IPO and are from the same market as the venture. *The inflow of exits to the target market* is the number of IPOs by non-domestic companies to the target market or the number of non-domestic companies acquired by firms from the target market divided by the number of acquisitions and IPOs made by firms in

[13] For distance and language data, we use a dataset provided by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) augmented with data from the CIA World Factbook for those combinations of home and target nations for which information is not available from the CEPII database.

[14] In other words, if x and y are vectors containing the scores for the cultural dimensions (power distance, individualism vs. collectivism, masculinity vs. femininity, and uncertainty avoidance), the cultural distance is $||x-y||$.

the target market. *The directed outflow from the home market to the target market* is the number of non-domestic IPOs and acquisitions from the venture's home market to the target market divided by all the non-domestic acquisitions and IPOs by firms in the home market. *The relative activity of the markets* is the difference between the number of IPOs and acquisitions in the target market relative to the number of IPOs and acquisitions in the home market. The market-related controls – the outflow of exits, the inflow of exits, directed outflow, and relative activity – are calculated as the sum of both exit types in the models predicting the exit nation of a venture and are calculated independently for both exit types in the models predicting exit type and exit nation. All of the market-related controls are measured for the year preceding the exit from the venture.

4. Results

4.1. Results on non-domestic exits

In Hypothesis 1, we predicted that the more a venture has direct and indirect ties to non-domestic markets, the greater likelihood of a non-domestic exit. To test the hypothesis, we use a discrete-time competing risk model (implemented using a multinomial logit regression) to estimate the effects of network ties on the likelihood of exit to domestic and non-domestic markets. We divide the observations into yearly spells and predict the likelihood of exit in each spell. For each venture, the first spell is the year of the first investment round, and the last is either the exit year or the year 2008, when our observation window for exits closes. All of the independent variables are observed and updated for each yearly spell, and we include the logarithm of the time at risk in all regressions.

The results are shown in Table 2. Each model presents the effects of the independent and control variables on domestic and foreign exits. Model 2, which adds the number of first-order

ties to the model as an independent variable, shows that first-order ties have a positive and significant effect on both domestic and foreign exits. The effect appears to be significantly higher for foreign exits. Similarly, in Model 3, the second-order ties have a positive effect on both exits destinations. There is less variation in the size of the effect across the two types of exit destinations than there is for the first-order ties. When they are estimated simultaneously, the effect of first-order ties on domestic exits becomes statistically insignificant.

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Table 2 approximately here

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Concerning Hypothesis 1, we find that both first- and second-order ties are clearly associated with non-domestic exits, which provides support for Hypothesis 1. First-order ties increase the likelihood of non-domestic exit, whereas second-order ties increase both domestic and non-domestic exits, with a slightly stronger effect on non-domestic exits. To examine the magnitude of these effects, we calculated the marginal effect of increasing the number of ties by one standard deviation from the mean (as reported in Table 1). For first-order ties, increasing the number of ties from 2 to 4 increases the likelihood of an exit to a foreign market by 0.8%. For second-order ties, increasing the number of ties from their mean (128 ties) by one standard deviation (202 ties) increases the likelihood of foreign exit by 0.3%. Although the effects appear relatively small, it is worth remembering that these estimates pertain to the full sample of 4,216 ventures, 10.5% of which experienced a foreign exit. Accordingly, to assess whether the ties affect the selection of the foreign exit market as predicted in Hypothesis 2, we focus next on the market selection of the 444 sample companies that made foreign exits.

4.2. Results concerning exit destinations

If the first- and second-order ties mediate information as predicted, we should expect to observe that ventures are more likely to make an exit to those markets to which they are connected through direct or second-order ties when other factors are controlled for. To test this Hypothesis 2, we analyze the exit destinations of the 444 sample ventures with non-domestic exit destinations. We use venture-market pairs as our unit of analysis, pairing the ventures with the potential exit markets and using an indicator variable to record whether the venture exited a specific market. We identify the potential exit markets as the markets to which, in the case of an IPO, there is at least one recorded IPO made and from which, in the case of a trade sale, there is at least one recorded acquisition made by the end of the observation window of sample exits in June 2008. We identify these markets using all of the recorded IPOs and acquisitions in the SDC New Issues and Mergers and Acquisitions databases. These databases contain records for acquisitions from 1978 onward and for IPOs from 1970 onward. We identify 203 nations, including 201 market nations for acquisitions and 83 market nations for IPOs. For our sample, data on Hofstede's (2001) cultural dimensions are not available for all potential exit countries. However, excluding markets without these data does not negatively affect our analysis because 99% of all exits from EU-15 countries to non-domestic markets are made to markets for which data on Hofstede's cultural dimensions are available.

Table 3 presents the results of the logistic regressions. We examine the effects of network ties by estimating their effects on the likelihood of an exit to a specific market. Model 1 is the base model and estimates the effect of control variables on exit market selection. The effect of distance is negative, as expected based on the results of earlier studies of the effects of distance on investments, but the effect is not statistically significant. In contrast, the effect of the cultural distance between the home market and the target market is both negative and statistically

significant. This finding indicates that ventures making non-domestic exits prefer markets that are culturally near their domestic market. In Model 2, we include the measures for the number of network ties that the venture has to the target market. In support of Hypothesis 2, we find that the coefficients of both the first- and second-order ties to a market are positive and statistically significant, which suggests that the existence of such network ties increases the probability of an exit to this market and that a higher number of network ties increases the magnitude of the positive effect.[15] When a venture is more highly connected to a specific market, it is more likely to attract new investors from that specific market.

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Table 3 approximately here

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To examine whether this positive effect of ties mitigates the negative effect of geographical distance, as suggested in Hypothesis 3, we add the interaction terms for distance and network ties into Models 3 and 4. The interaction terms for the first-order and second-order ties are both positive and highly significant. However, in non-linear models such as the logit model, the direction and magnitude of the interaction effect are not directly observable from the partial interaction terms (Ai and Norton 2003, Hoetker 2007). To examine whether these estimated models validate the hypothesized moderating effect on distance, we follow Greene (2010) and observe the interaction effect by plotting the estimated models.

Fig 1. graphically presents the moderating effect of first- and second-order ties on distance based on the estimates of the full model (Model 7) in Table 3. Presenting the geographical distance between the home market of the venture and the potential exit market on

[15] Because of space constraints, we report only the results obtained from a model including both the measures of direct and second-order ties. However, both of the variables are also positive and statistically significant at the 0.001 level when they are individually entered into the estimated equation.

the horizontal axis, the graph plots the effect of geographic distance on the probability of exit at the levels of first-order and second-order ties. We observe that when the other variables are held at their means, both types of ties mitigate the negative impact of geographic distance on the probability of exit. The figure indicates that with no first-order or second-order ties, geographic distance rapidly decreases the probability of exit, whereas the existence of first-order ties appears to cancel this negative effect. When a firm is more highly connected to a distant market, exit there is more likely. For second-order ties, the effect is similar and is in fact greater in magnitude. The existence of second-order ties mitigates the negative effect of geographic distance, and this effect is stronger for longer distances. Therefore, second-order ties are also beneficial in terms of reaching investors over geographic distances.

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Fig. 1 approximately here

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In Hypothesis 4, we predicted that in addition to geographic distance, network ties mitigate the negative effect of cultural distance on the likelihood of exit. To test this hypothesis, we add the interaction terms for the two types of ties and cultural distance to Models 5 and 6. The coefficients of the terms are positive and statistically significant, although the significance of the interaction with first-order ties is reduced when all interactions are estimated jointly in Model 7. These results provide support for Hypothesis 4. To examine the magnitude of the effects, we plot them in Fig. 2. As with geographic distance, without network ties, the likelihood of exit to a focal market decreases as cultural distance increases. The first-order ties have a small, positive mitigating effect on this relationship, but that effect is statistically insignificant. Nevertheless, the positive effect of second-order ties is more pronounced and increases as cultural distance increases.

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Fig. 2 approximately here

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Overall, it appears that, as hypothesized, first-order ties to specific foreign markets increase the likelihood of exit to those markets, and first-order ties also mitigate the negative effect of geographical distance, although they do not have the same influence on cultural distance. Second-order ties have a similar effect but also mitigate the negative effect of cultural distance.

4.3. Robustness tests of the effects of network ties on exit market choice

We next examine the robustness of the results and the potential role and magnitude of two alternative mechanisms, the certification effect of lead-investor ties and the endogeneity of market choice. Essentially, it is possible that companies that intend to internationalize seek both investors from foreign markets and an exit route to these markets. We first consider the lead-investor effect. We hypothesize that the positive effect of direct ties to non-domestic markets is caused by both the reach and the credibility of the information; however, the above measures aggregate these effects. To shed further light on this issue, we disaggregate the roles of VCs in their investments and separately measure the effects of the direct ties generated by lead and non-lead investors. We identify the roles of VCs in the syndicate by using the investment size of each VC in a given financing round and identifying the lead investor as the investor with the highest round-specific investment in the venture. If a lead investor comes from a foreign market, we identify the investor as generating a lead tie, which we distinguish from other direct ties to that market; the latter are referred to as non-lead ties. In addition, we use the distinction between lead and non-lead investor to distinguish the indirect ties to those originating from lead and to those

from non-lead investors. We use probit regressions to reanalyze the models from previous analyses. The results are presented in Table 4.

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Table 4 approximately here

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Models 1 to 4 in Table 4 detail this effect of disaggregation. As shown in Model 2, both types of direct ties, lead and non-lead ties, have strong positive effects on exit, as expected. However, when the indirect ties are incorporated into Model 3, the effect of non-lead ties becomes insignificant. This finding suggests that the direct non-lead ties and indirect ties have some overlap in terms of their effects, although lead ties also have a separate, additional effect. Although this analysis does not fully explain whether the effect is attributable to the certification effect or to the actions of the lead investor, the findings nevertheless demonstrate that the direct lead and non-lead ties have different effects on exit probability.[16] To test whether this applies to the indirect ties, Model 4 separates the effects of the indirect ties of lead and non-lead investors on the exit probability. In contrast to direct ties, the indirect ties through the lead investor have a positive, but less significant effect than the indirect ties of non-lead investors. Thus, the lead investor effect appears to be limited to the direct ties, whereas with the indirect ties, the greater reach is more significant.

To address endogeneity concerns, we use an instrumental variable approach. We believe that in any case, the joint occurrence of first-order ties and non-domestic exits is partly a result of a venture's intention to internationalize. Nevertheless, we maintain that cross-border network ties should play a beneficial role, and we expect non-domestic network ties to facilitate information

[16] To test the robustness of our findings, we also ran additional unreported robustness tests including an aggregated reputation measure of the investor syndicate operationalized as their cumulative numbers of exits (or alternatively investments). The findings remained qualitatively unchanged.

transfer even after we control for their endogeneity. As a strategy for identifying a suitable instrument, we use the geographical market share approach introduced by Hellmann et al. (2008). Given our cross-border venture capital context, we are able to use the availability of foreign VC funding as a measure of the first-order ties to the exit market. We measure the availability of VC funding from a foreign market by calculating the *market share of foreign VCs* from a specific market in the year of the first VC investment received by the focal venture. We calculate the investments made by VCs from each foreign market and their volume relative to the total volume of the home markets of the venture. The market share of foreign VCs indicates the presence and, thus, the availability of funding from specific foreign markets, demonstrating the availability of such funding for the focal venture and consequently explaining the direct ties to foreign markets through the decision to use such funding. Importantly, the general availability of foreign VC funding in a given market is conceptually unrelated to an individual venture's decision to target certain exit markets. Therefore, the *market share of foreign VCs* fulfills the two of the criteria for an instrumental variable. First, it is related to the venture's use of foreign funding, as it indicates the availability of such funding, and second, it is unrelated to the dependent variable.

Models 5 and 6 in Table 4 report the results of the instrumental probit regression in which we instrument the number of first-order ties to a market with the market share of VCs from this specific market. The results are equivalent to those obtained from Model 2 in Table 3. The effect of first-order ties on the likelihood of exit to the market is positive and statistically significant. This finding supports the conclusion that first-order ties to a non-domestic market enhance the likelihood of exit to this market through the distribution of information.

4.4. Results concerning types of cross-border exits

So far, the results have demonstrated that both first- and second-order ties increase the likelihood of exit to a focal market and also mitigate the negative effect of geographical and cultural distance. However, as predicted in Hypothesis 5, the two types of ties may have different effects on the type of information that they are able to transfer and thus may have different effects on the different exit types. Accordingly, Table 5 reports the results obtained from the models examining whether the types of ties to a non-domestic market affect information transfer and, consequently, the probability of a given exit type. We suggest that first-order ties mediate rich information with credibility, thus increasing the likelihood of an IPO to a specific market, whereas second-order ties facilitate information distribution, which will affect the likelihood of acquisition from a specific market. To distinguish between the types of exits, we move from a binary dependent variable to a categorical dependent variable that indicates whether the exit to the focal market is a trade sale or an IPO exit. Accordingly, we estimate the models using a multinomial logit regression.

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Table 5 approximately here

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The models in Table 5 essentially expand Model 2 in Table 3 by detailing the type of exit, indicated by the categorical variable. As in the market-level analyses, the first- and second-order network ties have positive and statistically significant effects on both types of exits when entered separately into the models. In addition, in Model 4, the jointly estimated effects of the first- and second-order ties are all statistically significant and positive. Therefore, it appears that the two types of ties have similar effects on both types of exits. However, when we examine

whether these statistically significant results also have economic significance, we find that second-order ties have no meaningful impact on the likelihood of an IPO.

Fig. 3 presents the marginal effect of ties on the probability of exit to a focal market type based on the estimates in Model 4 and plots it against the number of ties scaled by the maximum number of types. Second-order ties appear to have a strong effect on trade-sale exits but seem to have only a very limited effect on IPO exits. Whereas the coefficients are nearly equal for both exit types in Model 4, the constant term is considerably lower for IPO exits, which explains the low overall effect of second-order ties. First-order ties do have a positive and meaningful effect on both types of exits. Overall, these results provide support for Hypothesis 5, in which we predicted that the second-order ties will not mediate sufficiently rich and trustworthy information regarding the investment targets to actually facilitate IPO exits. The positive association with trade-sale exits suggests that second-order ties do spread information that increases the awareness of the targets. The first-order ties have a positive impact on both types of exit. The results indicate that direct and indirect ties have different effects on the type of information distribution and the resulting exit type.[17]

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Fig. 3 approximately here

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4.5. Additional robustness checks

In addition to the robustness tests that we conducted to ensure that endogeneity problems had not biased the results that we report in Table 4, we also executed additional unreported

[17] We conducted also auxiliary analyses to test the robustness of these results with respect to the ordering of the decisions regarding the exit type and exit destination. To allow for simultaneous selection of type and location, we used the data used in analyses reported on Table 2 on all ventures and examined and distinguished the exit type and destination (foreign M&A, foreign IPO, domestic M&A, domestic IPO). We find that, consistent with Hypothesis 5, direct ties are associated with foreign exits (M&A and IPO), but indirect ties affect only foreign M&As, not foreign IPOs. In addition, the effect of direct ties was four times larger on foreign IPOs than on foreign M&As.

robustness tests to examine and limit the effects of potential unobserved heterogeneity. We re-estimated all models using a restricted sample to test the effects of limiting the sample nations to the five largest, focusing on the ventures whose first investment rounds occurred during or prior to 2000 and removing the network effects of the most influential investors (3i). All of the results for both the direct effects and the moderated effects of first- and second-order ties remained qualitatively identical when they were estimated using each restricted sample.

5. Discussion and conclusions

In this paper focused on cross-border venture capital exits, we aimed to examine the role of network distance in the preference for local investments and to study the effects of direct, first-order and indirect, second-order ties and of the different types of information that they distribute on the impact of investors' local and cultural biases. We examined the exit market selections of venture capital-backed companies from EU-15 countries and found that a venture that has more non-domestic ties, both direct and indirect, is more likely to exit to a non-domestic market. Furthermore, we examined ventures that made non-domestic exits and found that the network ties of the sample ventures increase the likelihood of exit to markets to which the venture has preexisting investor network ties. We also found that direct and indirect network ties differ in their potential to help mitigate two key problems related to imperfect information, the identification of investment opportunities and the evaluation of their quality in investments by geographically and culturally distant investors. Because the indirect, second-order ties provide a broad reach, they help to alleviate the identification problem. However, the direct, first-order ties have stronger certification effects and thus are more effective in mitigating the quality evaluation problem. Our results demonstrate that indirect ties provide reach, reducing the problem of opportunity identification. On the other hand, direct ties appear to serve as a channel for the

transfer of rich information, reducing the problems of investor quality assessment, and consequently facilitate IPO exits to markets to which the venture is connected. Therefore, the structure of the network ties of financial intermediaries affects the distribution of information.

These results contribute to the literature on the proximity preference (Coval and Moskowitz 1999) or local bias of investors by demonstrating the significance of inter-organizational ties and thus furthering attempts to reveal the distance-related mechanisms of information distribution. Our results suggest that the preference for proximity is intrinsically tied to the distribution and receipt of information. Therefore, geographical distance is less problematic than the investors' lack of connectedness. Although such connectedness is closely (negatively) correlated with physical distance, investors that are able to connect to non-local markets despite the distance are at a smaller social distance from these markets and consequently obtain better information from them. In addition to mitigating local bias based on geographical distance, network ties also mitigate bias based on cultural distance (Guiso et al. 2009). We were able to observe these effects using data on formal cooperative relationships between venture capital organizations, and we expect the effects to be considerably more pronounced when the personal contacts of individual investors and traders are examined. Future research in international entrepreneurship (Jones et al. 2011) and entrepreneurial finance could benefit from examining and comparing the roles of different networks and information channels (see e.g., Ozmel et al. 2013) in reputation building and information distribution in the financing of international new ventures. While the role of social networks in traditional forms of entrepreneurial finance such as venture capital and business angel finance have been long acknowledged, recent research on crowdfunding suggests that also e.g. online social networks may have important effects on information distribution, reputation building, and success in

entrepreneurial finance (e.g., Mollick 2013). In addition to different types of networks and information channels, also more in-depth analyses of different types of foreign partners, their market-specific reputations and network positions, contracting, and the interactions of these factors with other aspects of internationalization strategy should be pursued if it is possible to obtain suitable data. For instance, differential access to information on non-local markets might influence contractual terms of VC investments and subsequently also exits (Cumming 2008). Clearly, while contributing to the understanding of how direct and indirect network ties help mitigate geographical and cultural biases, the findings and limitations of this paper also suggest many fruitful avenues for future research in concerning the role of networks in international entrepreneurial finance.

Finally, as one of the first studies focusing on cross-border venture capital exits, this paper also makes several contributions to practice and policy concerning international entrepreneurship and venture capital. For entrepreneurs, our results show that early-stage financing choices may have long-standing consequences for the development of their ventures. Having both foreign investors and domestic investors with strong international syndication networks may facilitate an international exit. Given that the functioning of the exit market is crucial to the functioning of venture capital markets (Black and Gilson 1998), these findings are also important for VCs, institutional investors, and policymakers. For venture capital investors, this new information lends additional justification to internationalization strategies and cross-border syndication (Dai et al. 2012, Meuleman and Wright 2011). Even if cross-border syndicates are more challenging to build and manage than domestic ones, this paper suggests that they may be valuable because they increase the ability of the investor to make successful international exits. For institutional investors investing in markets with constrained domestic exit

opportunities, the findings of this paper suggest that the international syndication of venture capital firms may be another valuable factor to consider in fund investments. Finally, for policy-makers, the findings show that encouraging international venture capital activity may help to improve opportunities for the creation of value from investments made in science, technology, and innovation. When there are more exit opportunities, valuations are higher, and the returns on early-stage technology investments are better.

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Table 1
Descriptive statistics.

Panel A Number of ventures, exits, exits of particular types, and exit destinations per year

Year of first investment	Ventures	Exits	Non-domestic acquisition	Non-domestic IPO	Domestic acquisition	Domestic IPO	Share of exits	Average time to exit in years
1990	36	20	7	2	8	3	56 %	8.4
1991	58	17	7	1	6	3	29 %	6.4
1992	64	33	7	3	14	9	52 %	5.1
1993	53	26	5	2	15	4	49 %	5.7
1994	71	38	16	4	11	7	54 %	5.5
1995	99	44	20	1	18	5	44 %	6.3
1996	203	83	30	4	33	16	41 %	4.7
1997	146	54	17	0	28	9	37 %	5.4
1998	295	90	41	2	31	16	31 %	4.3
1999	641	190	72	7	77	34	30 %	4.0
2000	1389	252	105	2	109	36	18 %	4.2
2001	805	122	54	2	50	16	15 %	4.0
2002	356	64	30	3	25	6	18 %	3.4
Total	**4216**	**1033**	**411**	**33**	**425**	**164**	**25 %**	**5.2**

Panel B Number of ventures and exits for sample nations

Market nation	Ventures	Share of sample	Exits	Exits / ventures	Non-domestic exits	Non-domestic / all exits
Austria	57	1.4 %	6	10.5 %	3	50.0 %
Belgium	122	2.9 %	28	23.0 %	16	57.1 %
Denmark	105	2.5 %	23	21.9 %	12	52.2 %
Finland	169	4.0 %	33	19.5 %	17	51.5 %
France	667	15.8 %	182	27.3 %	72	39.6 %
Germany	810	19.2 %	142	17.5 %	68	47.9 %
Ireland	119	2.8 %	31	26.1 %	23	74.2 %
Italy	124	2.9 %	35	28.2 %	16	45.7 %
Luxembourg	11	0.3 %	3	27.3 %	2	66.7 %
Netherlands	211	5.0 %	41	19.4 %	24	58.5 %
Portugal	53	1.3 %	3	5.7 %	1	33.3 %
Spain	183	4.3 %	28	15.3 %	12	42.9 %
Sweden	289	6.9 %	70	24.2 %	41	58.6 %
United Kingdom	1296	30.7 %	408	31.5 %	137	33.6 %
Total	**4216**	**100 %**	**1033**	**21.2 %**	**444**	**50.8 %**

Panel C Ties to non-domestic markets

	All 4216 ventures		444 ventures with non-domestic exits	
	First-order	**Second-order**	**First-order**	**Second-order**
Share of ventures with non-domestic ties	63 %	70 %	72 %	85 %
When ties exist:				
Number of non-domestic ties				
Mean	1.94	127.70	2.25	153.9
Standard deviation	1.60	202.47	1.91	221.91
Maximum value	14	2180	14	1789
Number of markets to which ventures have ties				
Mean	1.41	10.07	1.53	11.48
Standard deviation	0.77	7.83	0.91	8.25
Maximum value	9	34	9	32
Number of ties to those markets to which ties exist				
Mean	1.37	12.68	1.46	13.40
Standard deviation	0.91	52.31	0.99	54.55
Maximum value	11	1823	8	1600

Table 2

Competing risks models of cross-border and domestic exits for all 4216 sample ventures.

	Model 1		Model 2		Model 3		Model 4	
	Domestic exit	Foreign exit	Domestic exit	Foreign exit	Domestic exit	Foreign exit	Domestic exit	Foreign exit
Number of first-order ties (ln) to foreign markets			0.358 ***	0.770 ***			0.200 *	0.588 ***
			(.10)	(.12)			(.10)	(.13)
Number of second-order ties (ln) to foreign market					0.124 ***	0.162 ***	0.110 ***	0.111 ***
					(.02)	(.03)	(.02)	(.03)
Number of investors	-0.019	0.024	-0.072 **	-0.102 **	-0.058 **	-0.029	-0.084 ***	-0.111 ***
	(.02)	(.02)	(.03)	(.03)	(.02)	(.03)	(.03)	(.03)
Company age (ln)	0.102	0.018	0.136	0.086	0.086	-0.006	0.107	0.056
	(.14)	(.17)	(.14)	(.17)	(.14)	(.17)	(.14)	(.17)
Number of investment rounds company received	0.158 ***	0.184 ***	0.144 ***	0.162 ***	0.130 ***	0.150 ***	0.125 ***	0.144 ***
	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)
Time from first investment (ln)	-0.050	0.204 +	-0.082	0.136	-0.067	0.197	-0.082	0.150
	(.11)	(.12)	(.11)	(.12)	(.11)	(.12)	(.11)	(.12)
Company nation controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Company industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.615 ***	-4.972 ***	-4.680 ***	-5.148 ***	-4.686 ***	-5.110 ***	-4.721 ***	-5.213 ***
	(.35)	(.39)	(.35)	(.38)	(.36)	(.39)	(.35)	(.38)
Observations	36101		36101		36101		36101	
Log-Likelihood	-4461.4		-4417.8		-4445.9		-4414.43	

Discrete-time competing risk model implemented using multinomial logit regression. Clustered standard errors in parentheses. Results marked with ***, **, *, and + are significant at the .001, .01, .05, and 0.1 levels, respectively. One-tailed tests for hypotheses; two-tailed tests for controls.

Table 3
Logit models of exits to specific foreign markets for the 444 foreign exits.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Number of first-order ties (ln) to focal market		1.220 ***	-3.191 **	1.135 ***	-0.603 *	1.063 ***	-2.519 +
		(.22)	(1.36)	(.23)	(.36)	(.21)	(1.72)
Number of second-order ties (ln) to focal market		0.503 ***	0.489 ***	-0.501 *	0.474 ***	-0.060	-0.972 **
		(.05)	(.05)	(.29)	(.05)	(.08)	(.37)
# First-order ties (ln) X Geographic distance			0.546 ***				0.364 *
			(.17)				(.19)
# Second-order ties (ln) X Geographic distance				0.125 ***			0.114 **
				(.04)			(.04)
# First-order (ln) X Cultural distance					0.043 ***		0.013 +
					(.01)		(.01)
# Second-order ties (ln) X Cultural distance						0.013 ***	0.012 ***
						(.00)	(.00)
Geographic distance (ln)	-0.069	-0.126 *	-0.208 ***	-0.277 ***	-0.069	-0.023	-0.217 **
	(.05)	(.05)	(.06)	(.07)	(.06)	(.06)	(.07)
Cultural distance	-0.014 ***	-0.014 ***	-0.012 ***	-0.012 ***	-0.019 ***	-0.026 ***	-0.023 ***
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Cumulative number of foreign investors in investment group	0.013	-0.211 ***	-0.204 ***	-0.197 ***	-0.233 ***	-0.235 ***	-0.224 ***
	(.03)	(.05)	(.05)	(.05)	(.05)	(.05)	(.05)
Total number of investment rounds company received	-0.032	-0.086 *	-0.089 *	-0.082 +	-0.071 +	-0.066	-0.057
	(.04)	(.04)	(.04)	(.04)	(.04)	(.04)	(.04)
Company age at time of exit (ln)	-0.037	-0.110	-0.103	-0.082	-0.080	-0.099	-0.060
	(.16)	(.17)	(.17)	(.17)	(.17)	(.17)	(.17)
Time to exit (in years)	0.026	0.041	0.040	0.038	0.036	0.037	0.031
	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)
Number of exit markets	0.287	0.306	0.290	0.276	0.291	0.302	0.269
	(.18)	(.19)	(.20)	(.20)	(.19)	(.19)	(.20)
Outflow of exits from home market	0.366	0.690	0.774	0.699	0.489	0.475	0.462
	(.52)	(.53)	(.53)	(.53)	(.54)	(.54)	(.54)
Inflow of exits to target market	-0.213	-0.015	-0.053	-0.080	0.002	0.038	-0.076
	(.27)	(.29)	(.28)	(.28)	(.29)	(.29)	(.29)
Directed outflow from home to target market	13.686 ***	9.130 ***	9.264 ***	9.200 ***	9.514 ***	9.832 ***	10.182 ***
	(.48)	(.56)	(.56)	(.56)	(.55)	(.55)	(.56)
Relative activity of target market and home market	0.009 ***	0.006 **	0.005 **	0.005 **	0.005 *	0.005 ***	0.005 **
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.256 ***	-3.623 ***	-3.046 ***	-2.533 ***	-3.771 ***	-3.835 ***	-2.444 ***
	(.58)	(.59)	(.61)	(.66)	(.60)	(.60)	(.67)
Observations	35964	35964	35964	35964	35964	35964	35964
Log-Likelihood	-1599.7	-1491.7	-1485.4	-1485.1	-1474.8	-1460.1	-1446.8

Standard errors in parentheses. Results marked with ***, **, *, and + are significant at the .001, .01, .05, and 0.1 levels, respectively. One-tailed tests for hypotheses; two-tailed tests for controls.

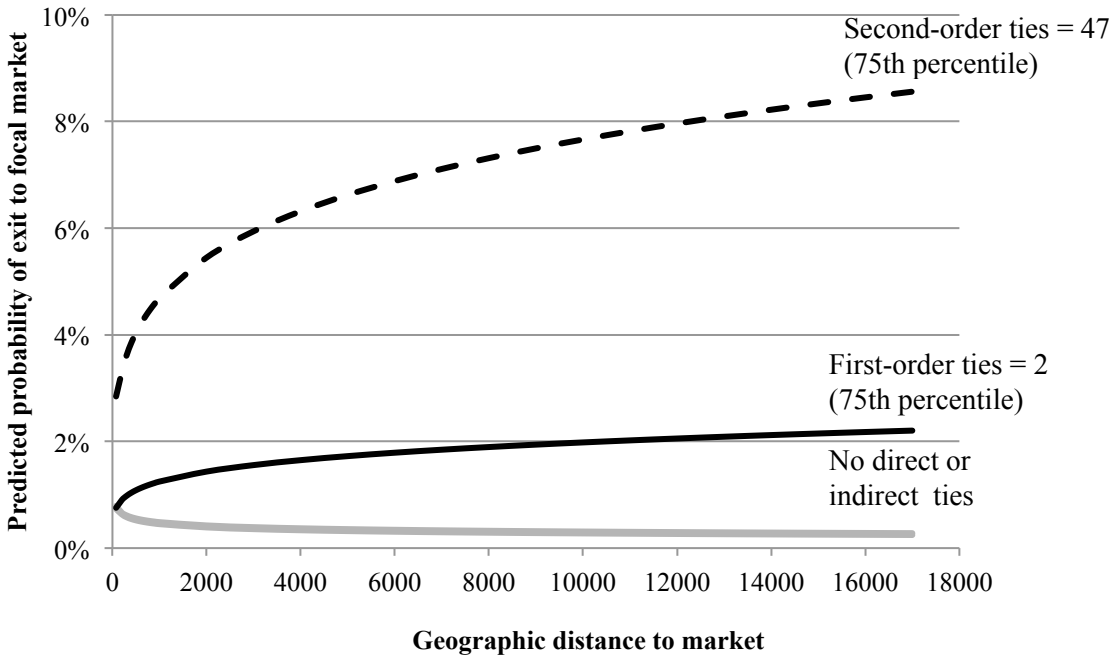

Fig. 1. The moderating effect of first- and second-order ties on the influence of geographic distance
Figure presents the effect of geographic distance (in kilometers) on the probability of an exit to the focal market at two levels of first-order and second-order ties (no ties and the 75th percentile for the type in question) based on the estimates for Model 7 in Table 3.

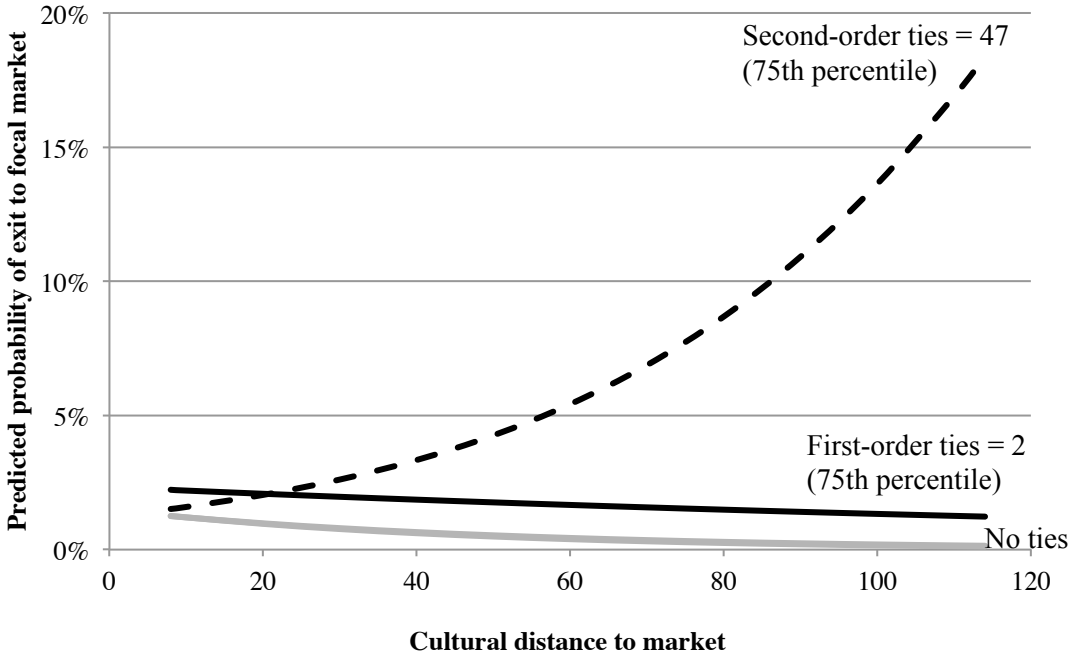

Fig. 2. The moderating effect of first- and second-order ties on cultural distance

Figure 2 presents the effect of cultural distance on the probability of an exit to the focal market at two levels of first-order and second-order ties (no ties and the 75th percentile for the type in question) based on the estimates for Model 7 in Table 3.

Table 4

Robustness analyses of exits to specific foreign markets. Probit models with a separate lead investor effect (Models 1-4) and instrumental variable probit analysis (Models 5-6) for the 444 foreign exits.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Number of first-order ties (ln) to focal market	2.195	***							3.082	***	2.828	***
	(.20)								0.274		0.319	
A lead tie to focal market (0/1)			1.350	***	0.667	**	0.627	*				
			(.24)		(.24)		(.26)					
Number of first-order non-lead ties (ln) to focal market			1.483	***	0.427	+	0.528	*				
			(.29)		(.29)		(.30)					
Number of second-order ties (ln) to focal market					0.564	***					0.046	+
					(.05)						0.032	
Number of second-order ties through lead investor (ln)							0.164	+				
							(.13)					
Number of second-order ties through non-lead investors (ln)							0.483	***				
							(.06)					
Geographic distance (ln)	-0.116	*	-0.076	+	-0.096	*	-0.109	*	-0.112	***	-0.108	***
	(.05)		(.05)		(.05)		(.06)		0.023		0.023	
Cultural distance	-0.015	***	-0.015	***	-0.014	***	-0.014	***	-0.005	***	-0.005	***
	(.00)		(.00)		(.00)		(.00)		0.001		0.001	
Cumulative number of foreign investors in investment group	-0.153	***	-0.072	*	-0.150	***	-0.142	***	-0.044	**	-0.057	**
	(.04)		(.04)		(.04)		(.05)		0.017		0.018	
Company age at time of exit (ln)	-0.055		-0.001		-0.078		-0.071		0.015		0.003	
	(.16)		(.16)		(.17)		(.17)		0.068		0.069	
Total number of investment rounds company received	-0.054		-0.058	+	-0.090	*	-0.093	*	-0.021		-0.030	+
	(.04)		(.04)		(.04)		(.04)		0.018		0.018	
Time to exit (in years)	0.031		0.018		0.034		0.033		0.010		0.012	
	(.03)		(.03)		(.03)		(.03)		0.014		0.014	
Number of exit markets	0.287	+	0.235		0.289	+	0.286	+	0.074		0.088	
	(.18)		(.19)		(.19)		(.19)		0.085		0.086	
Outflow of exits from home market	0.386		0.290		0.672		0.632		-0.354		-0.264	
	(.53)		(.53)		(.53)		(.53)		0.233		0.235	
Inflow of exits to target market	-0.110		-0.150		-0.030		-0.036		-0.033		-0.009	
	(.27)		(.27)		(.29)		(.28)		0.109		0.112	
Directed outflow from home to target market	11.166	***	12.413	***	9.603	***	9.901	***	3.191	***	3.292	***
	(.52)		(.50)		(.55)		(.55)		0.432		0.380	
Relative activity of target market and home market	0.006	**	0.007	***	0.006	***	0.006	***	0.004	+	0.006	*
	(.00)		(.00)		(.00)		(.00)		0.003		0.003	
Industry controls	Yes		Yes		Yes		Yes		Yes		Yes	
Constant	-3.626	***	-3.954	***	-3.925	***	-3.801	***	-1.285	***	-1.326	***
	(.59)		(.59)		(.60)		(.60)		0.246		0.251	
Observations	35964		35964		35964		35964		35964		35964	
Log-Likelihood	-1538.2		-1563.4		-1501.8		-1509.9		36757.0		38547.8	

Standard errors in parentheses. Results marked with ***, **, and * are significant at the .001, .01, and .05 levels, respectively. One-tailed tests for hypotheses; two-tailed tests for controls.

Table 5

Multinomial logit analysis of the effects of ties on exit types for the 444 foreign exits.

	Model 1		Model 2		Model 3		Model 4	
	Trade-sale	IPO	Trade-sale	IPO	Trade-sale	IPO	Trade-sale	IPO
Number of first-order ties (ln) to focal market			2.034 ***	4.260 ***			1.058 ***	3.342 ***
			(.30)	(.82)			(.31)	(.98)
Number of second-order ties (ln) to focal market					0.611 ***	0.868 ***	0.512 ***	0.456 **
					(.05)	(.13)	(.05)	(.18)
Geographic distance (ln)	-0.070	-0.051	-0.106 +	-0.321 *	-0.083	-0.271 +	-0.110 +	-0.386 *
	(.06)	(.16)	(.06)	(.15)	(.06)	(.16)	(.06)	(.16)
Cultural distance	-0.014 ***	-0.008	-0.015 ***	-0.010	-0.013 ***	-0.006	-0.014 ***	-0.009
	(.00)	(.01)	(.00)	(.01)	(.00)	(.01)	(.00)	(.01)
Cumulative number of foreign investors in investment group	0.010	0.173 **	-0.133 ***	-0.332 +	-0.129 ***	-0.078	-0.192 ***	-0.376 *
	(.02)	(.06)	(.04)	(.17)	(.02)	(.09)	(.04)	(.17)
Total number of investment rounds company received	-0.045 *	0.153	-0.066 ***	0.126	-0.098 ***	0.101	-0.100 ***	0.094
	(.02)	(.16)	(.02)	(.16)	(.02)	(.16)	(.02)	(.16)
Company age at time of exit (ln)	-0.035	-0.075	-0.044	-0.186	-0.085	-0.388	-0.088	-0.340
	(.07)	(.36)	(.06)	(.40)	(.08)	(.42)	(.07)	(.43)
Time to exit (in years)	0.028 *	-0.432 ***	0.032 **	-0.434 **	0.040 *	-0.362 *	0.040 **	-0.391 *
	(.01)	(.13)	(.01)	(.15)	(.02)	(.15)	(.01)	(.16)
Number of exit markets	-2.030 ***	2.378 ***	-2.077 ***	2.600 ***	-2.077 ***	2.531 ***	-2.101 ***	2.637 ***
	(.55)	(.28)	(.57)	(.34)	(.57)	(.33)	(.57)	(.36)
Outflow of exits from home market	0.480	0.809	0.520	1.095	0.935 **	0.963	0.862 **	0.973
	(.48)	(1.50)	(.41)	(1.34)	(.35)	(1.20)	(.33)	(1.15)
Inflow of exits to target market	-0.217	-0.187	-0.125	0.133	-0.054	0.181	-0.023	0.249
	(.19)	(.52)	(.19)	(.60)	(.21)	(.64)	(.21)	(.62)
Directed outflow from home to target market	13.607 ***	16.002 ***	11.267 ***	10.898 ***	9.696 ***	10.466 ***	9.181 ***	9.136 ***
	(.73)	(1.36)	(.74)	(1.87)	(.73)	(1.53)	(.72)	(1.82)
Relative activity of target market and home market	0.009	0.010	0.006	0.006	0.006	0.007	0.006	0.005
	(.01)	(.01)	(.01)	(.01)	(.01)	(.00)	(.00)	(.00)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.949 *	-9.685 ***	-1.399 +	-7.214 ***	-1.785 *	-7.729 ***	-1.424 +	-6.525 ***
	(.84)	(1.85)	(.83)	(1.57)	(.82)	(1.54)	(.82)	(1.49)
Observations		35964		35964		35964		35964
Log likelihood		-1659.0		-1591.6		-1564.2		-1544.5

Clustered standard errors in parentheses. Results marked with ***, **, and * are significant at the .001, .01, and .05 levels, respectively. One-tailed tests for hypotheses; two-tailed tests for controls.

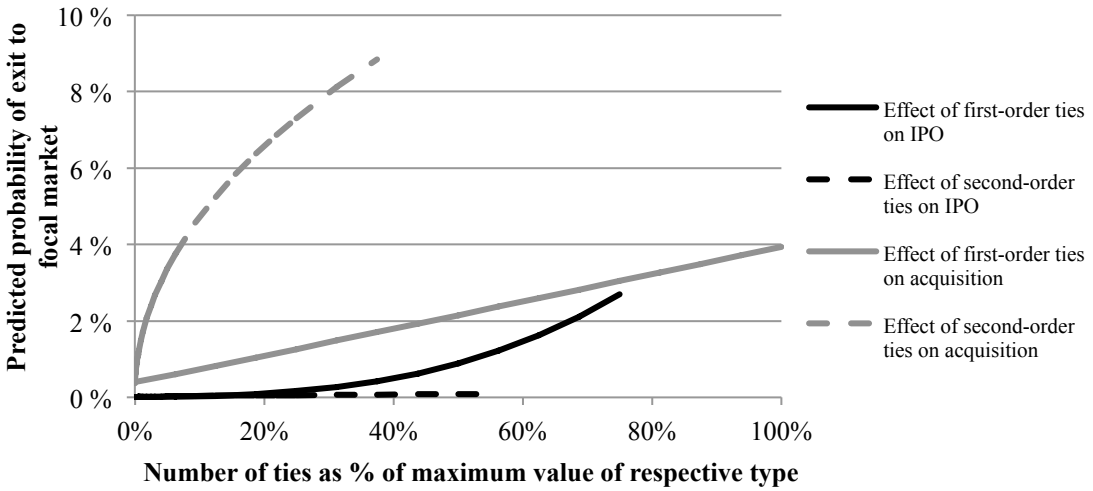

Fig. 3. The predicted probability of a type of exit to the focal market for a given level of ties.
The x-axis presents the number of first- and second-order ties scaled by the largest number of ties of the res
types (8 for direct ties and 1,600 for second-order ties). The predicted values are estimated using Model 4 in T
The solid and dashed lines present the effects of first- and second-order ties, respectively. The lines are es
over the range of empirically observed maximum values of specific tie types associated with respective exi
For IPO exits, the maximum numbers of first-order and second-order ties are 6 and 850, respectively, and fo
sale exits, the maximum numbers of first-order and second-order ties are 8 and 628, respectively.