The value of complementary assets for CVC-invested new ventures

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Abstract
Investments of a corporate venture capitalist (CVC) into new ventures are attractive for capturing the value from innovations for both partners. By investigating the matter of specialized complementary assets (CAs) provided by the parent corporation of a CVC on the performance of its funded ventures, my paper contributes to the literature on CVC investments. Drawing on resource dependence theory, I argue that an actual business overlap between a new venture and the parent makes the specialized CAs especially attractive for the venture. I hypothesize that the effective employment of specialized CAs is the reason for enhanced new venture performance. Further, I claim that sharing information with the CVC’s parent moderates the relationship of CA usability and the performance of new ventures positively. Analyzing almost 500 observations of roughly 150 ventures in the ICT industry in Europe and Latin America, I find empirical evidence for a positive effect of CA usability on new venture performance, but mixed results for the proposed moderating effect of information sharing.
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INTRODUCTION

New ventures are often liquidity and resource constrained (Teece, 1986). Hence, they miss resources to buy complementary assets (CAs) or lack the time and capabilities to build these CAs on their own. Yet, Teece (1986: 288) emphasizes that, “the successful commercialization of innovations requires that the know-how in question be utilized in conjunction with other capabilities or assets“. This is a critical aspect for new ventures because their survival depends on their innovation's success (e.g. Colombo, Grilli, and Piva, 2006). Therefore, especially new ventures need to rely on partners when wanting to innovate (Teece, 2018).

Corporate venture capital investments represent one possibility through which new ventures could overcome challenges alike (Dushnitsky, 2012). Apart from easily accessible generic CAs, established firms are likely to also control specialized and cospecialized CAs, which are scarce but particularly valuable for taking full advantage of innovations (Teece, 1986).

Despite of existing research on the meaningfulness of CAs for CVC relationships (e.g. Dushnitsky and Shaver, 2009; Katila, Rosenberger, and Eisenhardt, 2008) and new venture performance (e.g. Alvarez-Garrido and Dushnitsky, 2016; Gompers and Lerner, 2000), it remains unclear under which circumstances ventures can benefit from CAs. Since Maula, Autio, and Murray (2009) suggest that social interaction between the partners in a CVC relationship can increase new venture performance, one possible facilitator of CA usability could, for example, be information sharing of new ventures with CVCs and their parent corporations. Information sharing could therefore moderate the influence of CAs on new venture performance positively.

Arguing that an exchange of resources in the form of CAs and innovative ideas creates interdependencies between CVCs and new ventures, my paper draws on resource dependence theory (Pfeffer and Salancik, 1978). Relying on this tool, I argue that in case of a business overlap
with the CVC’s parent company, new ventures can particularly make use of the provided specialized CAs. I suggest that, ventures that could potentially use and ventures that actually already use the parent’s specialized CAs are performing better than ventures that cannot do so. The underlying research question, thus, reads: “To what extent does the accessibility of specialized CAs influence new venture performance in case of a business overlap with the funding CVC’s parent?”.

In this study, I analyze novel, proprietary data on new ventures backed by one independently operating CVC with regional offices in ten countries in Europe and Latin America. The CVC belongs to a globally active company from the information and communication technology (ICT) industry in which also the funded ventures operate. The data provide information about ventures that, according to the CVC and its parent, are characterized by a potential or actual business overlap with the parent. I adopt this information as measures for whether funded new ventures could potentially, actually, or not at all use the parent’s specialized CAs. Moreover, the data allow for an assessment of the venture’s willingness to share information with the CVC’s parent, thereby providing a measure for information sharing. In my analysis, I control for venture age and size, the ventures’ portfolio status, the rating year, and the managing regional office.

I use linear regression analyses with fixed effects on the regional office of the CVC to test my hypotheses. My results yield evidence for a positive influence of a potential use of the specialized assets of the parent on new venture performance whereas the support for a positive effect of their actual use on performance is only marginal. Furthermore, whereas for the ventures characterized by the potential to use the parent’s specialized CAs, information sharing seems to

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1 Since generic CAs per definition should be of basic and similar attractiveness for anyone (Teece, 1986), I state that the proposed relationship between business overlap and CA attractiveness is only true for specialized and cospecialized assets. For this purpose, a differentiation between specialized and cospecialized CAs is not needed. Hence, unless an explicit differentiation is realized, in the following the term “specialized” may unite both concepts.
affect performance negatively, ventures that already use these CAs do benefit slightly from it. However, for both of these moderation effects statistical significance is far above any conventional significance level. Nevertheless, my findings highlight the role of specialized CAs provided by a CVC’s parent for the performance of the new ventures funded by the CVC in case of a business overlap.

My paper’s main contribution to the existent literature is threefold. Firstly, I add to the research stream on CAs as a meaningful tool for new venture performance (e.g. Alvarez-Garrido and Dushnitsky, 2016; Park and Steensma, 2012) providing findings from another sector, namely the ICT industry. My results are mostly in line with findings about a positive effect of the use of CAs on new venture performance (e.g. Alvarez-Garrido and Dushnitsky, 2016; Park and Steensma, 2012).

Secondly, I introduce information sharing as a moderating effect. I receive mixed results that yield evidence for both, research claiming that information sharing increases the risk of misappropriation (Dushnitsky and Shaver, 2009; Teece, 1986, 2018), and for research highlighting the importance of information sharing for new venture performance in CVC relationships (Maula et al., 2009). My findings suggest a possible difference between ventures that can potentially use the parent’s CAs and ventures that actually use the parent’s specialized CAs already regarding the effect on new venture performance. Hence, how ventures manage information sharing might be especially crucial before ventures receive access to a parent’s specialized CAs.

Thirdly, my major theoretical contribution is represented by the application of resource dependence theory (Pfeffer and Salancik, 1978) to the topic of an enhanced attractiveness of the respective partner in CVC relationships that are characterized by a business overlap. I interpret my findings in terms of the existence of interdependencies and power imbalances between CVCs, their
parent companies and the new ventures they support. Hence, I argue that resource dependence theory is able to illustrate the crucial aspects of CVC relationships, namely dependency and power imbalance.

**THEORETICAL BACKGROUND**

Capturing the value of innovations is a difficult endeavor (Teece, 1986, 2018). Since new ventures lack resources and capabilities to autonomously do so, the need of having to rely on partners when wanting to innovate accrues especially to this type of firms (Teece, 2018).

One way to overcome the described challenges is represented by partnering up with a CVC (Dushnitsky, 2012). Whereas new ventures might seek CAs such as recognized brands, trained sales forces, specialized distribution channels or supplier networks (Colombo et al., 2006) owned by established firms (Maula et al., 2009), CVCs may enhance their understanding of new technologies and markets by interacting with new ventures (e.g. Dushnitsky and Lenox, 2005; Wadhwa and Kotha, 2006). Being one of the most attractive objectives for CVCs, this is referred to as gaining a window on technology (e.g. Benson and Ziedonis, 2009; Wadhwa and Kotha, 2006). Such benefits of CVC investments – the access to CAs and technologies respectively – are said to accrue specifically to partners that are characterized by a business overlap (e.g. Dushnitsky and Shaver, 2009; Gompers and Lerner, 2000).

Nevertheless, both actors also face downsides of CVC investments. An established firm might lose value due to underperformance of a funded venture (Park and Steensma, 2012). The latter, however, is exposed to the CVC’s opportunism leading to misappropriation fears (e.g. Dushnitsky and Shaver, 2009; Hallen, Katila, and Rosenberger, 2014).

Accordingly, seeking resources in a CVC relationship seems to create dependencies between the partners, a topic addressed by resource dependence theory (Pfeffer and Salancik,
1978). It acknowledges firm behavior as intertwined with its environment, including interdependencies with other organizations and concomitant uncertainty about the others’ actions (Pfeffer, 1987). Transferred to the CVC context, the uncertainty aspect relates to the risk of CVCs misappropriating the ventures’ innovative ideas (e.g. Dushnitsky and Shaver, 2009). Due to this risk, ventures, on the other hand, might hold back critical information (Anton and Yao, 1994). Hence, CVCs and ventures are both uncertain about the respective other’s actions. Moreover, CAs controlled by CVCs and innovative ideas of new ventures can be interpreted as key resources which the respective other party seeks. Therefore, both partners are in powerful positions controlling the resources, that are valuable for the corresponding partner (Hillman, Withers, and Collins, 2009). Consequently, CVCs and new ventures both experience mutual dependence and have power over one another that might be imbalanced (Casciaro and Piskorski, 2005), potentially rather benefiting the CVC (Katila et al., 2008). By explaining how interdependencies and power imbalances are created and managed, resource dependence theory can shed light on the circumstances under which the described key resources can be utilized gainfully.

**Specialized CAs and business overlap**

When exchanging resources and information on technologies, the partners in a CVC relationship expose themselves to dependencies on the respective other. These resources are represented by the information on emergent technologies held by the funded ventures sought after by the CVC (Wadhwa and Kotha, 2006). Yet, ventures search for financial backing and even more so for CAs (Maula et al., 2009).

CAs may be of generic, specialized or cospecialized nature (Teece, 1986). CAs of the first type can be applied to any innovation and are easily accessible in the market. Hence, their attractiveness should not vary much among different organizations and it is of little importance
where in the market they are sourced. However, the access to specialized and cospecialized assets is crucial for deriving value from innovations (Teece, 1986). In fact, Alvarez-Garrido and Dushnitsky (2016) show that new venture performance increases with the benefits new ventures can derive from corporate CAs what the authors approximate by geographic proximity. Park and Steensma (2012), moreover, find that CVCs add value to the new ventures they support when the provided CAs are of specialized rather than generic nature. Such specialized assets require time to be built and cannot be easily sourced in the market (Colombo and Dawid, 2016).

I argue that CVCs add value to the new ventures they fund especially if the businesses of ventures and the respective CVC’s parent overlap. Similar to the understanding of “fit” described by Dushnitsky (2009: 388), a business overlap is decisive for “the monetary and non-pecuniary support provided by the corporation, the knowledge and information that flows back from the venture and the level of relatedness between the products, services or technologies of the two”. Usually, when it comes to sourcing knowledge externally, there exists uncertainty about whether a firm can assess the other’s information. Hence, the firm’s absorptive capacity matters (Cohen and Levinthal, 1990). Lane and Lubatkin (1998) notice that interorganizational learning increases if partners show a similar knowledge base. A business overlap between CVCs and new funded ventures might make these ventures specifically attractive for an investor (Dushnitsky and Shaver, 2009) because the investor’s capacity to absorb information should then be high. However, such a business overlap might involve that ventures’ ideas compete with their CVC’s products, and hence, could offer a fertile ground for misappropriation of the ventures’ ideas (Dushnitsky and Shaver, 2009). Nevertheless, Benson and Ziedonis (2009) declare that the risk of misappropriation is reduced if the CVC is a dedicated corporate venture capital unit. Operating rather independently from its parent company, this type of investor is usually not interested in misappropriating its
funded new ventures. Consequently, both partners can potentially benefit from a business overlap. If such an overlap exists, new ventures can be expected to rely on similar technologies and commercialization mechanisms that their funding CVC’s parent works with and understands well (Dushnitsky and Shaver, 2009). In this case, CVCs should also be more capable of adding value to the ventures they support (e.g. Gompers and Lerner, 2000).

I state, that the added value results from an increased attractiveness of the specialized CAs controlled by the CVC’s parent. This increased attractiveness should be due to a business overlap between a new venture and the parent corporation. The larger this overlap is, the more likely it is, that the ventures get the chance to make use of the specialized CAs. This holds true because, firstly, the CVC is probably more likely to find the new ventures interesting (Dushnitsky and Shaver, 2009). Secondly, the ventures should perceive this CVC as especially appealing because sharing a business increases the firm’s ability to learn from the other one (Ahuja and Katila, 2001). Thus, a potential business overlap should imply the respective venture’s potential to make use of specialized CAs provided by the CVC’s parent.

\[ H1: \text{The performance of new ventures is higher if they can potentially make use of the specialized CAs provided by a CVC’s parent.} \]

Following the same logic, new ventures might actually already utilize the CAs. An actual business overlap between ventures and the parent should render the parent’s specialized assets especially suitable for the new ventures to develop and commercialize their innovation. They, thus, should show a higher performance than ventures that do not actually use the parent’s specialized CAs:

\[ H2: \text{The performance of new ventures is higher if they actually make use of specialized CAs provided by a CVC’s parent.} \]
Information sharing as a moderator

Firms can be understood as consisting of a set of tangible and intangible resources and capabilities that are sticky and difficult to imitate (Mowery, Oxley, and Silverman, 1998). According to resource dependence theory, by seeking such resources from each other, partners create interdependencies that are likely to involve power imbalances. For parent corporations of CVCs, the acquisition of information about technologies and markets is especially attractive (Wadhwa and Kotha, 2006). Yet, new ventures seek financial support but specialized CAs in particular (Maula et al., 2009). When provided with such assets, new venture performance is likely to increase (e.g. Alvarez-Garrido and Dushnitsky, 2016; Park and Steensma, 2012). CAs do not necessarily have to be of physical nature. CVCs and their parent companies could also provide specific expertise (Maula, Autio, and Murray, 2005) which could present itself in the form of tacit knowledge (Lubatkin, Florin, and Lane, 2001). This type of knowledge is usually difficult to transfer but critical for building a sustainable competitive advantage (Kogut and Zander, 1996). If firms are characterized by a business overlap, however, they are likely to understand the respective partner’s input more easily because they share a similar knowledge base (Lane and Lubatkin, 1998). Thus, the absorptive capacity should be high, making this input not only valuable but also facilitating its internalization.

According to Maula, Autio, and Murray (2003), nonetheless, what acts as a prerequisite to such a knowledge transfer between incumbents and new ventures are social interactions. However, for a new venture partnering up with a CVC is not merely about getting access to resources but also about protecting its own knowledge (Hallen et al., 2014). The common fear of misappropriation might leave CVCs with less attractive new ventures to fund. Since these ventures do not have a lot to lose when relying on a CVC, this type of ventures might be the only one willing
to disclose information (Maula et al., 2009). In case of a business overlap, the fear of misappropriation might even be larger because for the more powerful established firm imitation is then relatively easy (Dushnitsky and Shaver, 2009). Still, as has been stated in the last section, the risk of misappropriation is reduced if CVCs operate rather independently from their parent corporation (Benson and Ziedonis, 2009). This emphasizes how important a differentiation between the CVC and its parent corporation is. Hence, whether the misappropriation hazard is high depends to a great extent on the actual receiver of a venture’s proprietary information.

In fact, the formation of social ties could also enhance the communication of both partners and, thus, might promote an increased overlap (Di Lorenzo and van de Vrande, 2018). CVCs2 are then able to learn about markets and technologies from new ventures (Benson and Ziedonis, 2009) and can support them more effectively (e.g. Gompers and Lerner, 2000). For ventures, sharing information may facilitate the access to sought-after specialized CAs (Maula et al., 2009) that benefit their performance (e.g. Alvarez-Garrido and Dushnitsky, 2016; Park and Steensma, 2012). Indeed, firms want to know about the value of investment options before deciding to engage in risky resource commitments (Anton and Yao, 1994). They also like to know about the needs of new ventures that these want to get satisfied through CVC partnerships (Maula et al., 2009). This shows that information sharing of new ventures is critical for receiving access to valuable resources held by CVCs and their parents. Moreover, Maula et al. (2009) observe that social interaction in CVC relationships benefits learning. This might imply that specialized CAs can then be provided and applied more efficiently.

In summary, this means that new ventures characterized by a business overlap with a CVC might improve the accessibility of key specialized CAs if they share information about their

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2 It is probably rather a corporate investor’s parent company that can learn about these aspects.
business. I argue that this is true because the uncertainty that CVCs face (Wadhwa and Basu, 2013) is lowered by shared information. Thus, it facilitates the assessment of the ventures’ suitability for the CVC’s parent, and the actual value of the specialized CAs for the ventures. The potential of a venture to use these assets, combined with sharing information about its ideas and needs should, hence, translate into higher performance outcomes of the venture:

**H3:** The influence of the potential use of specialized CAs on new venture performance is greater if the new venture shares information with the CVC’s parent.

The logic previously described does not only apply to ventures that can potentially make use of the specialized CAs but also to the ones that actually do so. Sharing information might still be important when social ties between ventures and CVCs have already been established. Firstly, due to the risk of misappropriation, ventures might keep crucial information to themselves in the first place (Anton and Yao, 1994). Secondly, ventures whose environment is characterized by the frequent introduction of novelties have to continuously adapt their products and business models in order to stay competitive (Hampel, Tracey, and Weber, 2019). By doing so, they permanently create new information after the due diligence process. Hence, if ventures that actually use the specialized CAs of their CVC’s parent share information, assets and advice can probably be better tailored to the ventures in question. Consequently, information sharing is likely to also be beneficial for new venture performance when the actual usability of specialized assets has already been proven.

**H4:** The effect of the actual use of specialized CAs on new venture performance is greater if the venture shares information with the CVC’s parent.
METHODOLOGY

Setting and sample

The major part of the proprietary data analyzed in this paper was internally compiled and stems from the management information system (MIS) of a globally operating Spanish ICT company that is part of the EUROSTOXX 50 index. This company runs an independent CVC unit that started its early activities in Latin America and later extended them to Europe. The CVC’s key goal is to determine ideas and technologies that are interesting for its parent corporation. Moreover, the parent seeks additional knowledge about innovations and trends that find application in its core business.

The data fit my research well because they allow for an identification of the ventures characterized by a potential and/or actual business overlap. This makes it possible to assess which ventures can potentially and which actually use the specialized CAs of the CVC’s parent. In addition, the data provide insight about the willingness of new ventures to share their proprietary information with the parent company.

I analyze information on venture quality ratings from the MIS of the CVC’s parent looking at the period from 2015 to 2017. I merge this data with results from a survey collected every four months by the CVC that aims at monitoring the development of all operating ventures. However, some ventures did not take part in the survey because they had already gone out of business or not yet started their operations by the time of data collection.

The CVC is active in all countries wherein its parent operates. Its thirteen active managing offices are, therefore, based in ten countries, namely, Germany, Spain and Great Britain in Europe, and Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela in Latin America. Two offices in Europe are further dedicated to specific aspects. One focuses on business issues related
to the government and the other on R&D. Additionally, the CVC’s previous activities in Czech Republic and Ireland were ended during the sample period because its parent’s major operations in these countries were sold. Due to missing or inconsistent data, information on the ventures managed by one regional office in Spain, the office focusing on R&D, and the office in Czech Republic could not be considered in my analysis. The final sample I analyze comprises 148 ventures and 488 observations.

Description of variables

Dependent variable

My dependent variable is the performance of new ventures. Research has not yet identified one especially suitable measure for new venture performance (Thornhill and Amit, 2001). In the CVC literature, it has, for example, been measured in terms of innovation outcomes (e.g. Alvarez-Garrido and Dushnitsky, 2016) or valuations at the initial public offering (Ivanov and Xie, 2010).

I measure new venture performance by referring to the CVC’s internal assessment of the venture’s quality which is based on eight audited dimensions. The assessment is performed by the CVC’s operating manager of the respective business unit. It is based on a 0.5-paced scale ranging from 0 (worst) to 10 (best). My performance analysis is based on the rating on the revenues dimension only. The rationale for revenues as a valid performance indicator is, first, that financial performance is a crucial measure in the area of organizational effectiveness (Murphy, Trailer, and Hill, 1996). Second, the assessment of revenues represents an objective measure in the CVC’s internal rating on new venture quality whereas the other ratings contain subjective elements or might not be suited to measure new venture performance on their own.

I rely on ratings performed tertiary during the years 2015 and 2017. For 2017, however, only data from the last tertial are available for the analysis. Hence, my dependent variable is
performance, measured in terms of a revenues score that can take on 0.5-paced values in the range from 0 (worst) to 10 (best).

**Main explanatory variables**

My main explanatory variables are potential use of specialized CAs and actual use of specialized CAs by a new venture. I approximate these variables by referring to the status of a venture’s business overlap with the CVC’s parent.

A common understanding of an overlap between ventures and CVCs is represented by sharing the same industry (e.g. Dushnitsky and Shaver, 2009; Hallen et al., 2014). However, research has also assessed the topic of business overlap more in detail by considering mutual research topics measured in terms of publications (Lane and Lubatkin, 1998) or patent cross-citations between partners (Ahuja and Katila, 2001). As I have pointed out previously, firms characterized by a business overlap are likely to understand the partner’s input, for example specialized CAs, more easily (Lane and Lubatkin, 1998). In line with this, Gompers and Lerner (2000) show that CVCs can support new ventures more efficiently if a business overlap is present. It is likely, that this support involves that ventures can use the specialized CAs of the CVC’s parent. Therefore, I propose that the degree of business overlap between both parties is linked to the degree of usability of the parent’s specialized CAs by the ventures.

All ventures I analyze belong to the portfolio of one CVC and share the same industry with its parent corporation. The CVC asks each parent’s division for an analysis of the ventures in question. Hence, the assessment of the respective division gives information about whether a venture can potentially, actually or not at all make use of the provided specialized CAs. I approximate the potential use of specialized CAs by referring to the venture’s status of being currently analyzed regarding a potential business overlap with the CVC’s parent and, in addition,
an actual overlap. The rationale is that a venture can have a potential overlap, and thus, the potential to use the parent’s specialized CAs without actually using these assets already. This is the case for ventures that are engaged in negotiations with a division of the CVC’s parent but have not yet closed a deal. I argue that a potential business overlap and, consequently, the potential to use the parent’s assets, might be present if a venture is not yet actively collaborating with the CVC’s parent but is operating in the same industry, for instance. However, ventures whose actual business overlap has already been identified by the CVC, hence, that are already using the parent’s specialized CAs, must at the same time automatically be characterized by a potential overlap and, thus, the potential usability of CAs. Otherwise, their actual business overlap with the CVC’s parent could not have been assessed in the first place. Consequently, potential use of specialized CAs involves both types of ventures, those who already have an agreement with a parent’s division and those who are still negotiating an agreement. In line with this, I measure potential use of specialized CAs as a binary variable equaling 1 if the CVC is currently analyzing the existence of a business overlap or the CVC has already stated its current presence and 0 if there is not (yet) any potential overlap.

The presence of an actual usability of the specialized CAs of the CVC’s parent refers only to the new ventures characterized by an actual business overlap with the parent. To receive the status of an actual business overlap, there needs to be some sort of agreement between a venture and the responsible division. Hence, the latter’s assessment gives information about whether a venture is actually making use of the provided CAs or not. The actual use of specialized assets represents a static measure in the form of a binary variable that takes on the value 1 if the CVC has confirmed the presence of an actual business overlap and 0 otherwise.
Moderating variable

The moderating variable is *information sharing* of a new venture. I measure it by referring to the previously mentioned survey on the ventures’ steady development and relationship with the CVC’s parent. More precisely, I assess the ventures’ explicitly stated permission to share their proprietary information. Since the CVC is an independent legal entity, it is not allowed to share any information with its parent without a venture’s explicit permission to do so. As mentioned beforehand, in the CVC context, it is important to differentiate between the types of receivers of the ventures’ information, namely the CVC and the CVC’s parent (Benson and Ziedonis, 2009). The parent company is interested in a venture’s innovative ideas and, thus, has misappropriation incentives (Dushnitsky and Shaver, 2009). Due to its independence from its parent, the CVC itself, however, does not have a strong incentive to misappropriate a venture’s resources. Rather it wants to maximize the return on investment of its portfolio. Accordingly, the in the literature described risk of misappropriation (e.g. Dushnitsky and Shaver, 2009) should be low in this case.

The permission to share information is updated by the ventures at each reporting interval of the survey which examines venture development. Potential receivers of the information can be the CVC’s parent, its clients, and other investors. Information sharing is measured as a binary variable that equals 1 if a venture shares information with the CVC’s parent and 0 otherwise.

Control variables

To account for differences between ventures in terms of their over time acquired expertise, I control for venture age measured as the number of months since the agreement with the CVC.

Even though venture age and size are likely to be highly correlated (Pahnke, Katila, and Eisenhardt, 2015), I also add size as a control indicator to account for any unforeseen side effects like, for example, an enhanced productivity. As entrepreneurial ventures are usually characterized
by liabilities of newness (Di Lorenzo and van de Vrande, 2018), I measure firm size in the number of employees (Maula et al., 2003) taken from the MIS of the CVC’s parent.

I also look at the portfolio status of the venture to account for any possible characteristics that are specific to the respective status. More precisely, I control for whether a venture is an active member, including alumni and ventures in training, or whether it has already exited the CVC’s portfolio, meaning ventures that were acquired or that failed. Every status is assigned an identifying categorical number from 1 to 4.

In addition, I consider temporal effects which might influence the innovation output of every venture or the rating itself. I do so by creating a categorical variable with identifying numbers ranging from 1 to 3 for the years 2015, 2016, and 2017, in which the revenues ratings took place.

Since the ventures are managed by different regional offices of the CVC whose practices might vary among each other, I also control for the respective office. Every office is assigned an identifying categorical number from 1 to 12.

**Empirical strategy**

To investigate the effect of potential and actual usability of CAs on new venture performance and the moderating effect of information sharing, I use a linear random effects model. My dependent variable is ordinal because the intervals to receive a certain score on the revenues rating are not always similar. Even though the ordinal character of my dependent variable violates the assumption of linearity, it can be argued that the ease of interpreting a linear regression model justifies its use instead of an ordered logit or ordered probit model (Angrist and Pischke, 2009). Throughout the process of testing my hypotheses I apply fixed effects on the managing regional offices of the CVC to account for regional differences. Due to the fact that the panel is unbalanced, I cluster the standard errors at the venture level. By employing population averaged linear panel
regression, ordered logit regression and ordered probit regression methods, I test the robustness of my results.

**RESULTS**

Table 1 displays information on the ventures from the MIS of the CVC’s parent. The average revenues rating is 3.4. Furthermore, 38.5% of the funded ventures can potentially use the parent’s specialized CAs and 29% actually do so already. The correlations with the revenues score showing effect sizes of 0.248 for the potential use of specialized CAs and 0.203 for the actual use are relatively low.

In addition, 69% of the ventures are willing to share information with the parent. Compared to the literature, this seems to be a high fraction (e.g. Dushnitsky and Shaver, 2009). Information sharing seems to be slightly correlated with the revenues rating. However, it is unlikely to be related to neither a potential use of the parent’s specialized assets nor to an actual one.

Table 1 also shows, that the majority of the sample is described by 79% of the ventures having the status of being alumni and 15% of having failed. This implies that more than two third of the sample are actively part of the CVC’s portfolio. On average, most ratings are of the year 2015. Most ventures in the sample are from Argentina, followed by Venezuela and Columbia. Overall, correlations are rather low across the whole data set and vary in significance.

Moreover, Table 1 provides details about the ventures’ characteristics. On average they are 5.8 years old and show a standard deviation of roughly 15 months. Additionally, on average they have 5 (median) employees per venture.
Table 1: Descriptive statistics and correlations

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<tr>
<td>488</td>
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<td>488</td>
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<td>0.017</td>
<td>-0.063</td>
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<td>0.186***</td>
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<td>-0.077*</td>
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<tr>
<td>488</td>
<td>0.148</td>
<td>0.355</td>
<td>-0.251***</td>
<td>-0.294***</td>
<td>-0.228***</td>
<td>-0.030</td>
<td>0.045</td>
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<tr>
<td>488</td>
<td>0.016</td>
<td>0.127</td>
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<td>-0.102**</td>
<td>-0.083*</td>
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<td>0.028</td>
<td>-0.037</td>
<td>0.080**</td>
<td>0.002</td>
<td>-0.093**</td>
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<td>488</td>
<td>0.789</td>
<td>0.408</td>
<td>0.228***</td>
<td>0.296***</td>
<td>0.210***</td>
<td>0.062</td>
<td>-0.101**</td>
<td>0.050</td>
<td>-0.804***</td>
<td>-0.250***</td>
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<td>488</td>
<td>0.537</td>
<td>0.500</td>
<td>-0.041</td>
<td>-0.059</td>
<td>-0.020</td>
<td>0.010</td>
<td>0.181***</td>
<td>0.040</td>
<td>0.166***</td>
<td>-0.042</td>
<td>0.032</td>
<td>-0.148***</td>
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<tr>
<td>488</td>
<td>0.387</td>
<td>0.488</td>
<td>0.046</td>
<td>0.062</td>
<td>0.046</td>
<td>0.011</td>
<td>-0.178***</td>
<td>-0.027</td>
<td>-0.105**</td>
<td>0.063</td>
<td>0.002</td>
<td>0.071</td>
<td>-0.856***</td>
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<tr>
<td>488</td>
<td>0.076</td>
<td>0.265</td>
<td>-0.007</td>
<td>-0.004</td>
<td>-0.047</td>
<td>-0.040</td>
<td>-0.014</td>
<td>-0.026</td>
<td>-0.119***</td>
<td>-0.037</td>
<td>-0.064</td>
<td>0.148***</td>
<td>-0.308***</td>
<td>-0.228***</td>
<td>1</td>
</tr>
</tbody>
</table>

This table shows the case-wise correlations by venture-rating observations. The correlations for the regional office variables are excluded but are available on request.

*** p<0.01, ** p<0.05, * p<0.1.
The role of specialized CAs

Table 2 summarizes the results of the linear panel regression and provides information about the influence of potential and specialized asset usability on new venture performance and the moderating effect of information sharing.

Table 2: Linear regression analysis on new venture performance

<table>
<thead>
<tr>
<th>DV: Performance</th>
<th>Model 0 (Controls)</th>
<th>Model 1 (H1)</th>
<th>Model 2 (H2)</th>
<th>Model 3 (H3)</th>
<th>Model 4 (H4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.457*** (1.286)</td>
<td>3.131** (1.262)</td>
<td>3.431*** (1.233)</td>
<td>2.897** (1.277)</td>
<td>3.233*** (1.239)</td>
</tr>
<tr>
<td><strong>Controls:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venture age</td>
<td>-0.016 (0.013)</td>
<td>-0.014 (0.013)</td>
<td>-0.016 (0.013)</td>
<td>-0.013 (0.013)</td>
<td>-0.016 (0.013)</td>
</tr>
<tr>
<td>Venture size</td>
<td>0.004*** (0.002)</td>
<td>0.005*** (0.002)</td>
<td>0.004*** (0.002)</td>
<td>0.005*** (0.002)</td>
<td>0.005*** (0.002)</td>
</tr>
<tr>
<td>Status - Base category: Exit (failure)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit (in process)</td>
<td>-0.907 (1.113)</td>
<td>-0.835 (1.115)</td>
<td>-0.786 (1.110)</td>
<td>-0.843 (1.124)</td>
<td>-0.795 (1.117)</td>
</tr>
<tr>
<td>Exit (acquired)</td>
<td>1.956*** (0.735)</td>
<td>1.687** (0.730)</td>
<td>1.740** (0.736)</td>
<td>1.694** (0.718)</td>
<td>1.737** (0.719)</td>
</tr>
<tr>
<td>Active (alumni)</td>
<td>1.670*** (0.440)</td>
<td>1.308*** (0.471)</td>
<td>1.448*** (0.458)</td>
<td>1.274*** (0.467)</td>
<td>1.410*** (0.454)</td>
</tr>
<tr>
<td>Year - Base category: 2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>0.120 (0.242)</td>
<td>0.116 (0.243)</td>
<td>0.119 (0.242)</td>
<td>0.114 (0.240)</td>
<td>0.117 (0.240)</td>
</tr>
<tr>
<td>2017</td>
<td>0.413 (0.426)</td>
<td>0.416 (0.425)</td>
<td>0.426 (0.427)</td>
<td>0.459 (0.433)</td>
<td>0.471 (0.435)</td>
</tr>
<tr>
<td>Regional office - Base category: Spain</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ireland</td>
<td>0.618 (1.819)</td>
<td>0.243 (1.865)</td>
<td>0.501 (2.082)</td>
<td>0.161 (1.825)</td>
<td>0.384 (2.036)</td>
</tr>
<tr>
<td>Germany</td>
<td>-1.554* (0.832)</td>
<td>-1.323 (0.833)</td>
<td>-1.485* (0.817)</td>
<td>-1.347 (0.833)</td>
<td>-1.521* (0.806)</td>
</tr>
<tr>
<td>Great Britain</td>
<td>0.419 (1.699)</td>
<td>0.435 (1.586)</td>
<td>0.290 (1.597)</td>
<td>0.563 (1.546)</td>
<td>0.393 (1.547)</td>
</tr>
<tr>
<td>Government</td>
<td>-2.359 (1.512)</td>
<td>-1.794 (1.530)</td>
<td>-2.074 (1.508)</td>
<td>-1.890 (1.512)</td>
<td>-2.171 (1.492)</td>
</tr>
<tr>
<td>Argentina</td>
<td>-1.039* (0.600)</td>
<td>-1.026* (0.621)</td>
<td>-1.100* (0.594)</td>
<td>-1.086* (0.614)</td>
<td>-1.168** (0.582)</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.617 (1.958)</td>
<td>0.665 (1.937)</td>
<td>0.660 (2.014)</td>
<td>0.611 (1.936)</td>
<td>0.591 (2.005)</td>
</tr>
<tr>
<td>Chile</td>
<td>1.695* (1.958)</td>
<td>1.796* (1.937)</td>
<td>1.663* (2.014)</td>
<td>1.795* (1.936)</td>
<td>1.635* (2.005)</td>
</tr>
</tbody>
</table>
First, I study the influence of the potential use of specialized CAs on new venture performance. Ventures having the potential to make use of the specialized CAs of the CVC’s parent are likely to have a higher performance (Model 1). The coefficient of 0.921 and the p-value below 0.01 indicate that ventures with the potential to use the parent’s specialized CAs significantly score 0.921 points higher on the performance rating. Consequently, I find evidence for H1.
Second, I examine the matter of the actual usability of the parent’s specialized CAs for new venture performance (Model 2). The coefficient of 0.772 displays a positive relationship suggesting that ventures that actually make use of the specialized assets of the parent score 0.772 points higher on the performance rating. However, with 0.104, the p-value is slightly above the conventional threshold of 0.1 for statistical significance. Consequently, whereas the coefficient’s direction is in line with the outcome I propose in H2, the level of significance is not. Therefore, I only find marginal support for H2.

Third, I investigate the possibility of a positive moderating effect of information sharing on the relationship between the potential usability of specialized CAs and new venture performance (Model 3). With 0.992, the coefficient’s size for the potential use of specialized CAs is almost the same as in the first model. However, the level of significance is reduced to a p-value below 0.1. Information sharing is associated with a positive effect on new venture performance. The coefficient of 0.387 indicates that a venture that shares information with the CVC’s parent scores 0.387 points higher in the performance rating. However, the p-value is only 0.202 and, hence, larger than the conventional statistical significance levels. The coefficient -0.130 of the interaction of the potential use of specialized CAs and information sharing is, compared to the previously described effect sizes low and negative, indicating that ventures with a potential to use the specialized CAs of the CVC’s parent score lower if they share information with the parent. This contradicts the outcome I conjecture in H3. However, the p-value of 0.825 is far away from being statistically significant. Yet, I fail to find support for H3.

Finally, I consider the possibility of a positive moderating effect of information sharing on the relationship between actual usability of specialized CAs and new venture performance (Model 4). The coefficient’s size of 0.729 of the actual use of specialized CAs is similar but smaller than
the one in the second model, still indicating a positive relationship between actual use of specialized CAs and performance. However, with a p-value of 0.222 it is not statistically significant. The main effect of information sharing is, with 0.339, comparable to the one of the third model but smaller. It suggests a positive effect of information sharing on new venture performance, but with a p-value of 0.272 it lacks statistical significance. The interaction of the actual use of specialized CAs and information sharing has a positive but small coefficient of 0.046 suggesting a slightly positive effect on new venture performance. Since the p-value is 0.939, however, it is far from being statistically significant. Thus, I fail to find support for H4.

Robustness checks\(^3\)

The linear regression models in Table 2 which I use for my main analysis allow for a facilitated interpretation of the studied effects. Nonetheless, ordered logistic and ordered probit panel methods are especially suitable for my ordinal dependent variable (Long and Freese, 2014). Next to a population-averaged linear panel regression, I apply them to test the robustness of my main results. The findings are summarized by Appendix 1 to Appendix 4, whereby every appendix depicts the results from the alternative regression methods for every hypothesis. Model 1 of each table contains the benchmark results for the respective hypothesis from Table 2. Further, Model 2 in every of the appendices yields population averaged results. In each appendix, Model 3 shows the findings from an ordered logistic random effects panel method whereas Model 4 provides the results from an ordered probit random effects panel method.

When comparing Model 1 with Models 2 to 4 in Appendix 1, I detect that my findings for H1 are mostly robust to model changes. Looking at the statistical significance of the main effect,

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\(^3\) Results are available upon request.
the p-value is the lowest for my benchmark model being significant with a p-value below 0.01. The other models show significant outcomes with a p-value below 0.05.

Looking at Model 1 and comparing with Models 2 to 4 in Appendix 2, I also find mostly robust results. With a p-value below 0.1, the statistical significance of the main effect is the lowest for the population averaged linear panel regression model. The other models show no statistically significant outcomes at conventional levels of significance for the main effect but are slightly above the threshold of 0.1. Hence, they emphasize the marginal support for H2.

Appendix 3 yields the results of the robustness check for H3. When comparing Model 1 with Model 2 to 4, my results are largely robust. None of the models show any statistical significance for the main effect of information sharing nor the interaction of a potential to use the specialized CAs of the CVC’s parent and information sharing. All models provide evidence for a statistical significance of the mere effect of potential CA usability on new venture performance with a p-value below 0.1.

Appendix 4 summarizes the results of my robustness checks compared to the main findings for H4. Effect sizes for the single main effects of the actual use of specialized CAs and information sharing are all similar. No model shows any significant influence of the main explanatory variables on new venture performance. However, there are differences regarding the direction of the interaction effect of the actual use of specialized CAs and information sharing between the models. Whereas the linear models suggest a positive effect on new venture performance of 0.046 compared to 0.163, the logistic and probit models show evidence for a negative effect of -0.194 and -0.031, respectively. This might be because nonlinear models might not depict the real effect of interaction terms, possibly leading to results that point into the opposite direction (Ai and Norton, 2003). Therefore, the robustness of my results for H4 is limited.
DISCUSSION

CAs are important for capturing the value from innovations and are especially crucial for young firms that lack resources and capabilities (Teece, 1986). Specialized CAs are even more attractive than generic assets because they are essential for taking full advantage of innovations. By partnering up with CVCs, new ventures can get access to the specialized CAs of the CVC’s parent (Park and Steensma, 2012). The usability of this type of assets might be enhanced in case of a business overlap between a new venture and the parent (Dushnitsky and Shaver, 2009; Gompers and Lerner, 2000). Thus, if a business overlap is present, these specialized CAs can be understood as somewhat tailored to the specific needs of the innovating firm. Despite of being a prominent topic in the CVC literature, however, it remains unclear under which particular circumstances new ventures can benefit from CAs.

I apply resource dependence theory to explain the formation of mutual dependencies between new ventures and the CVC’s parent and why a business overlap between these two parties can make the parent’s specialized CAs particularly attractive for a venture and, on the other hand, a venture’s innovative ideas especially valuable for the parent. However, a business overlap might also be associated with the risk of misappropriation (e.g. Dushnitsky and Shaver, 2009) and, hence, the presence of power imbalance described by resource dependence theory. This power imbalance is likely to favor the CVC’s parent (Katila et al., 2008). Sharing information with the parent is, therefore, critical because it might result in the venture capturing only a small fraction of the value from an innovation or even nothing (Teece, 1986, 2018). Nevertheless, it might also support the formation of ties between ventures and the parent (Maula et al., 2009), possibly leading to a more effective and efficient provision and employment of the parent’s assets (Gompers and Lerner, 2000; Park and Steensma, 2012).
My paper contributes to the CVC literature by focusing on the value of specialized CAs for new ventures while differentiating between potential and actual CA usability of ventures and also referring to the topic of information sharing.

Firstly, so far only little work has focused on the empirical analysis of CAs as a meaningful tool for new venture performance (e.g. Alvarez-Garrido and Dushnitsky, 2016; Park and Steensma, 2012). In my study, I contribute to this research stream and provide findings from another sector, namely the ICT industry. This is important given its specific characteristics (Teece, 2018). In line with previous findings, I argue that particularly specialized CAs are attractive for new ventures (Park and Steensma, 2012) if there exists a business overlap with the CVC’s parent corporation (Dushnitsky and Shaver, 2009; Gompers and Lerner, 2000). Extending the focus by differentiating between potential and actual use of specialized CAs, I do find support for my proposition of a positive effect of potential use of specialized CAs on the performance of new ventures. However, the suggested positive impact of actual CA usability on performance is only marginally supported. As research has shown that ventures with high innovative capabilities are usually considered as more attractive by CVCs (Park and Steensma, 2013), a possible reason for this outcome could be that ventures with the potential to use the parent’s CAs have caught the parent’s attention because their innovative ideas are especially valuable. In order to gain access to the attractive specialized assets of the parent, ventures might be motivated to enhance their productivity, thereby increasing their performance. Additionally, during the process of closing a deal with the parent, it might be that because of a high absorptive capacity (Cohen and Levinthal, 1990), ventures and CVCs and their parents recognize the actual value of the other’s resources. Yet, ventures that actually use the parent’s specialized CAs already, are likely to be part of the CVC’s portfolio for a longer period of time. Thornhill and Amit (2003) suggest that innovativeness is likely to be reduced as ventures
age. Hence, ventures characterized by an actual CA usability might not be as interesting for the CVC’s parent as ventures characterized by a potential to use the CAs. Further research could shed light on this topic.

An additional reason for the reduced positive effect of actual CA usability compared to potential CA usability could be that the supporting parent company might have found a possibility to use the venture’s idea itself or to develop it further (Dushnitsky and Shaver, 2009). This is possible, because as an established firm, the parent probably controls a wide array of valuables CAs (Teece, 1986, 2018). I suggest that in some cases, the CVC might still want to take advantage of the venture’s ideas (e.g. Benson and Ziedonis, 2009; Wadhwa and Kotha, 2006) and continues to provide it with resources to maintain the venture’s trust (Parkhe, 1993). However, the CA’s value for the venture could have decreased. Since the parent is more powerful, it is likely to capture more or even the whole value from a certain innovation (Teece, 1986, 2018).

Secondly, I link the topic of CA usability and new venture performance to the matter of information sharing with the CVC’s parent. Contradicting my hypothesis, but in line with previous research on overlapping businesses and information sharing (Dushnitsky and Shaver, 2009), my results suggest a negative impact of information sharing on the relationship between potential CA usability and new venture performance. My findings indicate that some of the analyzed ventures characterized by the potential to use specialized CAs that share information about their innovative ideas at an early stage might experience misappropriation by the parent. Again, in this case rather the parent is likely to capture a higher proportion or even all of the innovation’s value (Teece, 2018). This, thus, might be a reason why these ventures perform less well than the ones not sharing information. Interestingly, whereas my results suggest that for ventures characterized by the potential to use the parent’s specialized CAs, information sharing affects new venture performance
negatively, I find a small positive effect of information sharing on the relation of actual use of specialized CAs and performance. A possible explanation for the different effects could be that there exists a tradeoff between the possible outcomes of information sharing. Ventures run the risk of experiencing misappropriation by the CVC’s parent (Dushnitsky and Shaver, 2009; Katila et al., 2008). Yet, sharing information might improve the learning outcomes of ventures (Maula et al., 2009). The difference based on the characteristic of ventures that potentially could use and ventures that actually use a parent’s specialized CAs, suggests that sharing information with the parent company could be especially critical when ventures do not yet have access to them. Hence, it might be interesting to investigate the crucial aspects which decide about whether and when information sharing benefits a new venture’s performance.

Thirdly, my major theoretical contribution is the application of resource dependence theory (Pfeffer and Salancik, 1978) to the topic of an enhanced attractiveness of the respective partner in CVC relationships that are characterized by a business overlap. By seeking desired resources from each other, the partners create interdependencies that are likely to involve power imbalances. My findings regarding the beneficial effect of potential CA usability on performance provide evidence for the dependence of new ventures on the funding CVC and its parent corporation. Moreover, I interpret my findings of a negative moderation of information sharing on new venture performance as a sign for existing power imbalances in favor of the CVC’s parent. Hence, resource dependence theory is able to illustrate crucial aspects of the relationship between CVCs, their parent companies and new ventures.

Finally, based on my empirical results, I argue that specialized CAs play an important role for new venture performance when CVC relationships are characterized by a business overlap between new ventures and the parent corporation of the funding CVC.
Lying in the nature of research, however, my study is characterized by certain limitations. In this study, I only consider the influence of the usability of the specialized assets of one CVC’s parent. However, ventures are likely to have several investors (Maula and Murray, 2002). This might reduce the ventures’ dependence on specialized CAs of one specific CVC’s parent. As Maula et al. (2009) point out, looking at other CVCs and different types of investors might shed more light on the role of CVCs on new venture performance.

Moreover, although the data I analyze contain very detailed information, I lack information on the ventures that were not chosen by the studied CVC. Thus, I cannot control for selection bias in my sample. Park and Steensma (2013), for example, find that CVCs rather focus on ventures characterized by innovative capabilities that were already large before they were funded. Consequently, I handle my findings cautiously.

Apart from that, my performance analysis is based on the rating on the revenue dimension only. In the entrepreneurial literature, however, it is frequently stated that revenues might not be a suitable measure for new venture performance. This type of organization might be too young and, thus, might not yet have any sales revenues (e.g. Maula et al., 2003). Since all ventures analyzed are relatively young, and hence, similar to each other, I argue that comparability is still possible.

Additionally, in the analysis I rely on a simplified measure of the revenues score. Due to the lack of necessary information, I could not consider that requirements for receiving a certain revenues score become more demanding throughout time. Hence, the effects of potential and actual CA usability on new venture performance might actually be more prominent than my results suggest. Therefore, measuring performance by different indicators might yield additional insights.

Furthermore, my findings for a moderating effect of information sharing on the relationship of the actual use of specialized CAs and new venture performance differ between linear and
nonlinear models. As Ai and Norton (2003) suggest, nonlinear models might not depict the real effect of interaction terms, possibly leading to results pointing into the opposite direction of the actual effect. This calls for further examination.

Finally, I study the portfolio data of one CVC with roughly 150 invested ventures in the ICT industry. Even though considering such a homogenous sample has benefits, it limits the generalizability of my findings. Future work could extend this research by analyzing larger portfolios, different industries and the role of specialized CAs of CVCs’ parents considering that ventures probably rely on more than one investor.
REFERENCES


