Team up! How co-investments of BA and VC investors influence the venture performance

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ABSTRACT

Ventures are financed by various investor types, in which Business Angels (BA) and Venture Capitalists (VC) play a major role in the early funding stages. Recently, researchers have analyzed syndicated investments, in which the two investor types participate in the same funding round, so-called co-investments. Research on this phenomenon seems both from a theoretical as well as the practical perspective of high relevance, but existing studies are limited on the question of whether co-investments are successful or not. Therefore, research on the conditions and reasons which are determining the outperforming co-investments remains scarce. This study aims at closing this gap by investigating the impact of investor characteristics and their level of heterogeneity amongst the syndicate members on venture performance. We hereby take the resource-based view into account and analyze the preconditions of successful co-investments, although the multi-principal situation could cause conflicts due to differing objectives. We use Cox proportional hazard models and a large-scale dataset with almost 2,500 venture fundings from 2005 to 2019 to find support for our hypotheses.

Keywords: Entrepreneurship; Business Angel; Venture Capital; Co-Investment; Syndicate; Value-adding theory; Resource-based view; Multi-prinzipal situation; Venture performance

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Introduction

> *"It takes two flints to make a fire." - Louisa May Alcott, American novelist, short story writer, and poet (1832-1888).*
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> *"The union of opposites, in so far as they are really complementary, always results in the most perfect harmony; and the seemingly incongruous is often the most natural." – Stefan Zweig, Austrian novelist, and biographer, 1939.*

Ventures are financed by various investor types, in which Business Angels (BA) and Venture Capitalists (VC) play a major role in the early funding stages. Venture Capital is a special area of the investment market in which high-risk investments are made in new companies with no established track record in exchange for equity and returns are generated through exit events such as an IPO or acquisition (P. Gompers & Lerner, 2002; Li & Mahoney, 2011). Although a significant share of these funding rounds results from multiple investor types, existing research applies mostly an isolated view on single types (Wallmeroth, Wirtz, & Groh, 2018).

Previous studies define joint investments of the two aforementioned investor types participating in the same funding round as so-called co-investments (Harrison & Mason, 2000). Entrepreneurial literature on both BA and VC investors builds the basis for this phenomenon. Whereas BAs are known as high-net-worth individuals with key capabilities such as profound industry and operations expertise, VCs are described as finance professionals with strong skills in strategy, screening, and monitoring (Bonnet & Wirtz, 2012; Maula, Autio, & Murray, 2005). Besides this, the literature describes conflicting objectives of the two investor types such as different expected time horizons of financial returns (T. Hellmann & Thiele, 2015).

Research on this phenomenon seems both from a theoretical as well as the practical perspective of high relevance, but existing studies are focused on the question of whether co-investments are successful or not (Croce, Guerini, & Ughetto, 2018). Based on the resource-based view, co-investments are expected to have a positive effect, whereas the multi-principal situation could cause conflicts due to differing objectives (Chahine, Arthurs, Filatotchev, & Hoskisson, 2012; Das, Jo, & Kim, 2011; T. Hellmann & Thiele, 2015). The contradictory effect of value-adding resources and conflicting objectives on venture performance has been examined in the light of a resource-based view and the principal-agency theory (Bonnet & Wirtz, 2012). Accordingly, complementary resources may result in better performance rates (Croce et al., 2018), whereas

different objectives in the multi-principal situation may lead to additional costs (Colombo, Croce, & Murtinu, 2014; Elitzur & Gavious, 2003).

However, research on the conditions and reasons which are determining outperforming co-investments remains scarce (Cumming, Deloof, Manigart, & Wright, 2019; Wallmeroth et al., 2018). The fact of unclear investor contributions and performance outcomes raises the question, which configurations and reasons lead to successful co-investments of BA and VC investors. This remains unanswered in academic research yet, although the occurrence of this phenomenon is increasing in practice (Cumming et al., 2019). Thus, this study aims at closing this gap by investigating the investor characteristics as well as the level of heterogeneity within the investor group to find out, which investor constellations increase the chances for a venture IPO or acquisition event. Criteria such as the portfolio focus, prior investor dyads, educational level, and geographical location build the research focus as we know their important role from entrepreneurial literature (Drover et al., 2017; Plagmann & Lutz, 2019).

Based on the syndication literature, a co-Investment of BA and VC investors arises when at least one of each type invests in the same company in the same funding round (Bonnet & Wirtz, 2012; Bygrave, 1987, 1988; Lerner, 1994). This investment behavior describes a voluntary commitment by both parties to a long-term cooperative relationship in which the investors bring in their knowledge or resources and share a payoff (Wright & Lockett, 2003). Henceforth, co-investments are similar to strategic alliances, since this inter-firm cooperation mode describes contributions by the alliance partners in sharing and co-development of capital, technology, or other assets (Ranjay Gulati, 1995). Previous literature supports this connectedness and states that syndicated investments are motivated by seeking quick access to complementary assets (Brander, Amit, & Antweiler, 2002; Bygrave, 1987; Deeds & Hill, 1996; Eisenhardt & Schoonhoven, 1996; Parkhe, 1993), or valuable external resources (De Clercq & Dimov, 2008). Finally, rationales for syndication can be sharing financial risk, portfolio diversification, and increasing deal flow (Lockett A. et al. 2006; Lockett & Wright, 2001; Norton & Tenenbaum, 1993; Sorenson & Stuart, 2001).

With a focus on VC investor types, Brander et al. (2002) find that syndicated investments have higher returns and explain this with the value-adding theory. Research by Cumming, Schmidt, & Walz (2010) and Tian (2012) reach similar conclusions, that ventures backed by VC syndicates are more likely to have a successful exit, and receive a higher IPO market valuation.

Further, Lerner (1994) has examined which investors invest together and finds that experienced VCs tend to make investments with similarly experienced investors. Another study supports these findings but argues that investors may benefit more from co-investing with partners that are different from them (Du, 2016). Sorenson & Stuart (2008) found that VCs with different locations or preferences invest with each other when the venture environment has low uncertainty. Concluding from this, there is a connection between different investor characteristics as well as their relation to each other.

Concerning the value-adding theory and thus the opportunity to bring together complementary assets in co-investments, the two investor types BA and VC differ in their resources, as described above. Even if this description does not apply to every individual case, the respective types tend to be characterized in this way. First, while some researcher doubt that business angels add significant value to ventures (Chemmanur & Chen, 2006; Fairchild, 2011), most studies state that the active involvement in the operational and strategic business, as well as the ability to support in providing access to follow-up fundings, are important contributions for the venture success (C. M. Mason & Harrison, 2002; Politis, 2008; Roger Sørheim, 2005). Politis (2008) provides more details with an explorative study and describes key assets such as strategic involvement, advisory of the founding team on important decisions, monitoring, and acquisition of resources. Brettel (2003), and Prowse (1998) highlight the non-financial value-add of knowledge transfer in various functions and in the industry, which provides the foundation for the ventures' survival and future growth. Since business angels often have entrepreneurial experience of their own and contribute with hands-on involvement during the post-investment phase, they are often described as co-entrepreneurs of the portfolio venture (De Clercq, Fried, Lehtonen, & Sapienza, 2006; Morrissette, 2007; Prowse, 1998).

Second, existing literature reveals that independent VC investors are more involved in their portfolio companies than other types of VC investors (Bottazzi, Da Rin, & Hellmann, 2008; Knockaert & Vanacker, 2013), but findings on the impact on venture success are ambiguous. Some studies suggest that VC firms may not significantly contribute to the venture success (Busenitz, Fiet, & Moesel, 2004; Gomez-Mejia, Balkin, & Welbourne, 1990; Steier & Greenwood, 1995), others find strong support for nonfinancial value-added effects (T. Hellmann, 2000; T. Hellmann & Puri, 2002; Macmillan, Kulow, & Khoylian, 1989; H. J. Sapienza, 1992). Research often assigns VCs three distinct roles in which the investor relates

to the venture: (1) a strategic role in making important future decisions, (2) an operational role including the provision of knowledge and external contacts, and (3) a personal role as mentor and confidant (P. Gompers & Lerner, 2002; Macmillan et al., 1989; H. J. Sapienza, Amason, & Manigart, 1994). The post-investment phase is characterized by consistent monitoring, in which specific milestones are continuously checked and need to be met for follow-on funding rounds (Lerner, 1994; Pahnke, McDonald, Wang, & Hallen, 2015). This involvement in monitoring steams from potential objective incongruences and information asymmetries between the venture management and the investor (Ţurcan, 2008). On the other hand, business angels often tend to invest based on a "gut feeling" and do not spend as much effort on due diligence and contracting as VC firms do. Instead of monitoring measures, informal investors bridge the information gap with a close relationship to the founder team (Morrissette, 2007).

Hence, resources and investment behavior differ for the two investor types and in the principal-principal situation of a co-investment (Wright & Lockett, 2003). While this can have a positive impact on portfolio companies, it also creates room for potential conflicts and additional costs for principals. Thus, a lack of evidence leads Cumming et al. (2019) to argue, that "more insight is needed into how and in which circumstances different types of investors […] interact to create value and to minimize principal-principal problems." Previous research of Hellmann & Thiele (2015) supports the two-sided argumentation, that the angel and VC market are "friends," where informal investors provide VC firms additional deal flow, while VCs provide requested follow-on capital. On the other hand, the two investor types are simultaneous "foes" in that business angel and VC collaborations may dive into conflicts about valuations, and so forth.

Nevertheless, the decision by an investor to participate in a funding round depends on the expectation of a successful growth story and exit of the venture (Cumming & Johan, 2008; Espenlaub, Khurshed, & Mohamed, 2015). Bruton et al. (2010) present in their study that business angels provide "value-enhancing effects" that are reflected in IPO performance of the venture and that angel involvement positively influences the relationship between slack resources and venture performance (Garry D. Bruton, Chahine, & Filatotchev, 2009; Drover et al., 2017; Vanacker, Collewaert, & Paeleman, 2013). Thereby, successful exits are not just critical for the investors, but also the portfolio companies and the complete ecosystem (Bottazzi & Da Rin, 2002). If investors do not receive a corresponding return from their investments,

they cannot put the money into follow-on investments (Schwienbacher, 2008), which would limit entrepreneurial activities in an economy.

In summary, previous studies have identified many findings of the two types of investors, especially for investment syndicates of a single type. For example, VC syndication literature states that syndication increases the likelihood of a successful venture exit (Jääskeläinen, 2012). There is even preliminary evidence that co-investment by BA and VC investors increases the likelihood of success for a venture IPO or acquisition event (Croce et al., 2018). However, to our knowledge, understanding the exact reasons and differences between successful and unsuccessful co-investments has been neglected, yet. This paper, therefore, investigates how the relative influence of a heterogeneous group of two investor types in a consortium affects the probability of a successful exit, focusing on certain characteristics of the investors as well as their heterogeneity.

To test the hypotheses, we gathered a sample of almost 2,500 US ventures that received funding from both BA and VC investors in simultaneous first funding round during the years 2000 and 2019. We applied a Cox proportional hazard model to analyze the probability of a successful venture exit and verify our results with several robustness tests. Our survival analysis treats 'time to acquisition or IPO' as the dependent variable that measures the time between the first funding round and exit event of the venture.

Our study contributes to research on co-investments of BA and VC investors, venture exit performance, and entrepreneurship. First, this paper advances the BA and VC investor literature with insight into the success factors of co-investments by the two types of investors. Our results reveal that distinctive resources and investor roles are determining the likelihood of a ventures' IPO or acquisition event. Second, we advance a theoretical understanding of the interrelated effects in co-investments between the value-adding theory and potential misunderstandings caused by the multi-principal situation by examining multiple investor characteristics on venture performance. Finally, and contrary to most existing studies, we can establish our results based on a large-scale dataset and extensive regression approaches. Besides theoretical contributions, our research helps practitioners to understand which investor characteristics and conditions of co-investments are promising. It also provides guidance for policy-makers on which investment constellations lead to high-performance rates and, therefore, promote the overall ecosystem.

Conceptual Framework and Hypotheses

The introduction has explained the background of this study with findings from previous literature and derived the research question. We raise the question of which investor-related characteristics and their relationship within a co-investor group of BA and VC investors lead to a successful exit event of the portfolio company. Hereby, the definition of a co-investment follows existing literature as a simultaneous financial equity investment within a defined timeframe of two or more different investor types in one venture (Cumming et al., 2019; Wallmeroth et al., 2018), whereas the scope of our analysis are BA and VC investor types. Since the research question is related to the characteristics of the investor types, these build the main focus of the following section, where we discuss our hypotheses based on theory and previous findings.

Business Angels as informal investors are defined as high-net-worth individuals, who invest their private capital in high-risk entrepreneurial ventures (Freear, Sohl, & Wetzel, 1994) and follow financial return goals without a fixed time horizon. Angel investors are often involved in venture operations and day-to-day business (Drover et al., 2017), whereby few studies even argue that they tend to invest for non-economic reasons, such as the intrinsic motivation to support new venture growth with their time and energy (Baty & Sommer, 2002). On the other hand, Venture Capital firms as institutional investors are finance professionals, who manage other investors‘ money (Bonnet & Wirtz, 2012) and often take post-investment strategic roles in the venture management, e.g. board seats (e.g., Berger & Udell, 1998). Primary investment motivations are financial returns with timely exits, and VCs usually have possibilities to participate in subsequent rounds and therefore often appear powerful, e.g. in term sheet negotiations (Harrison & Mason, 2000). As a result, VCs have a significant influence on the venture development and over the ventures' outcomes (Hochberg, Ljungqvist, & Lu, 2007; Lerner, 1994; Lungeanu & Zajac, 2016; Ma, Rhee, & Yang, 2013). Since BA investors also influence the venture and its success through their close mentoring role in the daily business, the strong link between investor's input and venture outcomes allows us to examine the probability of a successful IPO or acquisition event as an indicator of co-investment performance in this research model.

Taking the resource-based view, we assume that different resources of the two types of investors complement each other and thus lead to a positive impact on co-investment. However,

with regard to the multi-principal theory, the diversity of the investor types is accompanied by the possible disadvantage that different goals and expectations of the investors lead to potential conflicts and thus to additional costs that reduce the chances of success (Bertoni, Colombo, & Grilli, 2013; Chahine et al., 2012; Kang, 2019). Previous studies from the VC syndication literature find this effect in the light of different VC investor types (e.g. Corporate Venture Capital) and presents that multiple syndicate members compete for the influence over the portfolio company in order to achieve their interests (Park & Steensma, 2013; Park, LiPuma, & Park, 2017).

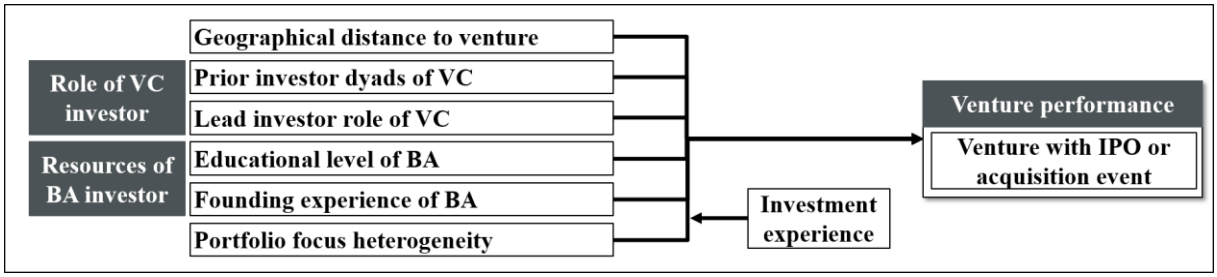

Figure 1: Conceptual Framework

In our study, we assume that the first effect can significantly outweigh the second argumentation if the investor types have a strong expression of their resources. In addition, recent studies from the VC literature indicates that similarities between the personal characteristics are a determinant for syndicate occurrence of the same investor type (Du, 2016; Gompers, Kovner, & Lerner, 2009), so that we do not expect a fundamental difference in exit strategy goals and even stronger demands on the similarity of the investors in co-investments, as they are different investor types. Heukamp et al. (2007) supports this argument in their survey-based study and find that BA's and VC's goals are substantially aligned. Consequently, we take characteristics such as the educational level and the founding experience of the business angel, as well as prior investor dyads and the lead investor role of the VC, and examine their influence on the performance of the portfolio company. In addition, we consider the composition of the investor types per funding round and their respective industry experience or geographical location.

The effect of geographical distance on the venture

For our first hypothesis, we investigate to what extent the geographical location of investors to the venture can influence the respective probability of success for a successful exit event. For this purpose, we consider in particular the respective findings from the VC and BA literature

and finally discuss them against the background of the previously explained value-adding and multi-principal theory.

Both BA and VC investors, tend to invest in deals that are in close geographical proximity to their location in order to mitigate potential information asymmetry challenges between investor and venture management (Cumming & Dai, 2010). Being close to the funded venture allows the investor to monitor more closely and to integrate mentoring activities in the daily business. Hence, it enhances the quality and quantity of the interaction between investor and venture (P. M. Lee, Pollock, & Jin, 2011; Sorenson & Stuart, 2001). Previous studies even discuss that the local bias has important implications for the venture performance so that local ventures of investors are more likely to achieve a successful exit event (Manigart & Wright, 2013). This reasoning should also mean that ventures with high proximity to the investor group of a co-investment of BA and VC investors have a particularly good chance of success in the case of co-investments.

The VC syndicate literature, on the other hand, often highlights the phenomenon of cross-border investments, in which a local and a foreign investor fund a venture. Existing studies find that ventures backed by a syndicate comprising both domestic and cross-border VC investors lead to an outperforming venture success (Chemmanur, Hull, & Krishnan, 2016; Dai & Nahata, 2016; Kong, Nitani, & Riding, 2016). In this context, it becomes clear that in such a constellation, the respective investors contribute their resources in a complementary manner based on their capabilities and do not hinder each other. In the context of co-investments, this mechanism would also suggest that the investor group does not necessarily have to be close to the venture in order to be particularly successful.

Concerning co-investments by BA and VC investors, the value-adding, as well as the multi-principal view, is of particular importance. Insights from the syndication literature reveal that competition among the investors within an investment syndicate negatively affects the probability of IPO venture success because investors hold back resources in order not to lose their unique selling points to competitors (Makarevich, 2018). Further, Clashes among the syndicate members reduce the efficiency of the investor group and make mentoring and providing clear guidance to the venture management more challenging (Ma et al., 2013; Makarevich, 2018). First, we conclude that in the multi-principal situation with the potential of different investor goals, each of the parties will try to keep its influence at least large enough to

achieve its interests. Second, investors will be able to bring in complementary resources with full potential if they have the opportunity to do so, which generally works well at a short geographical distance. As a result, these aspects suggest that the geographic proximity of the investor group in co-investments tends to be low for a high probability of ultimate venture success.

Similar to (Sorenson & Stuart, 2001), we control the potential intensity and frequency of the interaction between the investors and the venture, which may influence the mentoring and coaching possibilities (Lee et al., 2011). Since the investors' involvement influences the likelihood of an IPO or acquisition event, we postulate the following hypothesis.

***Hypothesis 1*:** Geographic distance of the investor group to the venture is negatively associated with a higher probability of an IPO or acquisition event of the portfolio venture

The role of the VC investor

In addition to financial resources, new ventures often lack necessary intangible resources such as human capital and access to networks, or reputation, to fully realize their potential and grow (Block et al., 2019; Bonini, Capizzi, & Zocchi, 2019). Existing literature confirms that VC firms provide financial and non-financial support to their investees (Large & Muegge, 2008). For example, investors with a large and high-quality network can serve a ventures' need for further resources and thus help the startup gain a better position (Plagmann & Lutz, 2019). Venture capital firms can facilitate information flows in their networks (R. Florida & Kenney, 1988; Lam, 1991). In this connection, literature often stresses the importance of networks in venture capital financing and quotes "it's not just what you know, but whom you know" (Werth & Boeert, 2013; Zheng, 2004). In entrepreneurial finance, investor networks commonly arise from former co-investments with others. Previous research supports this thought and finds that particular resources that firms receive from their networks are often contingent on the structure of existing ties among those partners (Hoehn-Weiss, Karim, & Lee, 2017; Reagans & McEvily, 2003; Zhang & Guler, 2020).

Since early-stage investors often learn about potential deals through personal contacts in the entrepreneurship scene, a network is of great concern to investors out of self-interest anyway. Previous studies show that VC firms with broader networks have access to a wider range of potential investments (Sorenson & Stuart, 2001) and better-networked VCs can significantly

increase their fund performance (e.g., Dimov & Milanov, 2010; Hochberg et al., 2007). The latter find after controlling for other determinants of investor performance, that valuable networks lead to a higher rate of successful portfolio exits over ten years as the most important factor. Dimov & Shepherd (2005) argue from a human capital approach that the general capital of VC firms has a positive on the portfolio venture IPO possibility, while specific human capital of the investment managers did not affect the venture success event occurrence. Others even find that venture capital alone does not generate economic development and entrepreneurship, but well-networked investor networks stimulate the entry of new ventures in high-technology industries (Florida et al., 1988). Consequently, a large network is of great interest to the VC investors themselves, while at the same time it can be of benefit to the portfolio ventures (Casamatta & Haritchabalet, 2007; de Prijcker et al., 2012).

In addition to their capital, the networks for VC firms to other capital providers, startups as well as the industry contacts of their startups are of high importance as social capital. Previous literature reveals that these contacts are used to connect portfolio ventures with key resource providers, such as potential partners (Hallen, 2009; Huang, Shangguan, & Zhang, 2008; Pollock & Gulati, 2007; Riyanto & Schwienbacher, 2006; Wang & Wang, 2012), media representatives (Santos & Eisenhardt, 2009), and service providers (Elfring & Hulsink, 2003). Hereby, particularly high interest is to enable startups to achieve a successful exit (Hallen, 2009; Hochberg et al., 2007; Lerner, 1994). For example, ventures can professionalize their human resources more quickly with the help of their VC investors (de Carvalho, Calomiris, & de Matos, 2005; T. Hellmann & Puri, 2002), so that a good network can be used to recruit suitable managers (de Carvalho et al., 2005). VC firms, therefore, have a strong motivation to optimize their network and use that to support their portfolio ventures.

Venture investments in an early phase are made with a high degree of uncertainty as to whether the capital invested will pay off. Investors particularly take into account which other syndicate members potentially participate in the focal funding round. The uncertainty as to whether the resources of the other parties are truly complementary and valuable, as well as whether the goals are not divergent, will only become clear in the post-investment phase. However, this uncertainty can be reduced, for example, by the fact that an investor already knows other parties from the funding round from previous investments. The social capital theory underlines this by the argumentation, that social connections explain how individuals interact with each other in

networks by forming ties (Brian, 1999; Burt, 1997; Granovetter, 1973; Shane & Cable, 2002). Investors highly rely on their network and decrease risks with familiar partners, since trust is one of the key determinants of success in collaborations (Dyer & Singh, 1998). Repeated relationships between investors may build trust and result in one investor gaining an understanding of the capabilities and expectations of the partner, thereby reducing risks for future transactions (R. Gulati, 1995). Furthermore, opportunistic behavior can be reduced through high levels of trust (Ganesan, 1994; Hill, 1990), and instead promotes the constructive transfer of resources (Kale, Singh, & Perlmutter, 2000; Zaheer, McEvily, & Perrone, 1998). We conclude from these arguments that an investor group with already known investor relationships is more likely to focus on the collective goal and have a mutual understanding of who best contributes which resources. This effective approach leads to maximizing the value-add to the venture as well as reducing the risk of conflict. From these explanations, we hypothesize:

***Hypothesis 2*:** High number of prior investor dyads is positively associated with a higher probability of an IPO or acquisition event of the portfolio venture

Syndicated investments are usually accompanied by a lead investor who primarily negotiates the investment details with the venture management for the entire investor group (Plagmann & Lutz, 2019; Wright & Lockett, 2003). Comparing the two investor types of BA and VC investors, it becomes clear that VC investors have a heavyweight role in this due to the professional organization and the large investment opportunities due to the high capital assets in the investment funds (Harrison & Mason, 2000). VC firms have a high level of experience in contract design, monitoring, and investment processes (Bonnet & Wirtz, 2011; T. Hellmann, 2002). Furthermore, since VC firms possess strong business expertise, they are more likely than founders aware of potential opportunities and threats in the business environment (Hsu, 2006). Implementing a governance mechanism by securing a board membership and concluding contracts provides participation and decision rights for the lead investor and influences the ventures' economic development. These competencies are important to successfully fill the role of the lead investor and thus to put the investment on a professional basis for both sides.

Second, given the heterogeneity in a co-investment of BA and VC investors, the successful exit of the venture depends not only on the respective resources of the investors but also on which investors prevail by playing a dominant role in the discussion of the set goals (Kang, 2019). In

this context, we argue that the VC investor has the best chances to do so due to its strong position and in the lead investor role and therefore pushes an IPO or acquisition event of the venture (Berger & Udell, 1998). For these reasons, we assume that a VC investor as lead investor increases the probability of an IPO or acquisition event of the venture and formulate:

***Hypothesis 3*:** Lead investor role by a venture capital firm is positively associated with a higher probability of an IPO or acquisition event of the portfolio venture

The value-adding resources of the BA investor

Based on Sørheim & Landström (2001), the concept of competence can be divided into four subcategories: knowledge, skill, will, and situation. This concept is based on various studies and assumes that competencies are not only composed of knowledge and skill but also the will to use them in a specific situation (e.g., Teece, Rumelt, Dosi, & Winter, 1994). As a proxy for the "will" dimension and thus a measure of activity, we have already discussed the geographic location of the investor to the venture. In connection with the resources to be contributed by the BA investor, skills and knowledge play a particularly important role. In the operationalization of the concept, we therefore use, similar to Sørheim & Landström (2001), the educational level as the theoretical knowledge and the previous founding experience as the practical knowledge as criteria for determining the individual resources.

First, the educational level can be seen as human capital with a persistent signal and static resource of an investor (Ko & McKelvie, 2018). This resource has been discussed in the entrepreneurial literature, particularly in the context of the founding team and the signaling effect of perceived skills and abilities (Becker, 1964; Shane & Stuart, 2002). Recent studies even reveal that founders with high human capital tend to set up high-performance goals and ultimately achieve them (Cassar, 2006, 2007). Furthermore, the link between higher levels of education and innovation (Bantel & Jackson, 1989; Freel, 2005; B. Lee, 2019), as well as the link between human capital and the ability to run fast-growing businesses (B. Lee, 2019; H. J. Sapienza & Grimm, 1997; Storey, 1994), show that educated individuals are more successful in managing their business. Maula et al. (2005) argues from a planned behavior theory that high educational levels are connected to the belief in one's capabilities to make successful investments. Not surprisingly, a typical informal investor is well educated (Freear et al., 1994; Harrison & Mason, 2000) and prior studies have found that in the United States 82% of the business angels had at least undergraduate degrees (Aram, 1989). Applying these findings to

the business angel investor, we assume that a higher educational level tends to lead to better mentoring resources and that this has a positive effect on the venture. Hence, we formulate:

***Hypothesis 4*:** High educational level and previous founding experience is positively associated with a higher probability of an IPO or acquisition event of the portfolio venture

In addition to theoretical knowledge at an educational level, the practical experience of mentors as human capital is also significant for the success of ventures. Business angels are particularly suitable for this type of coaching, as they are often described as being close to the entrepreneur (Kelly & Hay, 2003) and are often involved in the daily business of the startup out of intrinsic motivation (Drover et al., 2017). Their post-investment role is focused on hands-on support and operations (C. Mason, Botelho, & Harrison, 2016). First-hand practical experience from own start-up projects can be of particular advantage, from which a venture can benefit in various issues (Hsu, 2007; Ko & McKelvie, 2018). From these explanations, we assume that a BA's own start-up experience develops coaching resources particularly valuable and formulate:

***Hypothesis 5*:** Previous founding experience is positively associated with a higher probability of an IPO or acquisition event of the portfolio venture

The effect of complementary resources

The different types of investors in a co-investment of BAs and VCs lead to different resources in different dimensions that are ideally complementary. This consideration refers to resources that provide a value-added contribution to the portfolio venture, rather than different objectives that could lead to conflicts. According to previous findings, this can be advantageous for the venture as different opinions and meanings of syndicate members can stimulate innovative thinking and lead to more comprehensive decisions (Shin, Kim, Lee, & Bian, 2012; Simons, Pelled, Smith, Simons, & Smith, 1999). The VC syndication literature provides evidence that different resources with a complementary character are a motivation to mutually participate in a funding round. For example, while independent VCs may add value with strong monitoring and consultancy activities (Andrieu & Groh, 2012), corporate VC firms contribute with value in the areas of market access, technical advice, and supply chain knowledge (Katila, Rosenberger, & Eisenhardt, 2008) and bank-affiliated VC firms can support with insights into securing future loans as well as interest rates and fees (T. Hellmann, Lindsey, & Puri, 2008). Meuleman et al. (2006) find that investors are more likely to select partners for co-investments

with complementary skills. Hopp (2008) supports this argumentation and focuses the selection criteria on experience in a particular industry of the target venture.

VC investors gain their knowledge about industries to a large extent from the investments they have already made. Therefore, it is also clear that the investments made can either lead to a specialization or a broad diversification of industry experience and reflect a part of the investment strategy of the VC (Antretter, Sirén, Grichnik, & Wincent, 2020; Manigart & Wright, 2013). Investment strategies always refer to the management of risk, whereby these can be differentiated between systematic and unsystematic risks. While systematic risk refers to the effects of the entire market or economic sectors, unsystematic risk arises from the company- or other asset-specific effects (Norton & Tenenbaum, 1993). On the one hand, broad diversification is a well-known means to control investment risks by reducing systematic sector or market uncertainties. On the other hand, Bygrave (1987, 1988) argues that following a specialization strategy can also be a useful risk-reducing strategy due to gaining a high degree of network, information, and industry experience. Thus, while some investors prefer to diversify their investments broadly across different industries to reduce their financial risk, other investors prefer to focus on specific expertise within a particular industry by specializing in investments to reduce uncertainty at and after the investment decision (Lockett & Wright, 2001; Norton & Tenenbaum, 1993; H. J. Sapienza, 1992; H. J. Sapienza et al., 1994). For example, an investor with deep industry knowledge may find it easier to identify management incompetence or other critical information regarding business performance due to the more in-depth industry understanding (Norton & Tenenbaum, 1993). According to previous findings, this can be of high importance in the case of high-tech investments, since this kind of funding deal can be characterized by high levels of informational asymmetry (H. J. S. Sapienza & de Clercq, 2000). Matusik & Fitza (2012) finds that both highly specialized as well as highly diversified VC firms lead to a higher percentage of IPO in the investment portfolio. Similar findings support this argumentation for informal investors with regards to serial and non-serial angels (Aram, 1989; Ehrlich, De Noble, Moore, & Weaver, 1994; Freear & Wetzel, 1990; Van Osnabrugge, 2000). Hence, and following previous literature (Antretter et al., 2020), we conclude that one strategy is not necessarily better than the other, but builds up different resources of knowledge with the respective investor.

Summarizing the arguments, we derive from previous findings and value-adding theory that complementary resources are an ideal mix to increase the probability of successful venture development and therefore formulate:

***Hypothesis 6*:** A high heterogeneity in the investment industry focus is positively associated with a higher probability of an IPO or acquisition event of the portfolio venture

The moderating effect of investment experience

First, we would like to highlight previous findings from the syndicate literature in which investment experience mostly has a positive impact on venture success (Espenlaub et al., 2015; Sorensen, 2007). This is argued by the fact that investors gain deep levels of experiential knowledge from previous investments related to specific industries (Phalippou & Gottschalg, 2009). Giot and Schwienbacher (2007) present in their study that more experienced VC firms help facilitate successful exits of ventures through their expertise. By contrast, Gomper's (1996) grandstanding hypothesis formulates that young and inexperienced VC firms lacking proven track records of successful investments and, therefore, try to accelerate IPO or acquisition events. Hence, we might expect that ventures backed by VC firms with little experience will be more likely to achieve a timely exit (Espenlaub et al., 2015).

Considering the signaling theory, the theoretical VC syndication literature puts high emphasis on investment experience as a signal for partner selection (Casamatta & Haritchabalet, 2007). However, Hopp et al. (2014) argue that experience is likely to be an imperfect proxy for investor quality. Therefore, we assume that the signaling effect of the experience on other investors does not have a significant impact on our research model.

Instead, an important finding from the previous literature is that as the number of investments increases, so does the investor's portfolio size. Thus, an obvious argument is that the time an investor can invest per venture decreases with the number of portfolio ventures (Seppä, 2006). This in turn means that the investor can put less of his resources into the investment, which will have a negative impact against the background of the value-adding theory.

In the context of resource heterogeneity, we can assume that investors with a high level of experience steadily make up for missing knowledge and thus suffer less from a lack of certain resources. Therefore, we assume that the effect between heterogeneity of investors' industry experience and venture success wears off as investors' experience increases.

***Hypothesis 7*:** High investment experience negatively moderates the relationship between portfolio focus heterogeneity and venture success

Methodology

Data and Sample

We used Crunchbase as the main source, and matched data on venture and investor level with Refinitiv EIKON (Kwon, Lowry, & Qian, 2020) and added industry information of the Compustat database. TechCrunch's Crunchbase is one of the most comprehensive and regularly updated databases that brings together information on ventures, investors, and investments (Homburg, Hahn, Bornemann, & Sandner, 2014; Ter Wal, Alexy, Block, & Sandner, 2016; D. Wang, Pahnke, & McDonald, 2021). The source exploits multiple data collection approaches to provide timely and correct data. Especially for our purpose, Crunchbase is an excellent source, as it captures highly detailed longitudinal data on new venture fundings including non-institutional investors such as Business Angels. In comparison to the often used database Refinitiv EIKON, it does not only extend our sample but gives us a broad range of startup trajectories including young to established firms funded by early-stage investors. Nevertheless, we also take Refinitiv EIKON as an additional database to double-check and complement the data, e.g. the investor type classification, IPO and acquisition events, and the industry-level classification based on Standard Industrial Classification (SIC) codes. By using complementary sources, we increase the completeness and accuracy of our sample.

Crunchbase raw data from July 2019 build the basis for our dataset, including all relevant information until this date. We took several steps to delimit the data and develop our sample of analysis. In the first step, we specified the funding rounds relevant for the analysis and excluded, for example, all investments classified as debt or loan funding rounds. We then followed Guler (2007) and redefined the funding rounds by grouping individual investment events within a period of 90 days into one funding round together (T. F. Hellmann, Schure, & Vo, 2015). In the next step, we filtered the whole dataset by the investments which are relevant in our context. For each venture, this is the first round in which either a Business Angel, a VC, or both investor types appear. We took this step and restricted our analysis to the first equity funding round per venture to ensure that potential path dependencies of previous fundings do not affect the probability of investor compositions in the round we analyze (Lei, Gupta, & Hallen, 2017a). Successful new ventures typically receive staged capital over several rounds, with the first round representing the initial funding from investors. Subsequent rounds of funding are usually

made depending on the startup's achievement of certain milestones (Gompers, 1995) and thus differ qualitatively from the initial investment decisions (Podolny, 2001). It is therefore common that follow-on rounds may involve both the same and new investors concerning the previous round, as they are associated with different motivations and strategies (Lerner, 1994; Sorenson & Stuart, 2008). Hence, we focus on the first funding round in this study, as this is when the decision to merge different types of investors is least influenced by events that occurred prior to the focal investment (Lerner, 1994)(Lerner, 1994).

In the second step, we assigned each investor a unique investor type based on the database information using a multi-step approach. To avoid any bias resulting from the differing objectives of various types of Venture Capital providers (i.e. Corporate Venture Capital, Private Equity), we determine independent Venture Capital firms as VC investors and classify those Venture Capital funds which belong to a corporate firm as Corporate Venture Capital (CVC). Besides the clear definition of BA, VC, and CVC investors, we determine the residual investors as “others” and keep those within relevant funding rounds.

In a third step, we followed most studies of our research stream and restricted our sample to US-based ventures because it is the most active and largest technology startup ecosystem in the world. Additionally, we excluded ventures with the first relevant funding round before the year 2000. Since we want to measure the success of investments in the form of IPO and M&A events, we have to take into account the time lag between the first funding round and these events. We consider this with a time span of four years, based on previous literature (Dai & Nahata, 2016; Park, H. D. & Steensma, 2013; Seppä, 2006). As the funding amount is a very important control variable, we reduced those funding rounds with undisclosed investment volumes. We also assigned one main industry classification for each venture in the form of a two-digit SIC code based on the industry classifications in Refinitiv Eikon and Crunchbase. As Crunchbase has a strong focus on IT-related firms, our sample consists mainly of ventures that belong to the two-digit SIC code group of 73. In the final step, we aggregated the data to the venture level, so that for each venture the funding round characteristics are summarized in the relevant variable constructs.

Modeling

Contrary to existing studies with limited sample sizes, we have developed a unique large-data sample with almost 2.500 cross-industry US-based ventures, that received co-investments by

BA and VC investors since the year 2000. Table 1 reports our variables and important descriptions such as mean, min, and max values. From the description of the data sample, 19% of ventures that received initial funding round through a co-investment from BA and VC investors later have an IPO or acquisition event.

To test our hypotheses and verify the robustness of our results, we apply multiple regression models and use a Cox proportional hazard regression model to measure the probability of a successful exit of a venture (Cox, 1972), which is frequently used in entrepreneurial literature to study venture performance rates (e.g., Kang, 2019; Nahata, 2008; Shane & Stuart, 2002; D. Wang et al., 2021). A hazard model uses event timing to estimate the likelihood of a successful event of a venture. In our study, the timing frame is the difference between the first investment round until the success or failure event. We include the founding date of each venture to control for time-specific event conditions in our data sample and report coefficients, not hazard rates in Table 3. Our approach allows us to account for the right-censored issue in the dataset so that we do not know whether active firms in the later period would go public or bankrupt after the observation period. The probability of a venture's IPO or acquisition is captured by a hazard, which is a function of a vector of covariates (independent and control variables). Based on this hazard, we can use the aforementioned model to identify the determinants of the event. Since ventures may fail before going public, which would cause a selection bias, we include them in our model. To further validate or model, we tested the proportional hazards assumption using Schoenfeld residuals and find no violations (Schoenfeld, 1982). In addition, we verified the full model and used robust standard errors instead of random-effect models, and obtain similar results.

Measures

The variables from our research model are based on well-established constructs and are described in detail below. Due to the analysis on venture level, we group some information for each of the two investor types for each funding round in our dataset.

Dependent variable. Successful Co-Investment of BA and VC investor

The dependent variable in our study is a binary indicator variable that a venture had undergone a successful exit before July 2019. We follow entrepreneurial literature and classify initial public offerings (IPO) as well as acquisition events as successful exits (e.g., Chang, 2004; Kang,

2019; Kerr, Lerner, & Schoar, 2014; Nahata, 2008; Shane & Stuart, 2002). In this context, we point out that according to Amor and Kooli (2020) an M&A event is a comparable success measure to the IPO. Almost 19% (528) of the ventures in our sample have achieved a successful exit, whereby the proportion is higher than normal due to the exclusion of ventures with fewer than two investors (types).

According to previous studies, a venture's ability backed by equity investors to achieve an IPO depends to a significant extent on the investors' ability to support and contribute to this success (P. Gompers & Lerner, 2002; D. Ma et al., 2013; Makarevich, 2018). Hence, we focus on the probability of such an exit as a success indicator for the investors of the focal portfolio venture (P. Gompers & Lerner, 2002; Pollock & Gulati, 2007).

Independent variable: Geographical proximity between investors and venture

We obtained information about the geographical location (based on postal addresses) of the venture and the investors from the Crunchbase and Thomson ONE databases. After transforming address data in geodata of longitude and latitude values we calculate geographical distance using spherical geometry for each dyad between the venture and the investors in the focal funding round (Sorenson & Stuart, 2001) and then took the average of all dyads in a prospective investor group.

Independent variable: Prior investor dyads of venture capital investor

Based on previous studies (Bellavitis, Rietveld, & Filatotchev, 2019; De Clercq & Dimov, 2004; Lei, Gupta, & Hallen, 2017b), prior investor dyads are calculated as the sum of pairs an investor actively invested simultaneously in another venture within the 5 years prior to this investment (Lei et al., 2017b). According to the literature, this measure can only take the value 0 for no mutual prior investment or 1 for at least one mutual prior investment for each investor pair (Hallen, 2009; Hochberg et al., 2007; Sorenson & Stuart, 2001, 2008). This variable is dynamic and can change over time for each investor with investment activities. At the funding round level, we used the average value and grouped it for the venture capital investor type.

Independent variable: Lead investor role

An investment made by more than one investor is usually represented by a lead investor. We define a binary value that takes the value 1 if the venture capital investor type takes the role of the lead investor.

Independent variable: Educational level of business angel investor

The education data of Crunchbase related to the investors include data on the academic institutions as well as academic degrees, e.g. undergraduate, graduate, postgraduate (Ph.D., MBA). Based on previous studies, we measured investors' education as the highest completed degree and coded investors' education in ordered form, i.e., we coded a high school graduate as 1, bachelor's degree as 2, master's degree as 3, and doctorate degree as 4 (Dencker & Gruber, 2015; Gimeno, Folta, Cooper, & Woo, 1997; Hmieleski & Baron, 2009). We calculated the average number of all business angels in a funding round to determine the values.

Independent variable: Founding experience of business angel investor

Based on the findings of Bonnet & Wirtz (2012), we used a binary variable for the circumstance of whether a business angel had founded a company himself before becoming an investor. A former founder could contribute with extraordinary value due to the first-hand experience as a mentor to the startup.

Independent variable: Portfolio focus heterogeneity of the investor group

We calculate the industry portfolio focus of each investor, which is the quotient of the number of different industries in which the investor has invested and the total number of investments. Hence, an investor with a value of 1 is a specialist and an investor with a very low value holds a very wide brand range in industries in his portfolio. After taking the average value of each of the two investor types in a funding round, we use the difference of the values to define the heterogeneity of industry specialization of an investor group, regardless of how many investors are involved.

Independent variable: Investment experience

The variable of investment experience is defined as the number of all investments made by an investor in the last five years prior to the focal funding round. We take the average group value on venture level to consider the experience of the whole investor composition.

Control variables.

Besides the outcome and independent variables, several other factors may affect the direction and magnitude of the likelihood of the venture's exit, which we included as control variables.

Of particular interest are the data that describe the venture in more detail and the data that characterize the investor group.

To control for investment deal-specific characteristics that can determine the probability of venture success, we included several variables, such as the investment volume per funding round because this factor is seen in the existing literature as a driver for the formation of syndicates (e.g. Croce et al., 2018). The reason for this is simply the distribution of the necessary capital among several resource providers. Since this aspect could influence our analysis of the venture development, we consider the variable as a logarithmic value.

Since the age of a venture at the time of the first funding round could also be connected to the future success potential, our cox proportional hazard model considers the investment stage and time since the founding date of a startup as a variable in the model. Previous research presents that accelerator programs give ventures an extraordinary number of additional contacts of the investor landscape so that the investor group of the subsequent funding round and the subsequent success can be influenced (Cohen S., Fehder D., Hochberg Y., 2019; Hochberg, 2016). We control for this with a binary variable of accelerator program participation which takes the value one if the venture has participated in an accelerator program before the focal funding round. Furthermore, we include a variable that determines the customer focus of the venture (B2B, B2C), which could influence the odds of success in a certain industry.

Another factor that might influence ventures' development is the ecosystem in which the startup operates. Hence, we control for the venture's geographical location with a binary variable that takes the value one if the venture operates in a state with a commonly known entrepreneurial-friendly ecosystem. According to (G. Lee & Masulis, 2011), we define California and Massachusetts as those states with high-class entrepreneurial universities, established accelerators, and a high number of investors. The local proximity in these states to investors could influence the probability of important business contacts (Chahine et al., 2012; Falconieri, Filatotchev, & Tastan, 2019; G. Lee & Masulis, 2011).

The venture founder team size can have an impact on the venture development path as well as an influencing factor for the access opportunities to investors. We, therefore, control with the numerical count obtained from the Crunchbase database (Ko & McKelvie, 2018; Vanacker, Manigart, & Meuleman, 2014; Vanacker, Manigart, & Meuleman, 2014). Finally, we control for the industries based on the Crunchbase industry category list and a subsequent matching

logic with SIC codes. We include the total number of industries and use a set of binary variables for each industry which equals one if the venture operates in a specific industry, zero otherwise (Nahata, 2008).

Table 1: Overview of variables and descriptive statistics on venture level

Variable	Description	Mean	SD	Min	Max
Dependent variable					
BA & VC Co-Investment	Venture with successful exit (IPO/M&A)	0.19	0.39	0	1
Independent variables					
Geo. distance to venture	Distance betw. investor & venture (miles, avg.)	664	834	0	4357
VC investor dyads	Number of investor dyads (prior 5 years, avg.)	0.91	1.14	0	6.5
VC Lead investor	VC investor is lead investor in the focal round	0.36	0.48	0	1
BA educational level	Highest completed educational degree (avg.)	1.30	1.30	0	4
BA founding experience	Previous founding experience (avg.)	0.12	0.27	0	1
Portfolio focus heterog.	Industry portfolio focus heterogeneity (avg.)	0.35	0.25	0	0.94
Investment experience	Number of investments (prior 5 years, avg.)	30	43	0	486
Control variables					
Investment stage	Investment stage of the venture	1.27	0.57	1	5
Founder team size	Number of the founder of the venture	1.77	0.86	1	9
Invest. volume (ln)	Funding volume in the focal round (ln)	14.30	1.17	6.91	18.83
Venture customer focus	B2B / B2C focus per investor	0.15	0.36	0	1
Prev. accelerator round	Venture with prior accelerator participation	0.23	0.42	0	1
Venture location	Ventures in entrepreneurial state (MA, CA)	0.55	0.5	0	1
Venture age (month)	Month between founding and funding round	18.77	13.45	0	59.50
Venture no of industries	Two-digit level SIC-codes	3.80	1.75	0	12
Ownership balance	Ratio of BA and VC investors in funding round	0.59	0.29	0.11	1

Note: This table displays statistics for variables used in our models

Results

In this paper, we analyze the influence of several investor characteristic levels as well as their degree of heterogeneity within an investor group on the likelihood of venture success. To ensure that multicollinearity is not an issue in our model, we analyze the pairwise correlation values as well as the variance inflation factors (VIF) for all variables (Hair, Black, Babin, & Anderson, 2009; Mansfield & Helms, 1982; O'Brien, 2007). All correlation coefficients in Table 2 are below the value of 0.50. Additionally, our calculations show a very low mean VIF score of 1.11 (cf. Appendix). To ensure our assumptions and test for potential Type 1 errors, which might not be detected by VIF-diagnostics, we examine our model according to Kalnins (2018) and investigate each correlation value greater than |0.3| on whether two variables have significant regression coefficients of opposite signs in our main regression, if correlated positively, or of the same sign, if correlated negatively. Second, we analyze if one of the two variable's correlations with the dependent variable is the opposite sign from its regression coefficient. Since we do not have correlation values above the limit or do not find any violation we assume that multicollinearity does not bias our model.

The main estimation results based on Cox proportional hazard models are presented in Table 3. The first model (1) includes only the control variables, whereas the second model (2) includes the main independent variables, and the full model (3) comprises the interaction term of investment experience. All models are statistically significant and the quality is increasing step-by-step, which is derived from the Log-likelihood and Chi^2 values. We interpret our results in the next section on Model (3) as our primary source, since this has the best fit and includes all relevant variables to test our hypotheses. More details on the direct effects of each independent variable can be found in the appendix with regression results of step-wise added variables.

Table 2: Descriptive Statistics and Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Venture w IPO/M&A	1.00																
(2) Geo distance to venture	-0.05*	1.00															
	(0.01)																
(3) VC prior investor dyads	0.06*	0.04*	1.00														
	(0.00)	(0.02)															
(4) VC lead investor	0.01	0.03	0.10*	1.00													
	(0.54)	(0.20)	(0.00)														
(5) BA educational level	0.10*	-0.01	0.18*	-0.01	1.00												
	(0.00)	(0.58)	(0.00)	(0.69)													
(6) BA founding experience	-0.05*	0.00	0.06*	0.05*	0.11*	1.00											
	(0.01)	(0.85)	(0.00)	(0.01)	(0.00)												
(7) Portfolio focus heterogen.	0.03	0.05*	0.08*	0.01	-0.02	0.01	1.00										
	(0.12)	(0.02)	(0.00)	(0.54)	(0.24)	(0.50)											
(8) Investment experience	-0.07*	0.03	0.23*	-0.04	0.01	0.03	0.22*	1.00									
	(0.00)	(0.15)	(0.00)	(0.06)	(0.79)	(0.11)	(0.00)										
(9) Investment stage	-0.05*	0.03	-0.08*	-0.01	-0.07*	-0.04	-0.09*	-0.01	1.00								
	(0.01)	(0.20)	(0.00)	(0.62)	(0.00)	(0.07)	(0.00)	(0.57)									
(10) Founder team size	-0.07*	0.03	0.01	0.02	-0.01	0.00	-0.01	0.05*	0.08*	1.00							
	(0.00)	(0.14)	(0.48)	(0.22)	(0.77)	(0.87)	(0.79)	(0.01)	(0.00)								
(11) Invest. volume (ln)	0.02	0.05*	0.08*	0.32*	-0.02	0.09*	0.02	-0.08*	0.03	0.00	1.00						
	(0.42)	(0.01)	(0.00)	(0.00)	(0.33)	(0.00)	(0.22)	(0.00)	(0.08)	(0.81)							
(12) Vent. customer focus	0.03	0.03	-0.01	0.05*	-0.02	0.00	-0.03	-0.03	0.01	0.01	0.10*	1.00					
	(0.08)	(0.09)	(0.52)	(0.02)	(0.36)	(0.91)	(0.14)	(0.20)	(0.79)	(0.62)	(0.00)						
(13) Prev. accelerator round	-0.01	0.00	0.18*	-0.09*	0.01	-0.02	-0.06*	0.18*	0.29*	0.09*	-0.19*	-0.05*	1.00				
	(0.59)	(0.91)	(0.00)	(0.00)	(0.54)	(0.20)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)					
(14) Venture location	0.05*	-0.14*	0.10*	0.02	0.12*	0.03	0.07*	0.13*	-0.06*	0.02	0.09*	-0.01	0.04*	1.00			
	(0.01)	(0.00)	(0.00)	(0.44)	(0.00)	(0.16)	(0.00)	(0.00)	(0.00)	(0.22)	(0.00)	(0.69)	(0.02)				
(15) Venture age (month)	-0.11*	0.03	-0.09*	0.05*	-0.14*	-0.01	-0.06*	-0.06*	0.29*	-0.05*	0.18*	0.02	0.01	-0.11*	1.00		
	(0.00)	(0.12)	(0.00)	(0.01)	(0.00)	(0.60)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.30)	(0.66)	(0.00)			
(16) Venture No. of industries	0.01	-0.01	-0.01	-0.01	0.02	-0.01	0.00	0.01	0.03	0.03	-0.01	0.00	0.02	0.04*	-0.05*	1.00	
	(0.66)	(0.49)	(0.64)	(0.64)	(0.26)	(0.59)	(0.97)	(0.77)	(0.13)	(0.20)	(0.51)	(0.82)	(0.28)	(0.05)	(0.01)		
(17) Ownership balance	-0.02	-0.03	-0.18*	-0.08*	-0.11*	-0.01	-0.03	-0.02	0.03	0.00	-0.10*	-0.02	-0.01	-0.07*	0.05*	0.02	1.00
	(0.36)	(0.10)	(0.00)	(0.00)	(0.00)	(0.71)	(0.13)	(0.29)	(0.08)	(0.83)	(0.00)	(0.34)	(0.58)	(0.00)	(0.01)	(0.35)	

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

Table 3: Main analysis results (Cox proportional hazard regression)

Dependent variable Successful BA & VC Co-Investment	**Model 1** Baseline	**Model 2** Add IV variables	**Model 3** Full model
Control variables			
Investment stage	-0.102	-0.070	-0.069
	(0.305)	(0.482)	(0.489)
Founder team size	-0.143**	-0.153***	-0.148***
	(0.012)	(0.008)	(0.010)
Investment volume (ln)	0.135***	0.103**	0.092**
	(0.002)	(0.026)	(0.048)
Vent. customer focus	0.049	0.092	0.096
	(0.684)	(0.448)	(0.427)
Previous accelerator round	0.269**	0.206*	0.211*
	(0.022)	(0.088)	(0.083)
Venture location	0.114	0.034	0.050
	(0.229)	(0.730)	(0.610)
Venture age (month)	-0.011***	-0.009**	-0.009**
	(0.004)	(0.018)	(0.016)
Venture No. of industries	-0.049*	-0.052*	-0.054*
	(0.075)	(0.059)	(0.054)
Ownership balance	-0.168	-0.076	-0.083
	(0.286)	(0.633)	(0.604)
Main effects			
Geographical distance to venture		-0.000**	-0.000**
		(0.016)	(0.019)
VC prior investor dyads		0.104***	0.114***
		(0.007)	(0.004)
VC lead investor role		0.191*	0.193*
		(0.060)	(0.058)
BA educational level		0.096***	0.093**
		(0.008)	(0.011)
BA founding experience		-0.107	-0.099
		(0.589)	(0.615)
Portfolio focus heterogeneity		0.229	0.600**
		(0.206)	(0.013)
Investment experience			0.002
			(0.425)
Portfolio focus heterogeneity x Investment experience			-0.011**
			(0.044)
Industry Dummy	YES	YES	YES
Year Dummy	YES	YES	YES
Observations	2,584	2,584	2,584
Log likelihood	-3434	-3420	-3416
LR Chi2	115.56	143.30	149.87

Event history analysis of the venture's likelihood of a successful exit
Dependent variable: The likelihood of a successful exit (IPO or acquisition)
We report covariate coefficients, p-values are in parentheses; *** p<.01, ** p<.05, * p<.1

Hypotheses Tests

Before we discuss the regression results with regards to the derived hypotheses in the next paragraphs, some effects of our control variables are worth mentioning. In line with existing literature, the amount of the funding volume of the first equity round is positively associated with venture success. Similar to this, prior participation in an accelerator round seems to contribute to venture development and increases the likelihood of a successful IPO or acquisition event. On the other hand, the founder team size, the number of industries, as well as the venture age are negatively associated with the outcome variable. We conclude, for example, that focusing on a limited number of industries and a founder team raises the probability of a successful exit. Furthermore, and surprisingly, other control variables such as the venture location and the ownership balance between BA and VC investors do not have a significant link on the dependent variable.

Hypotheses 1: Direct effect of geographical distance to the venture

Hypothesis 1 posits a negative association between the geographical distance of the investor group to the focal venture and an IPO or acquisition event of the venture. The regression results provide high significance and, therefore, our hypothesis of a negative correlation is confirmed over the full data range (β=-0.000, $p<0.05$). In the hypothesis derivation, we have previously explained in detail the two arguments of value-adding resources and the multi-principal situation. We argued that investors can particularly contribute to the venture development if they are geographically close located to the venture. Further, since all syndicate members try to achieve their individual objectives, geographical proximity for the investor group can reduce the risks that investors have different positions towards the venture management. The effects can be demonstrated in our results and support that an increasing distance to the venture leads to less probability of a successful venture exit event.

Hypotheses 2 and 3: Direct effect of VC firm resources

In hypotheses 2 and 3, we investigate whether a certain role of VC investors in a co-investment is particularly valuable for the development of the venture with respect to an exit event. On the one hand, the position of the VC investor towards other syndicate members is taken into account. Already known investors in a funding round provide a feeling of trust and it seems plausible that resources of familiar partners are well-known so that mutual understanding of the constructive collaboration mode is more likely. Furthermore, the conflict potential from the

multi-principal situation can be reduced. Indeed, we can confirm the hypothesis that more prior investor dyads increase the probability of a successful exit event of the venture on a high significance level ($\beta=0.114$, $p<0.01$). The second variable is the role of the lead investor. Due to the professional organization of a VC investor, we assume that this investor type is particularly well suited as a lead investor in co-investments with BAs and can confirm this argumentation with our full model results. The positive relationship between the VC as lead investor and our dependent variable is significantly detectable ($\beta=0.193$, $p<0.1$).

Hypotheses 4 and 5: Direct effect of BA investor resources

In addition to the resources of the VC investor, we also investigate whether and which resources of the BA investor type have a particularly positive effect on venture success in these investor constellations. Since the business angel as a private person contributes his individual knowledge and experience, we focus on the two variables of educational level and previous start-up experience. While our hypothesis on educational level is confirmed with a high degree of significance ($\beta=0.093$, $p<0.05$), we are surprisingly unable to prove this for start-up experience ($\beta=-0.099$, $p>0.1$). We assume that this could also be due to insufficient data, as past start-up projects at business angels could already date back many years and are therefore not included in our main data sources Crunchbase and Refinitiv EIKON. Nevertheless, our results give a clear signal that the level of knowledge acquired by a BA investor through an academic degree is positively related to the probability of a successful exit of a venture.

Hypotheses 6: Direct effect of investors' portfolio focus heterogeneity

Our sixth hypothesis establishes the intriguing link between complementary resources in terms of prior industry experience and investment strategy to venture success. In the full model, we can prove this relationship ($\beta=0.600$, $p<0.05$) and thus show that different resources of the two investor types have a positive influence on the probability of an IPO or acquisition event of the venture. We explain this result with the value-adding theory and say that in these cases the venture can benefit equally and complementarily from both investor types.

Hypotheses 7: Interaction effect of investment experience

Hypothesis 7 posits a negative moderating effect on the main relationship between the portfolio focus heterogeneity and the successful venture exit. The results support our hypotheses on a high significance level ($\beta=-0.011$, $p<0.05$) and confirm our assumption that a high investment

experience reduces the benefits of complementary resources in the multi-principal context. However, we can simultaneously find through our model that, surprisingly, investment experience has no direct effect on the probability of success for an IPO or acquisition event.

Robustness Tests

To validate the results of our main regression with further tests we perform some robustness checks. First, we use an alternative regression approach to examine the derived hypotheses. Since our binary dependent variable is the most extreme form of a discrete variable, we use logistic regression models to analyze the likelihood of an IPO or acquisition event of the portfolio venture (Cumming & Zhang, 2019; Makarevich, 2018; Plagmann & Lutz, 2019). The outcome variable takes the value 1 if the venture achieves an IPO or acquisition event within the timeframe of our dataset. The unit of analysis is the first funding round per venture, where multiple investors of the BA and VC type invest simultaneously. Individual industries might per se favor a better chance of a successful exit of the venture. To control for this heterogeneity and also for other industry factors that might affect the relationship between the independent variables and the outcome variable, we follow previous research studies and include fixed effects for the investment year and industry segments (Makarevich, 2018). By conducting the Hausman-Test we get strong support for this procedure that accounts for the effects of overall time-series trends (Hausman, 1978). Our step-wise regression models confirm the results of our main regression (cf. Table 4 and appendix). In addition, and to minimize the right censoring problem, we reduced the observation period by one year while performing the logit regression and find similar results.

We determined established approaches to cover various sources of potential endogeneity concerns. Different types of endogeneity can bias results in different magnitudes and directions. Conclusively, we identify potential sources and deploy suitable methods to address them (Certo, Busenbark, Woo, & Semadeni, 2016). Considering our research model connections, we chose an approach to address the main source of potential endogeneity issues, which might be caused by selection bias or simultaneity (Certo et al., 2016). Distinguishing between the relative contribution of particular investor constellations on venture exit performance is tied to (i) the investment decision or (ii) the active contributions in the post-investment phase as value-added services (e.g. mentoring). Whereas (i) can also be interpreted as the “selection” effect, (ii) determines the “treatment” effect. If Co-investment compositions are able to “select” better

ventures, this could affect the results on the outcome variable. However, our research model and derived hypotheses aim to explore the effects from "treatment". Therefore, we use an alternative regression model to control for selection effects.

The Heckman correction is the most efficient technique if all independent variables are observed in both the selection and the second stage equation (Wooldridge, 2010). Since our independent variables do not fulfill this condition since some variables can only be calculated in the co-investment case, we apply a similar estimation approach in the form of a bivariate probit model. Hereby, both probit equations are simultaneously estimated via a maximum likelihood method (Park, H. D. & Steensma, 2013; Wooldridge, 2010). We use investment availability as an instrument and calculate a new variable as the number of investments made by BA and VC investors for each year. The instrument variable must describe a condition on the market that influences the deal probability of a co-investment, and not the venture success. Otherwise and according to Tian (2012), the instrument fails to satisfy the exclusion restriction. Hence, we predict the probability of a co-investment occurrence with the investment supply by all investor types in the first stage. By using the two-stage regression approach, it is important to thoroughly complete all required steps according to previous literature. After conducting the tests reported in Table 4, we can provide robustness against endogeneity and confirm most of our hypotheses of the main regression model.

Table 4: Robustness analysis results

Dependent variable	Bivariate probit		Logit
	First stage (Co-Investment)	Second stage (Venture success)	Full model (Venture success)
Control variables			
Investment stage	0.018	0.029	-.091
	(0.522)	(0.422)	(.122)
Founder team size	0.017	-0.043*	-.135*
	(0.332)	(0.057)	(.07)
Investment volume (ln)	-0.002	0.125***	.117**
	(0.853)	(0.000)	(.058)
Vent. customer focus	-0.097**	0.096*	.146
	(0.021)	(0.056)	(.155)
Previous accelerator round	-0.192***	0.049	.267*
	(0.000)	(0.368)	(.149)
Venture location	0.061*	0.027	.043
	(0.051)	(0.499)	(.12)
Venture age (month)	-0.006***	-0.003*	-.009*
	(0.000)	(0.081)	(.005)
Venture No. of industries	0.034***	-0.018	-.057
	(0.000)	(0.129)	(.035)
Ownership balance		-0.032	-.065
		(0.772)	(.198)
(Instrument) VC & BA supply	0.108***		
	(0.000)		
Main effects			
Geographical distance		-0.000	0**
		(0.680)	(0)
VC prior investor dyads		0.052**	.105**
		(0.015)	(.051)
VC lead investor role		0.110**	.296**
		(0.010)	(.127)
BA educational level		0.063***	.121***
		(0.002)	(.045)
BA founding experience		-0.138	-.06
		(0.210)	(.236)
Portfolio focus heterogeneity		0.371***	.643**
		(0.000)	(.294)
Investment experience		0.002***	.003
		(0.006)	(.003)
Port. focus het. X Invest. exp.		-0.003***	-.012*
		(0.001)	(.006)
Industry Dummy	YES	YES	YES
Year Dummy	YES	YES	YES
Observations	7,152	2,584	2,458
Log-likelihood		-7475.6347	-1011.902
Wald / LR $\chi 2$		1323.84	451.07

Dependent variable: Likelihood of a successful exit (IPO or acquisition)
*** p<.01, ** p<.05, * p<.1

Discussion

In our research, we focus on the question under which circumstances and conditions the resources of investors lead to IPO and acquisition events of new ventures. The value-adding perspective with regards to co-investments of Business Angel and Venture Capital investors is an under-researched phenomenon with high practical relevance and thus needs more attention. In particular, the characteristics that characterize each type of investor are important in determining whether the resources of the different investors complement each other. We not only examine the expression of individual characteristics of the investors but also compare, for example, the previous investment strategy concerning the industry focus and thus determine what effects heterogeneous investment behavior has on the success of the venture. The regression results largely confirm our arguments derived from the resource-based view and the multi-principal situation. In particular, we can show for most of the typical characteristics that a high expression has a positive effect on the outcome variable. For example, the educational level of the business angel investor or the lead investor role of the VC investor is positively associated with the probability of an IPO or acquisition event of the venture. Furthermore, we can show that a heterogeneous investment strategy in terms of industry focus has a positive effect and that due to the special situation of two different types of investors, high geographical proximity to the venture increases the probability of success.

Implications

This study has important implications for both entrepreneurial theory and practice. Previous theoretical and survey-based approaches focused primarily on single investor types, whereas we intend to fill the research gap on the reasons for outperforming co-investments with BA and VC investors. We hereby contribute to research on collaboration between BA and VC investors, venture exit performance, and entrepreneurship.

First, this paper advances the literature with insights into the success factors of co-investments by the two types of investors. Our results reveal that distinctive resources and investor roles are determining the likelihood of a ventures' IPO or acquisition event. Since BAs as individual investors contribute predominantly with their direct resources, we specifically investigate the influence of human capital. As a professional financial institution, we include the role of the

VC investor, and thus, the social capital. We are able to show that certain factors play an extraordinary contribution to the likelihood of success for a successful exit of the venture.

Second, we advance a theoretical understanding of the interrelated effects in co-investments between the value-adding theory and potential misunderstandings caused by the multi-principal situation by examining multiple investor characteristics on venture performance. We hereby show that the value-adding theory prevails over the opposing argument of potential conflicts in the case of certain resources. In doing so, we dissolve the contradiction in the theoretical foundation of principal-agent and resource-based view. We present that a strong expression of the investor-typical characteristics, as well as a degree of complementary resources, represents a high probability of success for a venture exit. From this, we conclude that in precisely these cases the contribution and thus the value-adding theory of co-investments is particularly strong and outweighs the disadvantages of the multi-principal situation. Third, we are able to establish our results based on a large-scale dataset with more than 3,000 investors and use suitable regression models including robustness tests to verify our results.

Our study has also practical insights for both the investor and the founder. Founders gain knowledge about requirements on investor characteristics to increase their odds of success. Furthermore, it enhances investors' understanding of the importance of their capabilities relative to other investors and their influence on investments. Policy-makers gain insights from the results that certain co-investments of BA and VC investors pay off, making them an ideal opportunity for a thriving ecosystem.

Limitations and Avenues for Further Research

Our research is not without limitations and gives an avenue for further research. The first step is to point out that while our dataset is very extensive, it certainly has limitations. The restriction to US-based startups can be expanded to other regions to include aspects such as cultural and ethical differences. Despite the enormous matching process of the very extensive databases, it cannot be ruled out that funding rounds are not included in the sample. The risk here is particularly high for very early investments by VC investors, who tend to be small, as well as ventures that close business activities shortly after the first funding. It is therefore also quite possible that the failure rates are higher in reality and that some business angels are not included in the data sources. Further studies via interviews or surveys could therefore provide additional insights.

First, since we are looking at value-adding effects in our study, other methodological approaches would be conceivable at this point. Besides primary data, the inclusion of dynamic learning over time could provide helpful insights into the extent to which investors change their mentoring activities towards ventures. Second, further resource variables for both BA and VC investor types can be examined in our research context to provide more details on which resources are of high relevance. Examples of such resources are the managerial experience of business angels or the fund number and reputation of VC investors. Third, further consideration of heterogeneity concerning resources would be of high interest to determine whether multi-principal theory also promotes high congruence for mutual understanding in some dimensions. Finally, the consideration could be extended to other types of investors, for example, to understand the interaction of business angels with crowdfunding, or venture capital firms with venture debt providers.

References

Amor, S. Ben, & Kooli, M. (2020). Do M&A exits have the same effect on venture capital reputation than IPO exits? *Journal of Banking and Finance*, *111*, 105704. https://doi.org/10.1016/j.jbankfin.2019.105704

Andrieu, G., & Groh, A. P. (2012). Entrepreneurs' financing choice between independent and bank-affiliated venture capital firms. *Journal of Corporate Finance*, *18*(5), 1143–1167. https://doi.org/10.1016/j.jcorpfin.2012.07.001

Antretter, T., Sirén, C., Grichnik, D., & Wincent, J. (2020). Should business angels diversify their investment portfolios to achieve higher performance? The role of knowledge access through co-investment networks. *Journal of Business Venturing*, *35*(5), 106043. https://doi.org/10.1016/j.jbusvent.2020.106043

Aram, J. D. (1989). Attitudes and behaviors of informal investors toward early-stage investments, technology-based ventures, and coinvestors. *Journal of Business Venturing*, *4*(5), 333–347. https://doi.org/10.1016/0883-9026(89)90005-0

Bantel, K. A., & Jackson, S. E. (1989). Top management and innovations in banking: Does the composition of the top team make a difference? *Strategic Management Journal*, *10*(1 S), 107–124. https://doi.org/10.1002/smj.4250100709

Baty, G., & Sommer, B. (2002). True then, truenow: A 40-year perspective on the early stage investment market. *Venture Capital*, *4*(4), 289–293. https://doi.org/10.1080/1369106022000024914

Becker, G. S. (1964). Human capital. A theoretical and empirical analysis, with special reference to education. *National Bureau of Economic Researc*, *33*(3), 556–557.

Bellavitis, C., Rietveld, J., & Filatotchev, I. (2019). The effects of prior co-investments on the performance of venture capitalist syndicates: A relational agency perspective. *Strategic Entrepreneurship Journal*, (October 2017), 1–25. https://doi.org/10.1002/sej.1320

Bernstein, S., Korteweg, A., & Laws, K. (2017). Attracting Early-Stage Investors: Evidence from a Randomized Field Experiment. *Journal of Finance*, *72*(2), 509–538. https://doi.org/10.1111/jofi.12470

Bertoni, F., Colombo, M. G., & Grilli, L. (2013). Venture capital investor type and the growth

mode of new technology-based firms. *Small Business Economics*, *40*(3), 527–552. https://doi.org/10.1007/s11187-011-9385-9

Block, J. H., Fisch, C. O., Obschonka, M., & Sandner, P. G. (2019). A personality perspective on business angel syndication ☆. *Journal of Banking and Finance*, *100*, 306–327. https://doi.org/10.1016/j.jbankfin.2018.10.006

Bonini, S., Capizzi, V., & Zocchi, P. (2019). The performance of angel-backed companies. *Journal of Banking and Finance*, *100*, 328–345. https://doi.org/10.1016/j.jbankfin.2018.12.006

Bonnet, C., & Wirtz, P. (2011). Investor Type, Cognitive Governance and Performance in Young Entrepreneurial Ventures: A Conceptual Framework. *Advances in Behavioral Finance & Economics: The Journal of the Academy of Behavioral*, *1*(1), 42–62. Retrieved from http://halshs.archives-ouvertes.fr/halshs-00642737

Bonnet, C., & Wirtz, P. (2012). Raising capital for rapid growth in young technology ventures: When business angels and venture capitalists coinvest. *Venture Capital*, *14*(2–3), 91–110. https://doi.org/10.1080/13691066.2012.654603

Bottazzi, L., & Da Rin, M. (2002). Europe's new stock markets. *FINANCIAL ECONOMICS and INTERNATIONAL MACROECONOMICS*, (3521).

Bottazzi, L., Da Rin, M., & Hellmann, T. (2008). Who are the active investors?. Evidence from venture capital. *Journal of Financial Economics*, *89*(3), 488–512. https://doi.org/10.1016/j.jfineco.2007.09.003

Brander, J. A., Amit, R., & Antweiler, W. (2002). Venture-capital syndication: Improved venture selection vs. The value-added hypothesis. *Journal of Economics and Management Strategy*, *11*(3), 423–452. https://doi.org/10.1111/j.1430-9134.2002.00423.x

Brettel, M. (2003). Business angels in Germany: A research note. *Venture Capital*, *5*(3), 251–268. https://doi.org/10.1080/1369106032000122095

Brian, U. (1999). Embeddedness in the making of financial capital : How social relations and networks benefit firms seeking financing. *American Sociological Review*, *64*(4), 481–505.

Bruton, G. D., Filatotchev, I., Chahine, S., & Wright, M. (2010). Governance, ownership structure, and performance of IPO firms: The impact of different types of private equity

investors and institutional environments. *Strategic Management Journal*, *31*, 491–509. https://doi.org/10.1002/smj

Bruton, Garry D., Chahine, S., & Filatotchev, I. (2009). Founders, private equity investors, and underpricing in entrepreneurial IPOs. *Entrepreneurship: Theory and Practice*, *33*(4), 909–928. https://doi.org/10.1111/j.1540-6520.2009.00309.x

Burt, R. S. (1997). A note on social capital and network content. *Social Networks*, *19*(4), 355–373. https://doi.org/10.1016/S0378-8733(97)00003-8

Busenitz, L. W., Fiet, J. O., & Moesel, D. D. (2004). Reconsidering the venture capitalists' "value added" proposition: An interorganizational learning perspective. *Journal of Business Venturing*, *19*(6), 787–807. https://doi.org/10.1016/j.jbusvent.2003.06.005

Bygrave, W. D. (1987). Syndicated investments by venture capital firms: A networking perspective. *Journal of Business Venturing*, *2*(2), 139–154. https://doi.org/10.1016/0883-9026(87)90004-8

Bygrave, W. D. (1988). The structure of the investment networks of venture capital firms. *Journal of Business Venturing*, *3*(2), 137–157. https://doi.org/10.1016/0883-9026(88)90023-7

Casamatta, C., & Haritchabalet, C. (2007). Experience, screening and syndication in venture capital investments. *Journal of Financial Intermediation*, *16*(3), 368–398. https://doi.org/10.1016/j.jfi.2007.03.003

Cassar, G. (2006). Entrepreneur opportunity costs and intended venture growth. *Journal of Business Venturing*, *21*(5), 610–632. https://doi.org/10.1016/j.jbusvent.2005.02.011

Cassar, G. (2007). Money, money, money? A longitudinal investigation of entrepreneur career reasons, growth preferences and achieved growth. *Entrepreneurship and Regional Development*, *19*(1), 89–107. https://doi.org/10.1080/08985620601002246

Certo, S. T., Busenbark, J. R., Woo, H., & Semadeni, M. (2016). Sample selection bias and Heckman models in strategic management research. *Strategic Management Journal*, *37*(13), 2639–2657. https://doi.org/10.1002/smj

Chahine, S., Arthurs, J. D., Filatotchev, I., & Hoskisson, R. E. (2012). The effects of venture capital syndicate diversity on earnings management and performance of IPOs in the US

and UK: An institutional perspective. *Journal of Corporate Finance*, *18*(1), 179–192. https://doi.org/10.1016/j.jcorpfin.2011.11.007

Chang, S. J. (2004). Venture capital financing, strategic alliances, and the initial public offerings of Internet startups. *Journal of Business Venturing*, *19*(5), 721–741. https://doi.org/10.1016/j.jbusvent.2003.03.002

Chemmanur, T. J., & Chen, Z. (2006). Venture capitalists versus angels: The dynamics of private firm financing contracts. *Bost Coll Unpubl Manuscr*. https://doi.org/10.2139/ssrn.342721

Chemmanur, T. J., Hull, T. J., & Krishnan, K. (2016). Do local and international venture capitalists play well together? The complementarity of local and international venture capitalists. *Journal of Business Venturing*, *31*(5), 573–594. https://doi.org/10.1016/j.jbusvent.2016.07.002

Cohen S., Fehder D., Hochberg Y., M. F. (2019). The design of startup accelerators. *Research Policy Journal*, *48.7*, 1781–1797.

Colombo, M. G., Croce, A., & Murtinu, S. (2014). Ownership structure, horizontal agency costs and the performance of high-tech entrepreneurial firms. *Small Business Economics*, *42*(2), 265–282. https://doi.org/10.1007/s11187-013-9483-y

Cox, D. R. (1972). Regression Models and Life-Tables. *Journal of the Royal Statistical Society: Series B (Methodological)*, *34*(2), 187–202. https://doi.org/10.1111/j.2517-6161.1972.tb00899.x

Croce, A., Guerini, M., & Ughetto, E. (2018). Angel Financing and the Performance of High-Tech Start-Ups. *Journal of Small Business Management*, *56*(2), 208–228. https://doi.org/10.1111/jsbm.12250

Cumming, D., & Dai, N. (2010). Local bias in venture capital investments. *Journal of Empirical Finance*, *17*(3), 362–380. https://doi.org/10.1016/j.jempfin.2009.11.001

Cumming, D., Deloof, M., Manigart, S., & Wright, M. (2019). New directions in entrepreneurial finance. *Journal of Banking and Finance*, *100*, 252–260. https://doi.org/10.1016/j.jbankfin.2019.02.008

Cumming, D., & Johan, S. A. binti. (2008). Preplanned exit strategies in venture capital.

European Economic Review, *52*(7), 1209–1241. https://doi.org/10.1016/j.euroecorev.2008.01.001

Cumming, D., Schmidt, D., & Walz, U. (2010). Legality and venture capital governance around the world. *Journal of Business Venturing*, *25*(1), 54–72. https://doi.org/10.1016/j.jbusvent.2008.07.001

Cumming, D., & Zhang, M. (2019). Angel investors around the world. *Journal of International Business Studies*, *50*(5), 692–719. https://doi.org/10.1057/s41267-018-0178-0

Dai, N., & Nahata, R. (2016). Cultural differences and cross-border venture capital syndication. *Journal of International Business Studies*, *47*(2), 140–169. https://doi.org/10.1057/jibs.2015.32

Das, S. R., Jo, H., & Kim, Y. (2011). Polishing diamonds in the rough: The sources of syndicated venture performance. *Journal of Financial Intermediation*, *20*(2), 199–230. https://doi.org/10.1016/j.jfi.2010.08.001

de Carvalho, A., Calomiris, C., & de Matos, J. (2005). Venture Capital as human resource management. *NBER Working Paper Series*.

De Clercq, D., & Dimov, D. (2008). Internal knowledge development and external knowledge access in venture capital investment performance. *Journal of Management Studies*, *45*(3), 585–612. https://doi.org/10.1111/j.1467-6486.2007.00747.x

De Clercq, D., & Dimov, D. P. (2004). Explaining venture capital firms' syndication behaviour: A longitudinal study. *Venture Capital*, *6*(4), 243–256. https://doi.org/10.1080/1369106042000277688

De Clercq, D., Fried, V. H., Lehtonen, O., & Sapienza, H. J. (2006). An entrepreneur's guide to the venture capital galaxy. *Academy of Management Perspectives*, *20*(3), 90–112. https://doi.org/10.5465/AMP.2006.21903483

de Prijcker, S., Manigart, S., Wright, M., & De Maeseneire, W. (2012). The influence of experiential, inherited and external knowledge on the internationalization of venture capital firms. *International Business Review*, *21*(5), 929–940. https://doi.org/10.1016/j.ibusrev.2011.11.001

Deeds, D. L., & Hill, C. W. L. (1996). Strategic alliances and the rate of new product

development: An empirical study of entrepreneurial biotechnology firms. *Journal of Business Venturing*, *11*(1), 41–55. https://doi.org/10.1016/0883-9026(95)00087-9

Dencker, J. C., & Gruber, M. (2015). The effects of opportunities and founder experience on new firm performance. *Strategic Management Journal*, *36*(7), 1035–1052. https://doi.org/10.1002/smj.2269

Dimov, D., & Milanov, H. (2010). The interplay of need and opportunity in venture capital investment syndication. *Journal of Business Venturing*, *25*(4), 331–348. https://doi.org/10.1016/j.jbusvent.2009.01.002

Dimov, D. P., & Shepherd, D. A. (2005). Human capital theory and venture capital firms: Exploring "home runs" and "strike outs." *Journal of Business Venturing*, *20*(1), 1–21. https://doi.org/10.1016/j.jbusvent.2003.12.007

Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A Review and Road Map of Entrepreneurial Equity Financing Research: Venture Capital, Corporate Venture Capital, Angel Investment, Crowdfunding, and Accelerators. *Journal of Management*, *43*(6), 1820–1853. https://doi.org/10.1177/0149206317690584

Du, Q. (2016). Birds of a feather or celebrating differences? The formation and impacts of venture capital syndication. *Journal of Empirical Finance*, *39*, 1–14. https://doi.org/10.1016/j.jempfin.2016.09.001

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Annals of Business Administrative Science*, *23*(4), 660–679.

Ehrlich, S. B., De Noble, A. F., Moore, T., & Weaver, R. R. (1994). After the cash arrives: A comparative study of venture capital and private investor involvement in entrepreneurial firms. *Journal of Business Venturing*, *9*(1), 67–82. https://doi.org/10.1016/0883-9026(94)90027-2

Eisenhardt, K. M., & Schoonhoven, C. B. (1996). Resource-based View Strategic Alliance of in Formation : Effects Strategic and Social Firms Entrepreneurial. *Organization*, *7*(2), 136–150.

Elfring, T., & Hulsink, W. (2003). Networks in Entrepreneurship: The Case of High-

Technology Firms. *Small Business Economics*, *21*(4), 409–422.

Elitzur, R., & Gavious, A. (2003). Contracting, signaling, and moral hazard: A model of entrepreneurs, "angels," and venture capitalists. *Journal of Business Venturing*, *18*(6), 709–725. https://doi.org/10.1016/S0883-9026(03)00027-2

Espenlaub, S., Khurshed, A., & Mohamed, A. (2015). VC investments and global exits. *European Journal of Finance*, *21*(7), 608–628. https://doi.org/10.1080/1351847X.2013.871736

Fairchild, R. (2011). An entrepreneur's choice of venture capitalist or angel-financing: A behavioral game-theoretic approach. *Journal of Business Venturing*, *26*(3), 359–374. https://doi.org/10.1016/j.jbusvent.2009.09.003

Falconieri, S., Filatotchev, I., & Tastan, M. (2019). Size and diversity in VC syndicates and their impact on IPO performance. *European Journal of Finance*, *25*(11), 1032–1053. https://doi.org/10.1080/1351847X.2018.1560345

Florida, R., & Kenney, M. (1988). Venture capital and high technology entrepreneurship. *Journal of Business Venturing*, *3*(4), 301–319. https://doi.org/10.1016/0883-9026(88)90011-0

Florida, R. L., Kenney, M., Balderston, J., Chambers, F., Davis, W., Dennis, R., … Shane, J. (1988). Venture capital-financed innovation and technological change in the USA. *Venture Capital*, *17*, 119–137.

Freear, J., Sohl, J. E., & Wetzel, W. E. (1994). Angels and non-angels: Are there differences? *Journal of Business Venturing*, *9*(2), 109–123. https://doi.org/10.1016/0883-9026(94)90004-3

Freear, J., & Wetzel, W. E. (1990). Who bankrolls high-tech entrepreneurs? *Journal of Business Venturing*, *5*(2), 77–89. https://doi.org/10.1016/0883-9026(90)90001-A

Freel, M. S. (2005). Patterns of innovation and skills in small firms. *Technovation*, *25*(2), 123–134. https://doi.org/10.1016/S0166-4972(03)00082-8

Ganesan, S. (1994). Determinants of Long-Term in Buyer-Seller Orientation Relationships. *Journal of Marketing*, *58*(2), 1–19.

Gimeno, J., Folta, T. B., Cooper, A. C., & Woo, C. Y. (1997). Survival of the fittest?

Entrepreneurial human capital and the persistence of underperforming firms. *Administrative Science Quarterly*, *42*(4), 750–783. https://doi.org/10.2307/2393656

Giot, P., & Schwienbacher, A. (2007). IPOs, trade sales and liquidations: Modelling venture capital exits using survival analysis. *Journal of Banking and Finance*, *31*(3), 679–702. https://doi.org/10.1016/j.jbankfin.2006.06.010

Gomez-Mejia, L. R., Balkin, D. B., & Welbourne, T. M. (1990). Influence of venture capitalists on high tech management. *Journal of High Technology Management Research*, *1*(1), 103–118. https://doi.org/10.1016/1047-8310(90)90016-W

Gompers, P. A. (1995). Optimal Investment, Monitoring, and the Staging of Venture Capital. *The Journal of Finance*, *50*(5), 1461–1489. https://doi.org/10.1111/j.1540-6261.1995.tb05185.x

Gompers, P. A. (1996). Grandstanding in the venture capital industry. *Journal of Financial Economics*, *42*(1), 133–156. https://doi.org/10.1016/0304-405X(96)00874-4

Gompers, P., Kovner, A., & Lerner, J. (2009). Specialization and success: Evidence from venture capital. *Journal of Economics and Management Strategy*, *18*(3), 817–844. https://doi.org/10.1111/j.1530-9134.2009.00230.x

Gompers, P., & Lerner, J. (2002). The Money of Invention: How Venture Capital Creates New Wealth. *Journal of Economic Literature*, *40*(4), 1259–1261.

Granovetter, M. (1973). The Strength of Weak Ties Author (s): Mark S . Granovetter Published by : The University of Chicago Press Stable URL : http://www.jstor.com/stable/2776392 The Strength of Weak Ties ’. *American Journal of Sociology*, *78*(6), 1360–1380.

Gulati, R. (1995). Does Familiarity Breed Trust ? the Implications of Repeated Ties for. *Academy of Management*, *38*(1), 85–112.

Gulati, Ranjay. (1995). Social Structure and Alliance Formation Patterns: A Longitudinal Analysis. *Administrative Science Quarterly*, *40*(4), 619. https://doi.org/10.2307/2393756

Guler, I. (2007). Throwing Good Money after Bad? Political and Institutional Influences on Sequential Decision Making in the Venture Capital Industry. *Administrative Science Quarterly*, *52.2*, 248–285.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate Data Analysis*

(7th ed.). Pearson.

Hallen, B. L. (2009). The Causes and Initial Network Positions of New Organizations : *Administrative Science Quarterly*, *53*, 685–718. https://doi.org/10.2189/asqu.53.4.685

Harrison, R. T., & Mason, C. M. (2000). Venture capital market complementarities: The links between business angels and venture capital funds in the United Kingdom. *Venture Capital*, *2*(3), 223–242. https://doi.org/10.1080/13691060050135091

Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica*, *46*(6), 1251–1271.

Hellmann, T. (2000). *The Interaction between Product Market and Financing Strategy: The Role of Venture Capital*. *13*(4), 959–984.

Hellmann, T. (2002). A theory of strategic venture investing. *Journal of Financial Economics*, *64*(2), 285–314. https://doi.org/10.1016/S0304-405X(02)00078-8

Hellmann, T. F., Schure, P., & Vo, D. (2015). Angels and Venture Capitalists: Substitutes or Complements? *SSRN Electronic Journal*, (September). https://doi.org/10.2139/ssrn.2602739

Hellmann, T., Lindsey, L., & Puri, M. (2008). Building relationships early: Banks in venture capital. *Review of Financial Studies*, *21*(2), 513–541. https://doi.org/10.1093/rfs/hhm080

Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: Empirical evidence. *Journal of Finance*, *57*(1), 169–197. https://doi.org/10.1111/1540-6261.00419

Hellmann, T., & Thiele, V. (2015). Friends or foes? The interrelationship between angel and venture capital markets. *Journal of Financial Economics*, *115*(3), 639–653. https://doi.org/10.1016/j.jfineco.2014.10.009

Heukamp, F. H., Liechtenstein, H. V, & Walkeling, N. (2007). Do Business Angels Alter the Risk-Return Equation in Early Stage Investments? *The Journal of Private Equity*, *10*(3), 67–86. https://doi.org/10.3905/jpe.2007.686431

Hill, C. W. L. (1990). Cooperation, Opportunism, and the Invisible Hand: Implications for Transaction Cost Theory. *Academy of Management Review*, *15*(3), 500–513. https://doi.org/10.5465/amr.1990.4309111

Hmieleski, K., & Baron, R. (2009). Entrepreneurs' optimism and new venture performance: A

social cognitive perspective. *Academy of Management Journal*, *52*(3), 473–488. https://doi.org/10.5465/AMJ.2009.41330755

Hochberg, Y. V. (2016). Accelerating entrepreneurs and ecosystems: The seed accelerator model. *Innovation Policy and the Economy*, *16*(1), 25–51. https://doi.org/10.1086/684985

Hochberg, Y. V., Ljungqvist, A., & Lu, Y. (2007). Whom you know matters: Venture capital networks and investment performance. *Journal of Finance*, *62*(1), 251–301. https://doi.org/10.1111/j.1540-6261.2007.01207.x

Hoehn-Weiss, M. N., Karim, S., & Lee, C. H. (2017). Examining alliance portfolios beyond the dyads: The relevance of redundancy and nonuniformity across and between partners. *Organization Science*, *28*(1), 56–73. https://doi.org/10.1287/orsc.2017.1108

Homburg, C., Hahn, A., Bornemann, T., & Sandner, P. (2014). The role of chief marketing officers for venture capital funding: Endowing new ventures with marketing legitimacy. *Journal of Marketing Research*, *51*(5), 625–644. https://doi.org/10.1509/jmr.11.0350

Hopp, C. (2008). Are Firms Reluctant to Engage in Inter-Organizational Exchange Relationships with Competitors? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1680199

Hopp, C., & Lukas, C. (2014). A signaling perspective on partner selection in venture capital syndicates. *Entrepreneurship: Theory and Practice*, *38*(3), 635–670. https://doi.org/10.1111/etap.12023

Hsu, D. H. (2006). Venture capitalists and cooperative start-up commercialization strategy. *Management Science*, *52*(2), 204–219. https://doi.org/10.1287/mnsc.1050.0480

Hsu, D. H. (2007). Experienced entrepreneurial founders, organizational capital, and venture capital funding. *Research Policy*, *36*(5), 722–741. https://doi.org/10.1016/j.respol.2007.02.022

Huang, R., Shangguan, Z., & Zhang, D. (2008). The Networking Function of Investment Banks: Evidence from Private Investments in Public Equity. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1270689

Jääskeläinen, M. (2012). Venture Capital Syndication: Synthesis and future directions. *International Journal of Management Reviews*, *14*(4), 444–463.

https://doi.org/10.1111/j.1468-2370.2011.00325.x

Kale, P., Singh, H., & Perlmutter, H. (2000). Learning and protection of proprietary assets in strategic alliances: Building relational capital. *Strategic Management Journal*, *21*(3), 217–237. https://doi.org/0143–2095/2000/030217–21

Kalnins, A. (2018). Multicollinearity: How common factors cause Type 1 errors in multivariate regression. *Strategic Management Journal*, *39*(8), 2362–2385. https://doi.org/10.1002/smj.2783

Kang, S. (2019). The impact of corporate venture capital involvement in syndicates. *Management Decision*, *57*(1), 131–151. https://doi.org/10.1108/MD-01-2017-0024

Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. (2008). Swimming with Sharks : Technology Ventures ,. *Administrative Science Quarterly*, *53*(2), 295–332. https://doi.org/10.2189/asqu.53.2.295

Kelly, P., & Hay, M. (2003). Business angel contracts: The influence of context. *Venture Capital*, *5*(4), 287–312. https://doi.org/10.1080/1369106032000141940

Kerr, W. R., Lerner, J., & Schoar, A. (2014). The consequences of entrepreneurial finance: Evidence from angel financings. *Review of Financial Studies*, *27*(1), 20–55. https://doi.org/10.1093/rfs/hhr098

Knockaert, M., & Vanacker, T. (2013). The association between venture capitalists' selection and value adding behavior: Evidence from early stage high tech venture capitalists. *Small Business Economics*, *40*(3), 493–509. https://doi.org/10.1007/s11187-011-9378-8

Ko, E. J., & McKelvie, A. (2018). Signaling for more money: The roles of founders' human capital and investor prominence in resource acquisition across different stages of firm development. *Journal of Business Venturing*, *33*(4), 438–454. https://doi.org/10.1016/j.jbusvent.2018.03.001

Kong, S., Nitani, M., & Riding, A. (2016). Cross-border VC investment in Canadian firms: implications for exit patterns. *Venture Capital*, *18*(1), 63–93. https://doi.org/10.1080/13691066.2015.1078566

Kwon, S., Lowry, M., & Qian, Y. (2020). Mutual fund investments in private firms. *Journal of Financial Economics*, *136*(2), 407–443. https://doi.org/10.1016/j.jfineco.2019.10.003

Lam, S.-S. (1991). Venture Capital Financing: A Conceptual Framework. *Journal of Business Finance & Accounting*, *18*(January), 137–149.

Large, D., & Muegge, S. (2008). Venture capitalists' non-financial value-added: An evaluation of the evidence and implications for research. *Venture Capital*, *10*(1), 21–53. https://doi.org/10.1080/13691060701605488

Lee, B. (2019). Human capital and labor: the effect of entrepreneur characteristics on venture success. *International Journal of Entrepreneurial Behaviour and Research*, *25*(1), 29–49. https://doi.org/10.1108/IJEBR-10-2017-0384

Lee, G., & Masulis, R. W. (2011). Do more reputable financial institutions reduce earnings management by IPO issuers? *Journal of Corporate Finance*, *17*(4), 982–1000. https://doi.org/10.1016/j.jcorpfin.2011.04.012

Lee, P. M., Pollock, T. G., & Jin, K. (2011). The contingent value of venture capitalist reputation. In *Strategic Organization* (Vol. 9). https://doi.org/10.1177/1476127011400505

Lei, Z., Gupta, A. K., & Hallen, B. L. (2017a). The conditional importance of prior ties: A group-level analysis of venture capital syndication. In *Academy of Management Journal* (Vol. 60). https://doi.org/10.5465/amj.2013.1088

Lei, Z., Gupta, A. K., & Hallen, B. L. (2017b). The conditional importance of prior ties: A group-level analysis of venture capital syndication. *Academy of Management Journal*, *60*(4), 1360–1386. https://doi.org/10.5465/amj.2013.1088

Lerner, J. (1994). The syndication of venture capital investments. *Financial Management*, *23*(3), 16–27. https://doi.org/10.1016/S0305-0483(01)00024-X

Li, Y., & Mahoney, J. T. (2011). When are venture capital projects initiated? *Journal of Business Venturing*, *26*(2), 239–254. https://doi.org/10.1016/j.jbusvent.2009.08.001

Lockett A., Manigart S., Hommel U., Meuleman M., Wright M., Landström H., Bruining H., D. P. (2006). Venture Capitalists' Decision to Syndicate. *Entrepreneurship: Theory and Practice*, *30*(March 2006), 131–153. https://doi.org/10.1111/etap.12145

Lockett, A., & Wright, M. (2001). The syndication of venture capital investments. *Omega*, *29*(5), 375–390. https://doi.org/10.1016/S0305-0483(01)00024-X

Lungeanu, R., & Zajac, E. (2016). Venture Capital Ownership as a Contingent Resource: How Owner/Firm fit influences IPO Outcomes. *Working Paper*.

Ma, D., Rhee, M., & Yang, D. (2013). Power Source Mismatch and the Effectiveness of Interorganizational Relations: The Case of Venture Capital Syndication. *Academy of Management Journal*, *56*(3), 711–734. https://doi.org/10.5465

Ma, S. (2020). The Life Cycle of Corporate Venture Capital. *The Review of Financial Studies*, (33.1), 358–394.

Macmillan, I. C., Kulow, D. M., & Khoylian, R. (1989). Venture capitalists' involvement in their investments: Extent and performance. *Journal of Business Venturing*, *4*(1), 27–47. https://doi.org/10.1016/0883-9026(89)90032-3

Makarevich, A. (2018). Performance Feedback as a Cooperation Switch: A Behavioral Perspective on the Success of Venture CApital Syndicates among Competitors. *Strategic Management Journal*, *39*(12), 3247–3272. https://doi.org/10.1002/smj.2722

Manigart, S., & Wright, M. (2013). Venture capital investors and portfolio firms. *Foundations and Trends in Entrepreneurship*, *9*(4–5), 365–370. https://doi.org/10.1561/0300000040

Mansfield, E. R., & Helms, B. P. (1982). Detecting multicollinearity. *The American Statistician*, *36*(3), 158–160.

Mason, C., Botelho, T., & Harrison, R. (2016). The transformation of the business angel market: empirical evidence and research implications. *Venture Capital*, *18*(4), 321–344. https://doi.org/10.1080/13691066.2016.1229470

Mason, C. M., & Harrison, R. T. (2002). Is it worth it? The rates of return from informal venture capital investments. *Journal of Business Venturing*, *17*(3), 211–236. https://doi.org/10.1016/S0883-9026(00)00060-4

Matusik, S., & Fitza, M. (2012). Diversification in the Venture Capital Industry: Leveraging Knowledge under Uncertainty. *Strategic Management Journal*, *33*, 407–426. https://doi.org/10.1002/smj.1942

Maula, M., Autio, E., & Arenius, P. (2005). What drives micro-angel investments? *Small Business Economics*, *25*(5), 459–475. https://doi.org/10.1007/s11187-004-2278-4

Maula, M., Autio, E., & Murray, G. (2005). Corporate venture capitalists and independent

venture capitalists: What do they know, who do they know and should entrepreneurs care? *Venture Capital*, *7*(1), 3–21. https://doi.org/10.1080/1369106042000316332

Mohammadi, A., Shafizadeh khoolenjani, M., & Johan, S. A. (2014). A Signaling Theory Of Entrepreneurial Venture's Valuation. *Academy of Management Proceedings*, *2014*(1), 16575–16575. https://doi.org/10.5465/ambpp.2014.16575abstract

Morrissette, S. G. (2007). A Profile of Angel Investors. *The Journal of Private Equity*, *10*(3), 52–66. https://doi.org/10.3905/jpe.2007.686430

N. Berger, A., & F. Udell, G. (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking and Finance*, *22*(6–8), 613–673. https://doi.org/10.1016/S0378-4266(98)00038-7

Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, *90*(2), 127–151. https://doi.org/10.1016/j.jfineco.2007.11.008

Norton, E., & Tenenbaum, B. H. (1993). Specialization versus diversification as a venture capital investment strategy. *Journal of Business Venturing*, *8*(5), 431–442. https://doi.org/10.1016/0883-9026(93)90023-X

O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity*, *41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6

Pahnke, E. C., McDonald, R., Wang, D., & Hallen, B. (2015). Exposed : Venture Capital , Competitor Ties , and Entrepreneurial Innovation University of Washington University of Washington. *Academy of Management Journal*, *58*(5), 1334–1360.

Park, H. D. & Steensma, H. K. (2013). The selection and nurturing effect of Corporate investors on new venture innovativeness. *Strategic Entrepreneurship Journal*, *7*, 311–330. https://doi.org/10.1002/sej

Park, S., LiPuma, J. A., & Park, S. S. (2017). Concentrating Too Hard? Foreign and Corporate Venture Capital Involvement in Syndicates. *Journal of Small Business Management*, *57*(2), 327–342. https://doi.org/10.1111/jsbm.12322

Parkhe, A. (1993). Strategic Alliance Structuring: A Game Theoretic and Transaction Cost Examination of Interfirm Cooperation. *Academy of Management Journal*, *36*(4), 794–829. https://doi.org/10.5465/256759

Phalippou, L., & Gottschalg, O. (2009). The performance of private equity funds. *Review of Financial Studies*, *22*(4), 1747–1776. https://doi.org/10.1093/rfs/hhn014

Plagmann, C., & Lutz, E. (2019). Beggars or choosers? Lead venture capitalists and the impact of reputation on syndicate partner selection in international settings. *Journal of Banking and Finance*, *100*, 359–378. https://doi.org/10.1016/j.jbankfin.2019.01.007

Podolny, J. M. (2001). Networks as the pipes and prisms of the market. *American Journal of Sociology*, *10*(1), 33–60. https://doi.org/10.1086/323038

Politis, D. (2008). Business angels and value added: What do we know and where do we go? *Venture Capital*, *10*(2), 127–147. https://doi.org/10.1080/13691060801946147

Pollock, T. G., & Gulati, R. (2007). Standing out from the crowd: The visibility-enhancing effects of IPO-related signals on alliance formation by entrepreneurial firms. In *Strategic Organization* (Vol. 5). https://doi.org/10.1177/1476127007083346

Prowse, S. (1998). Angel investors and the market for angel investments. *Journal of Banking and Finance*, *22*(6–8), 785–792. https://doi.org/10.1016/S0378-4266(98)00044-2

Reagans, R., & McEvily, B. (2003). Network Structure and Knowledge Transfer: The Effects of Cohesion and Range. *Administrative Science Quarterly*, *48*(2). https://doi.org/10.2307/3556658

Riyanto, Y. E., & Schwienbacher, A. (2006). The strategic use of corporate venture financing for securing demand. *Journal of Banking and Finance*, *30*(10), 2809–2833. https://doi.org/10.1016/j.jbankfin.2005.11.005

Santos, F. M. (INSEAD), & Eisenhardt, K. M. (Stanford U. (2009). Constructing Markets and Shaping Boundaries : Entrepreneurial Power in Nascent Fields Author (s): Felipe M . Santos and Kathleen M . Eisenhardt Source : The Academy of Management Journal , Vol . 52 , No . 4 (Aug ., 2009), pp . 643-671 Published by : A. *Academy of Management Journal*, *52*(4), 643–671.

Sapienza, H. J. (1992). Determinants of Venture Capitalfirms ' Preferences Regarding the Industry Geographic Scope of Their Investments. *Business*, 347–362.

Sapienza, H. J., Amason, A. C., & Manigart, S. (1994). The Level and Nature of Venture Capitalist Involvement in Their Portfolio Companies: A Study of Three European

Countries. *Managerial Finance*, *20*(1), 3–17. https://doi.org/10.1108/eb018456

Sapienza, H. J., & Grimm, C. M. (1997). Founder Characteristics, Start-Up Process, and Strategy/Structure Variables as Predictors of Shortline Railroad Performance. *Entrepreneurship Theory and Practice*, *22*(1), 5–24. https://doi.org/10.1177/104225879702200101

Sapienza, H. J. S., & de Clercq, D. D. E. (2000). Venture Capitalist-Entrepreneur Relationships in Technology-Based Ventures. *Enterprise & Innovation Management Studies*, *1*(1), 57–71.

Schoenfeld, D. (1982). Partial residuals for the proportional hazards regression model. *Biometrika*, *69*(1), 239–241. https://doi.org/10.1093/biomet/69.1.239

Schwienbacher, A. (2008). Venture capital investment practices in Europe and the United States. *Financial Markets and Portfolio Management*, *22*(3), 195–217. https://doi.org/10.1007/s11408-008-0080-z

Seppä, M. J. M. M. T. (2006). Allocation of Attention to Portfolio Companies and the Performance of Venture Capital Firms. *Entrepreneurship: Theory and Practice*, (March, 2006), 185–206.

Shane, S., & Cable, D. (2002). Network ties, reputation, and the financing of new ventures. *Management Science*, *48*(3), 364–381. https://doi.org/10.1287/mnsc.48.3.364.7731

Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university start-ups. *Management Science*, *48*(1), 154–170. https://doi.org/10.1287/mnsc.48.1.154.14280

Shin, S. J., Kim, T. Y., Lee, J. Y., & Bian, L. (2012). Cognitive team diversity and individual team member creativity: A cross-level interaction. *Academy of Management Journal*, *55*(1), 197–212. https://doi.org/10.5465/amj.2010.0270

Simons, T., Pelled, L. H., Smith, K. A., Simons, T., & Smith, K. E. N. A. (1999). *Making Use of Difference: Diversity, Debate, and Decision Comprehensiveness in Top Management Teams*. *42*(6), 662–673.

SØrensen, M. (2007). How smart is smart money? A two-sided matching model of venture capital. *Journal of Finance*, *62*(6), 2725–2762. https://doi.org/10.1111/j.1540-

6261.2007.01291.x

Sorenson, O., & Stuart, T. E. (2001). Syndication networks and the spatial distribution of venture capital investments. *American Journal of Sociology*, *10*(6), 1546–1588. https://doi.org/10.1086/321301

Sorenson, O., & Stuart, T. E. (2008). Bringing the context back in: Settings and the search for syndicate partners in venture capital investment networks. *Administrative Science Quarterly*, *53*(2), 266–294. https://doi.org/10.2189/asqu.53.2.266

Sørheim, R., & Landström, H. (2001). Informal investors - A categorization, with policy implications. *Entrepreneurship and Regional Development*, *13*(4), 351–370. https://doi.org/10.1080/08985620110067511

Sørheim, Roger. (2005). Business angels as facilitators for further finance: An exploratory study. *Journal of Small Business and Enterprise Development*, *12*(2), 178–191. https://doi.org/10.1108/14626000510594593

Steier, L., & Greenwood, R. (1995). Venture Capitalist Relationships in the Deal Structuring and Post-Investment Stages of New Firm Creation. *Journal of Management Studies*, *32*(3), 337–357. https://doi.org/10.1111/j.1467-6486.1995.tb00779.x

Storey, D. J. (1994). Understanding the small business sector. *Routledge, London.* https://doi.org/10.1016/0024-6301(95)90953-2

Teece, D. J., Rumelt, R., Dosi, G., & Winter, S. (1994). Understanding corporate coherence. Theory and evidence. *Journal of Economic Behavior and Organization*, *23*(1), 1–30. https://doi.org/10.1016/0167-2681(94)90094-9

Ter Wal, A. L. J., Alexy, O., Block, J., & Sandner, P. G. (2016). The Best of Both Worlds: The Benefits of Open-specialized and Closed-diverse Syndication Networks for New Ventures' Success. *Administrative Science Quarterly*, *61*(3), 393–432. https://doi.org/10.1177/0001839216637849

Tian, X. (2012). The role of venture capital syndication in value creation for entrepreneurial firms. *Review of Finance*, *16*(1), 245–283. https://doi.org/10.1093/rof/rfr019

Ţurcan, R. V. (2008). Entrepreneur-venture capitalist relationships: Mitigating post-investment dyadic tensions. *Venture Capital*, *10*(3), 281–304.

https://doi.org/10.1080/13691060802151960

Van Osnabrugge, M. (2000). A comparison of business angel and venture capitalist investment procedure s: An agency theory-based analysis. *Venture Capital*, *2*(2), 91–109. https://doi.org/10.1080/136910600295729

Vanacker, T., Collewaert, V., & Paeleman, I. (2013). The relationship between slack resources and the performance of entrepreneurial firms: The role of venture capital and angel investors. *Journal of Management Studies*, *50*(6), 1070–1096. https://doi.org/10.1111/joms.12026

Wallmeroth, J., Wirtz, P., & Groh, A. P. (2018). *Foundations and Trends in Entrepreneurship: Venture Capital, Angel Financing, and Crowdfunding of Entrepreneurial Ventures: A Literature Review Boston — Delft* (Vol. 14). https://doi.org/10.1561/0300000066

Wang, D., Pahnke, E. C., & McDonald, R. (2021). The Past Is Prologue? Venture-Capital Syndicates' Collaborative Experience and Start-Up Exits. *Academy of Management Journal*, amj.2019.1312. Retrieved from http://journals.aom.org/doi/10.5465/amj.2019.1312

Wang, L., & Wang, S. (2012). Endogenous networks in investment syndication. *Journal of Corporate Finance*, *18*(3), 640–663. https://doi.org/10.1016/j.jcorpfin.2012.03.004

Werth, J. C., & Boeert, P. (2013). Co-investment networks of business angels and the performance of their start-up investments. *International Journal of Entrepreneurial Venturing*, *5*(3), 240–256. https://doi.org/10.1504/IJEV.2013.055292

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Wright, M., & Lockett, A. (2003). The Structure and Management of Alliances: Syndication in the Venture Capital Industry. *Journal of Management Studies*, *40*(8), 2073–2102. https://doi.org/10.1046/j.1467-6486.2003.00412.x

Zaheer, A., McEvily, B., & Perrone, V. (1998). Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance. *Organization Science*, *9*(2), 141–159. https://doi.org/10.1287/orsc.9.2.141

Zhang, L., & Guler, I. (2020). How to Join the Club: Patterns of Embeddedness and the Addition of New Members to Interorganizational Collaborations. *Administrative Science*

Quarterly, *65*(1), 112–150. https://doi.org/10.1177/0001839219834011

Zheng, J. K. (2004). A Social Network Analysis of Corporate Venture Capital Syndication By. *Waterloo ON University of Waterloo*, 89.

Appendix

Definition of funding rounds in Crunchbase database

Since funding rounds are an essential factor of our analysis, we manually verify funding rounds based on the announced date of each investment event and re-classify them, where necessary. We follow previous literature and combine investments into one financing round if the individual investment events are made within a period of 90 days from the first investment in this period (Guler, 2007; T. Hellmann & Thiele, 2015b; Mohammadi & Johan, 2014). This correction is since the classification of the financing round in the Crunchbase database sometimes divides the investments into several rounds even though they are within a very short period of time. This circumstance could possibly distort our analysis.

Database matching process (Crunchbase and Refinitiv Eikon)

In this passage, we describe our multi-step approach to merge ventures of Crunchbase with the Refinitiv EIKON database. Similar to (Kwon et al., 2020), we make the effort to match the two data sets to firstly increase our level of data quality and secondly amplify information on venture characteristics in our sample. As an example, Crunchbase usually tags ventures with multiple industry labels which makes a direct allocation of a venture to one industry impossible without manual work. In contrast, Thomson EIKON exhibits one SIC as well as NACIS industry code for each venture, which also enables us to incorporate common industry-level variables in our model from Compustat. We apply a fuzzy matching logic similar to Ma (2020) and (Bernstein, Korteweg, & Laws, 2017) to match Crunchbase and Thomson EIKON on the venture level.

We export the full data set from Crunchbase and Thomson EIKON (both dated July 2019) with all relevant information required for our analysis. We include ventures founded from 1995 onwards to ensure sufficient variability in market conditions by capturing both the dot com bubble (2000/01) and the financial crisis (2008/09) in our sample. As the first step in our matching procedure, we standardize venture names by removing common company prefixes and suffixes and strip names of punctuation and capitalization in both data sets. We hereby isolate a company's stem name (i.e. the main body of the company name). We then apply our

fuzzy matching procedure in a multiple-step approach using the venture stem names in combination with time and geographic information to increase accuracy.

Step 1: Each Crunchbase venture stem name is matched with stem names from Thomson EIKON data in combination with the venture city and country location. If a match of the venture name and geographic location via the Jaro Distance function (90% threshold) is identified, we consider this as a "potential match". All ventures with a value of 100% are considered a "successful match". In case one venture matches multiple ventures in the other database, we match the venture with the highest fit according to the Jaro Distance function and remove the remaining observations.

Step 2: For the non-matched ventures in step 1, we repeat the approach with the venture stem name in combination with the venture founding year via the Jaro Distance function (90% threshold). The fitted ventures are also considered a "potential match".

Step 3: For all potential matches (fitting value above 90%, yet below 100%), we conduct manual checks and categorize fitting ventures as "successful matches". For all matched ventures, we conduct sample tests and verify our previous matching process.

Non-matched ventures from Crunchbase mainly represent young ventures without any significant funding by Venture Capital firms in their funding trajectory. Excluding these ventures reduces our sample size, yet we significantly increase the quality and information per venture in our sample. Although Crunchbase has a thorough data quality process in place, it is an open platform with information being directly entered by the community. By combining Crunchbase and Thomson EIKON, we verify all venture-level information with two independent sources of information.

Table 5: Variance Inflation Factors

Variable	Values
Geo. distance to venture	1.03
VC prior investor dyads	1.20
VC Lead investor	1.13
BA educational level	1.08
BA founding experience	1.03
Portfolio focus heterog.	1.08
Investment experience	1.16
Investment stage	1.24
Founder team size	1.02
Invest. volume (ln)	1.25
Venture customer focus	1.01
Prev. accelerator round	1.25
Venture location	1.09
Venture age (month)	1.18
Venture no of industries	1.01
Ownership balance	1.06
Average	**1.11**

Table 6: Main analysis results (Stepwise Cox proportional hazard regression)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
Dependent variable Successful BA & VC Co-Investment	Baseline	Add IV1	Add IV2	Add IV3	Add IV4	Add IV5	Add IV6	Add IV7	Full model
Control variables									
Investment stage	-0.102	-0.100	-0.073	-0.107	-0.099	-0.103	-0.094	-0.092	-0.069
	(0.305)	(0.317)	(0.466)	(0.282)	(0.319)	(0.304)	(0.344)	(0.357)	(0.489)
Founder team size	-0.143**	-0.140**	-0.149***	-0.145**	-0.145**	-0.143**	-0.146**	-0.143**	-0.148***
	(0.012)	(0.014)	(0.009)	(0.011)	(0.011)	(0.012)	(0.010)	(0.012)	(0.010)
Investment volume (ln)	0.135***	0.143***	0.117***	0.105**	0.141***	0.135***	0.132***	0.123***	0.092**
	(0.002)	(0.001)	(0.007)	(0.021)	(0.001)	(0.002)	(0.002)	(0.004)	(0.048)
Vent. customer focus	0.049	0.059	0.057	0.061	0.058	0.049	0.056	0.059	0.096
	(0.684)	(0.626)	(0.639)	(0.614)	(0.633)	(0.687)	(0.644)	(0.626)	(0.427)
Previous accelerator round	0.269**	0.265**	0.192	0.276**	0.260**	0.269**	0.276**	0.278**	0.211*
	(0.022)	(0.024)	(0.111)	(0.019)	(0.027)	(0.022)	(0.019)	(0.020)	(0.083)
Venture location	0.114	0.076	0.100	0.120	0.087	0.114	0.107	0.117	0.050
	(0.229)	(0.431)	(0.290)	(0.204)	(0.358)	(0.227)	(0.258)	(0.218)	(0.610)
Venture age (month)	-0.011***	-0.011***	-0.011***	-0.011***	-0.010**	-0.011***	-0.011***	-0.011***	-0.009**
	(0.004)	(0.004)	(0.007)	(0.004)	(0.012)	(0.004)	(0.005)	(0.004)	(0.016)
Venture No. of industries	-0.049*	-0.050*	-0.049*	-0.049*	-0.051*	-0.049*	-0.050*	-0.052*	-0.054*
	(0.075)	(0.069)	(0.078)	(0.079)	(0.067)	(0.075)	(0.071)	(0.062)	(0.054)
Ownership balance	-0.168	-0.180	-0.107	-0.148	-0.132	-0.168	-0.165	-0.174	-0.083
	(0.286)	(0.253)	(0.498)	(0.350)	(0.407)	(0.286)	(0.294)	(0.269)	(0.604)
Main effects									
Geographical distance to venture		-0.000**							-0.000**
		(0.030)							(0.019)
VC prior investor dyads			0.124***						0.114***
			(0.001)						(0.004)
VC lead investor role				0.209**					0.193*
				(0.038)					(0.058)
BA educational level					0.105***				0.093**
					(0.003)				(0.011)
BA founding experience						-0.031			-0.099
						(0.870)			(0.615)
Portfolio focus heterogeneity							0.235	0.587**	0.600**
							(0.187)	(0.012)	(0.013)
Investment experience								0.003	0.002
								(0.223)	(0.425)
Portfolio focus heterogeneity x Investment experience								-0.011**	-0.011**
								(0.030)	(0.044)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,584	2,584	2,584	2,584	2,584	2,584	2,584	2,584	2,584
Log likelihood	-3434	-3431	-3428	-3431	-3429	-3434	-3433	-3430	-3416
LR Chi2	115.56	120.52	125.77	119.79	124.36	115.59	117.29	123.29	149.87

Event history analysis of the venture's likelihood of a successful exit
Dependent variable: Likelihood of a successful exit (IPO or acquisition)
We report covariate coefficients, p-values are in parentheses; *** p<.01, ** p<.05, * p<.1

Table 7: Robustness test results (Logistic regression)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
Dependent variable Successful BA & VC Co-Investment	Baseline	Add IV1	Add IV2	Add IV3	Add IV4	Add IV5	Add IV6	Add IV7	Full model
Control variables									
Investment stage	-.133	-.134	-.101	-.139	-.122	-.132	-.125	-.12	-.091
	(.119)	(.12)	(.12)	(.12)	(.12)	(.119)	(.12)	(.12)	(.122)
Founder team size	-.138**	-.132*	-.137**	-.142**	-.14**	-.138**	-.14**	-.138**	-.135*
	(.069)	(.069)	(.069)	(.069)	(.069)	(.069)	(.069)	(.069)	(.07)
Investment volume (ln)	.182***	.189***	.162***	.14**	.181***	.182***	.179***	.167***	.117**
	(.054)	(.054)	(.054)	(.056)	(.054)	(.054)	(.054)	(.054)	(.058)
Vent. customer focus	.098	.106	.108	.098	.116	.098	.104	.109	.146
	(.154)	(.154)	(.154)	(.154)	(.154)	(.154)	(.154)	(.154)	(.155)
Previous accelerator round	.33**	.324**	.253*	.345**	.315**	.33**	.337**	.33**	.267*
	(.143)	(.144)	(.147)	(.144)	(.144)	(.143)	(.144)	(.145)	(.149)
Venture location	.115	.072	.103	.124	.086	.114	.107	.114	.043
	(.115)	(.117)	(.116)	(.116)	(.116)	(.115)	(.116)	(.116)	(.12)
Venture age (month)	-.011**	-.011**	-.01**	-.01**	-.01**	-.011**	-.011**	-.011**	-.009*
	(.005)	(.005)	(.005)	(.005)	(.005)	(.005)	(.005)	(.005)	(.005)
Venture No. of industries	-.056	-.058*	-.054	-.055	-.057	-.056	-.056	-.056	-.057
	(.035)	(.035)	(.035)	(.035)	(.035)	(.035)	(.035)	(.035)	(.035)
Ownership balance	-.177	-.183	-.114	-.154	-.126	-.177	-.174	-.178	-.065
	(.194)	(.194)	(.196)	(.195)	(.196)	(.194)	(.194)	(.194)	(.198)
Main effects									
Geographical distance to venture		0**							0**
		(0)							(0)
VC prior investor dyads			.125***						.105**
			(.048)						(.051)
VC lead investor role				.31**					.296**
				(.125)					(.127)
BA educational level					.132***				.121***
					(.044)				(.045)
BA founding experience						.018			-.06
						(.231)			(.236)
Portfolio focus heterogeneity							.239	.617**	.643**
							(.22)	(.287)	(.294)
Investment experience								.004	.003
								(.003)	(.003)
Portfolio focus heterogeneity x Investment experience								-.012**	-.012*
								(.006)	(.006)
Constant	-7.208***	-7.26***	-7.075***	-6.739***	-7.363***	-7.21***	-7.261***	-7.165***	-6.761***
	(1.28)	(1.283)	(1.281)	(1.29)	(1.282)	(1.28)	(1.28)	(1.282)	(1.3)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2458	2458	2458	2458	2458	2458	2458	2458	2458
Pseudo R^2	.17	.172	.172	.172	.173	.17	.17	.172	.182
Log-likelihood	-1027.314	-1024.732	-1024.012	-1024.263	-1022.802	-1027.311	-1026.726	-1024.48	-1011.902
Akaike's Criterium	2158.627	2155.464	2154.025	2154.526	2151.605	2160.621	2159.452	2158.96	2143.804
Bayesian Criterium	2460.597	2463.241	2461.801	2462.303	2459.381	2468.398	2467.228	2478.35	2492.23

Standard errors are in parentheses; *** p<.01, ** p<.05, * p<.1