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A world of difference? The impact of corporate venture capitalists' investment motivation on startup valuation

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Abstract Corporate venture capital (CVC) investors are regularly painted with the same brush, a fact underscored by the often observed belief in the extant literature that corporate venture capitalists (CVCs) form a homogeneous group. In contrast to this simplifying perspective, this paper categorizes CVCs into subgroups by examining their levels of strategic and financial investment motivation using computer-aided text analysis and cluster analysis. To validate the resulting clusters, this paper studies the impact of CVC type on startup valuation from an *intra-group* perspective by applying hierarchical linear modeling, thus illustrating which particular investment motivation might be preferable to others in the context of negotiating valuations. An empirical analysis of 52 CVC mission statements and 147 startup valuations between January 2009 and January 2016 revealed that first, CVCs with a strategic investment motivation assign lower startup valuations than CVCs with an analytic motivation that have moderate levels of the two scrutinized dimensions, suggesting that entrepreneurs trade off these CVCs' value-adding contributions against a valuation discount; second, CVCs with an unfocused investment motivation pay significantly higher purchase prices, thus supporting the hypothesis that they have a so-called liability of vacillation; and third, the valuations of CVCs with a financial investment motive are not significantly different from

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those of their analytic peers. In sum, our results add to the knowledge of the continuum of corporate investors' investment motivation by illustrating how startup valuations differ across CVC types.

Keywords Corporate venture capital (CVC) · Valuation · Startups · Computer-aided text analysis (CATA) · Cluster analysis · Hierarchical linear modeling (HLM)

JEL Classification C12 · C30 · C38 · G24 · G32 · M13

1 Introduction

Corporate venture capital (CVC), which comprises minority equity investments from incumbent enterprises in private startups, is on the increase and has now returned to the levels of its heyday in 2000, a fact that underscores the cyclical nature of CVC (Caldbeck 2015; Dushnitsky and Lenox 2006; Gompers and Lerner 2000; NVCA 2016). According to the MoneyTree Report published by the National Venture Capital Association (NVCA) and PricewaterhouseCoopers (PwC), corporate venture capitalists (CVCs) participated in 905 transactions representing 21% of all U.S. venture capital (VC) deals in 2015 (NVCA 2015, 2016). In light of this, it is scarcely surprising that researchers have increased their interest in the role of CVCs in startup valuations (Gompers and Lerner 2000; Hellmann 2002; Heughebaert and Manigart 2012; Masulis and Nahata 2009). The empirical evidence, however, is mixed; for instance, Gompers and Lerner (2000) reported that CVCs pay higher purchase prices than independent venture capitalists (IVCs), while Heughebaert and Manigart (2012) found no significant difference between the two investor types. Intriguingly, it is well established that CVCs differ in their motivation regarding the target of strategic goals, such as gaining a window on technology, and financial returns (Dushnitsky and Lenox 2006; Gompers and Lerner 2000). It is therefore surprising that to date the impact of CVCs' heterogeneity on startup valuations in terms of their strategic and financial investment motivation has not been explored further. To address this conundrum, we analyzed the variability of startup valuations with CVC involvement against the backdrop of CVCs' underlying investment motivations. Therefore, in contrast to previous research that generally studies the *inter-group* comparison between the valuations of CVCs and IVCs, we deliberately shift the focus to an *intra-group* perspective to effectively scrutinize how CVCs' startup valuations differ based on the evidence of their publicly stated investment motives.

To discern a corporate investor's levels of strategic and financial motivation, we analyzed the public statements from the websites of 52 CVCs using computer-aided text analysis (CATA) (McKenny et al. 2013; Short et al. 2010). Our exploratory cluster analysis identified four types of CVCs: CVCs with a (1) strategic, (2) financial, (3) analytic, and (4) unfocused motivation. It should be noted that for the last two CVC motivations, we draw on the labeling and findings of the seminal work of Miles et al. (1978). To validate the identified clusters within the paper's theory-testing section, we applied hierarchical linear modeling (HLM) to explore 147

startup valuations between January 2009 and January 2016 that characterized the first round of CVC involvement.

Consequently, we contribute to multiple streams of research. Our first contribution is that we extend current research by classifying CVCs into more fine-grained subgroups. Specifically, by focusing on CVCs' *investment motivation* our research differs from Gompers and Lerner (2000), who used CVCs' parent firms' annual reports to assess the *strategic fit* between a corporate parent's business lines and the startup for each investment. By evaluating the type of investment in terms of its strategic fit, the approach of Gompers and Lerner (2000) implies that multiple investment categories can be assigned to a single CVC, thereby disregarding the implications of a CVC's holistic investment motivation for the valuation of a startup. Thus, we deliberately analyze a CVC's overall investment motivation and hence extend the black and white approach of Dushnitsky and Lenox (2006), classifying CVCs' investment motivation as either strategic or financial, and go beyond that to address its limitations stemming from the drawbacks of human coding (Neuendorf 2002; Short et al. 2010). We do this by introducing CATA and cluster analysis to measure CVCs' degree of strategic and financial motivation. A second contribution of the current study lies in adding to the studies of Basu et al. (2011), Cumming and Dai (2011) and Heughebaert and Manigart (2012) by examining how the heterogeneous characteristics of CVCs affect the valuation of startups. The findings of the current research also contribute to the prevailing literature stream by providing evidence that CVCs with a high strategic motivation pay lower purchase prices. This, in turn, suggests that entrepreneurs trade off highly strategically motivated CVCs' value-adding contributions against a valuation discount.

The remainder of this study is structured as follows: Sect. 2 reviews the current literature addressing distinctive CVC investment motives, and reflects the paper's underlying motivation. Section 3, the paper's explorative part, describes the data to construct the study's underlying sample and describes its approach of clustering CVCs into mutually exclusive subgroups. Section 4, the theory-testing part, borrows from the extant VC and CVC literature to develop hypotheses about the impact of the identified types of CVC motivation on startup valuations while also describing the paper's methodological approach and outlining the main empirical findings. Section 5 discusses the results and the last section draws a conclusion.

2 Literature review and motivation

Gompers and Lerner (2000) were the first to find empirical evidence that CVCs assigned significantly higher startup valuations than IVCs, indicating that CVCs pay a strategic premium. The study further subdivided CVC investments into two classes by analyzing the parent companies' annual reports to search for connections between the parents' business lines and the startup investments they sanctioned. The first class included CVC investments where CVC parent companies had direct

strategic relations with a venture, while the second class encompassed investments for which the authors did not find such a relation. Interestingly, the authors reported that the average pre-money valuation paid for CVC investments with a strategic fit was lower than that reported by their peers, even though one might intuitively expect higher prices for such investments. Building on this, Masulis and Nahata (2009) found empirical evidence that complementary CVCs, which invest in startups with products that complement those of the CVCs' parent companies (as opposed to competitive CVCs, which favor startups with products that compete with those of their parent firms) pay lower purchase prices. Moreover, among others, Chesbrough (2002), Dushnitsky and Lenox (2006) and Ivanov and Xie (2010) draw a line between strategic and financial or non-strategic CVCs.

The distinction between strategic and financial CVCs seems to be well established. The critical issue, however, is how to determine and measure the degree of a CVC's strategic and financial motivation. While most scholars, like Masulis and Nahata (2009) and Ivanov and Xie (2010), present financial CVCs as merely the opposite of their strategic counterparts, we believe that this approach does not capture a more moderate motivation of CVCs. Interestingly enough, Dushnitsky and Lenox (2006) were unable to classify 116 of their total 171 CVCs as having either a strategic or a financial investment motivation. For this reason—and also because Heughebaert and Manigart (2012) establish that the type of VC investor influences the valuations assigned to startups—studying the different investor types of the VC landscape is important. The prevailing simplistic black and white approach dominating the academic discourse in the CVC literature highlights the absence of empirical work scrutinizing the continuum of CVCs' investment motivation.

Identfying the varying types of CVCs' investment motivation will thus help to shed light on the interactaction of CVCs and entrepreneurs and, in turn, the variability of CVCs' startup valuations. The following example illustrates the topic's relevance: A startup entrepreneur looking for funding receives offers from both a financially and a strategically motivated CVC. While the financially motivated CVC only invests for financial reasons, the strategically motivated CVC, owing to its intrinsic investment motivation, will commit to providing the startup with access to its resource base. That resource base can benefit the startup, for instance, by attracting new foreign and domestic customers, or by helping the startup's technologies to evolve, implying a higher value-add potential. Hence, based on the well-established reasoning within the literature that entrepreneurs trade off higher value-add potential against a lower valuation (Hsu 2004), it must be concluded that the strategically motivated CVC should be able to negotiate a lower valuation. Nevertheless, despite the evident importance of CVCs' investment motivation to startup valuations, the extant literature has not comprehensively studied its impact. To fill this research gap, the current study intends to expand the prevailing black and white approach to CVCs' investment motivation and then to validate the cogency of the explored CVC types against the assigned startup valuations.

3 Exploring CVCs' investment motivation

The explorative part of this paper investigates the different types of CVC investment motivation. To overcome the limitations of the current literature, our explorative research strategy is based on a rigorous combination of CATA and cluster analysis because that approach permits us to objectively identify the whole continuum of CVCs' investment motivation. Furthermore, we followed the approach of Dushnitsky and Lenox (2006) in relying on CVCs' publicly disclosed statements as this makes it possible to parse a CVC's investment motivation in a front-stage setting.

3.1 Data and sample design

To construct a sample of CVCs unbiased by cross-country differences, like the institutional or cultural environment (Wright et al. 2005), we searched Dow Jones' VentureSource database, which is commonly used in the VC literature (Korteweg and Sorensen 2010), for accessing details of domestic startup investments by U.S. CVCs. To account for the cyclical nature of CVC, we considered the time period between January 2009 and January 2016 because CVCs have played an increasingly important role in startup investments since the economic crisis in 2008, and because it is apparently the most recent CVC wave (Dushnitsky and Lenox 2006; Roof 2015).[1] We further limited our search to transactions stating the startups' post-money valuation (i.e., the valuation after a financing round, including the amount invested) and excluded deals which only reported the estimated post-money valuation provided by VentureSource. By excluding estimated valuations, we avoided the risk that the underlying assumptions of the estimation algorithm would bias our analysis. Indeed, the algorithm from VentureSource in partnership with Sand Hill Econometrics does not even incorporate different types of VC firms as predictor variables (Blosser and Woodward 2014). Thus, we considered it unlikely that the reported estimations could capture potential valuation impacts in light of CVCs' investment motivation. As this, however, is the center of our empirical analysis, we decided to exclude estimated valuations from our sample.

In general, we focus on financing rounds where CVCs invest in a startup for the first time rather than on follow-on rounds, as the initial investment round is when the impact of CVC investment motivation might be expected to be most pronounced (see also Zhang et al. 2016). In cases where multiple CVCs initially invested in the same investment round, we followed Masulis and Nahata (2009) and treated each CVC-startup dyad separately. This process yielded an initial sample of 58 CVCs with 161 distinctive CVC-startup pairs. Finally, we reviewed the identified CVCs and included only those that complied with the definition and governance of CVCs proposed by Dushnitsky and Lavie (2010), focusing on legally separate CVC arms and established companies with external corporate business development units. Hence, we excluded the direct startup investments of JumpStart Inc., Facebook Inc., Citrix Systems Inc., MasterCard Inc., Second Century Ventures LLC and Peacock

[1] In January 2015 Michael Yang, managing director at Comcast Ventures, stated: "Corporate venture capital has been on the rise since the bowels of 2008" (Roof 2015).

Equity, resulting in a final sample of 52 CVCs with 147 unique investments, which compares favorably to the sample sizes of Dushnitsky and Lenox (2006) and Wadhwa and Basu (2013). The size of the final sample is driven by our focus on deals with both first time CVC involvement and a stated post-money valuation, which is sensitive information and accordingly less-frequently revealed (Kaplan et al. 2002).

Having compiled a sample of CVCs, we next—based on the aforementioned front-stage approach of Dushnitsky and Lenox (2006)—gathered the relevant information available from each CVC's mission statement from its website. The approach ensures the closest possible fit between our research question and the type of documents used, as recommended by Duriau et al. (2007). Accordingly, the following website information sources were included: *Message from the CEO, About Us, Who We Are, Our Approach, Our Mission* or alternatively a CVC unit's description of itself found in press releases. Hence, all organizationally produced texts offer a clear view of the underlying mission statements (e.g., Cochran and David 1986; Mullane 2002; Pearce and Fred 1987). It should be remarked that when a CVC's website was not active as of January 2016 due to a merger, spin-out, acquisition, or abandonment, we retrospectively accessed the required information using the Internet Archive's *Wayback Machine* (Hackett et al. 2004); a technique that has been applied previously (e.g., Youtie et al. 2012).

3.2 Capturing investment motivation through CATA

We relied on CATA to capture CVCs' levels of strategic and financial investment motivation from their public mission statements. The underlying idea of CATA is to classify communication while simultaneously allowing for contextual inferences (Krippendorff 2004; Weber 1990), which offer researchers deep insights into the perceptions and beliefs behind an organization's narrative (D'Aveni and MacMillan 1990). Previous articles used CATA to derive theoretically based but otherwise difficult to measure constructs from organizational narratives such as an initial public offering (IPO) prospectus (Payne et al. 2013), a shutdown message (Mandl et al. 2016), a corporate website (Zachary et al. 2011b) or an annual report (Moss et al. 2014). In contrast to human coding, where experts and trained coders evaluate the underlying text corpus, CATA improves the reliability and speed of the considered measurements substantially (Krippendorff 2004; Morris 1994; Rosenberg et al. 1990). Furthermore, we chose CATA because this method focuses solely on publicly accessible information, overcoming the issue of insufficient response rates when conducting survey studies (Zachary et al. 2011a). Especially in entrepreneurial and VC related articles, the population of limited partners (e.g., Kuckertz et al. 2015), IVCs (e.g., Fried et al. 1998) and corporate investment vehicles has proved reluctant to respond to prior surveys (Hill and Birkinshaw 2014; Maula et al. 2003, 2005; Proksch et al. 2016). In general, the gathered mission statements comprise between 42 and 8136 words, resulting in a mean word count of 428 and a standard deviation (SD) of 1098. On average, a sentence comprises 24 words (SD = 6).

To enhance the construct validity, we utilized the procedures introduced by Short et al. (2010) to develop mutually exclusive word lists capturing the whole continuum of CVCs' investment motivation. To capture all facets of the underlying theoretical construct and increase its validation simultaneously, Short et al. (2010) recommend the use of both deductively and inductively derived word lists. As a starting point, we developed a deductively derived word list building on prior theory (Potter and Levine-Donnerstein 1999). Therefore, we created a working definition for each investment motive based on the findings of Chesbrough (2002), Dushnitsky and Lenox (2006), Ernst et al. (2005), Weber and Weber (2005) and Winters and Murfin (1988).

Word representatives and synonyms were generated in turn for each construct (i.e., financial and strategic), using Rodale's (1978) *The Synonym Finder*, integrated dictionaries (money and quantitative) of *LIWC2015* and the already established profitability word list by Zachary et al. (2011a). Although initially written in 1978, *The Synonym Finder* remains deeply rooted and widely accepted within the academic landscape (e.g., Brigham et al. 2014; McKenny et al. 2013; Moss et al. 2011; Podsakoff et al. 2016; Vracheva et al. 2016; Zachary et al. 2011a). Owing to this impressive coverage, we decided to apply *The Synonym Finder* over other comparable and more recent dictionaries. The resulting word lists were then supplemented by a systematic analysis of all publications within the CVC research branch using the *WordStat* text analysis program from Provalis Research to extract knowledge and trends from an underlying text corpus. Consequently, a total of 300 additional words and 1344 phrases (e.g., window on technology, promote entrepreneurship, assets under management, and return on investment) which appeared at least 25 times were analyzed and allocated. In a last step, the construct validity of the word lists was assessed by two independent experts. Based on Holsti (1969) interrater reliabilities of .89 (strategic dimension) and .90 (financial dimension) were determined, indicating substantial agreement between the two raters (Short et al. 2010). Following this, we applied an inductive analysis supplementing the deductive lists with additional words and phrases directly stemming from the extracted mission statements. The combination of inductively and deductively derived word lists is commonly used in the field of organizational studies (Duriau et al. 2007; Moss et al. 2014; Wolfe and Shepherd 2015; Zachary et al. 2011a) and helps to forge links between theoretically driven research branches and more practically orientated ones (Short et al. 2010; Van De Ven and Johnson 2006). Table 1 reports the full lists of all deductively and inductively derived words.

After merging the deductively and inductively derived word lists, we subsequently relied on *LIWC2015*, a powerful computerized text analysis tool introduced by Tausczik and Pennebaker (2010), to extract the variables of interest. In addition, we followed Jegadeesh and Wu (2013) and omitted words that are accompanied by a negator (i.e., not, no, and never) within the space of three words. By standardizing all measures as a percentage of overall words, *LIWC2015* controls for the variance that could arise from the total word count of an underlying text corpus by default. Because longer mission statements increase the likelihood of there being strategic and financial related content, *LIWC2015* provides standardized output variables to compare the investment motivation of all 52 corporate investment vehicles in our

Table 1 Applied word lists to operationalize a CVC's investment motivation

Variable	Word lists[a]
Strategic deductive (68 words)	alliance, blueprint, boost demand, complement*, continuity, core, create new, development process, emerg*, enabling, entrepreneurial culture, entrepreneurial spirit, exploit*, explor*, external growth, fit, future, generalship, goal, opportun*, improve corporate image, increase demand, innovat*, instrumentality, Intellectual Property, internal efficiency, IP, key, knowledge, learning, long term, long-term, monitor*, new markets, new technologies, objective*, partner*, patent*, path, pioneer*, pivot*, plan*, position, program*, project, promote entrepreneurship, R&D, raise demand, renewal, research & development, research and development, shift*, social interaction, sourcing mode, spinoff*, spin-off*, stimulating demand, substi*, sustainable, synergi*, tactic*, talent, technological development, transfer*, venturing, vision, window on technology
Strategic inductive (23 words)	absorb*, access*, adapt*, capabilit*, capacit*, catalys*, collaborat*, commerciali*, flexibility, foster*, hiring, incubat*, integrat*, path, problem*, radar, recruit*, scout*, solution*, spinout*, trend*, strategic*, spin-out*
Financial deductive (79 words)	acqui*, assets under management, AUM, bottom line, buy back, buyback, buyout, buy-out, capital commitment, capital efficien*, capital expenditures, capital under management, cash flow, cash on cash, CoC, cash*, cost effective*, cost effic*, cost*, DEBT, distributed to paid in, DPI, dividend*, earn*, EBIT, EBITDA, economic, emolument, equity, exit, financ*, fiscal, gain*, hurdle rate, income*, initial public offering, investment, IPO, IRR, liquidity, loan, lucrative, lucre, M&A, market to book, market-to-book, merger, mezzanine, monetary, money*, paid off, pay off, pay*, pecuniary, performance, profit*, quartile, recompense, remunerat*, return*, revenue*, reward*, risk, ROI, sale*, scalability, secondary purchase, share*, stake, surplus, takeover, term sheet, track record, TVPI, valu*, well-paying, winnings, wins, yield*
Financial inductive (7 words)	capitalis*, discount*, maximi*, metric, odds, price, streamline*

This table presents the resulting word lists based on the deductive and inductive approaches. The first row contains the deductively derived words for the strategic dimension and the second row the respective inductively compiled words. In sum, 91 words on the strategic side were taken as basis for CATA. The third and fourth row report the deductively and inductively derived words for the financial dimension, resulting in a total of 86 words

[a] A wildcard (*) indicates that the root and different variants of a word were used. In addition, all abbreviations were also considered in their full forms

dataset. Hence, we calculated the strategic and financial investment motivation for every CVC. Across all CVC mission statements, we found an average word count of 4.61% (SD = 1.89, max. 10.75) representing a strategic investment motive respectively 2.57% (SD = 1.73, max. 8.16) for the financial dimension. To control for potential volatility in CVCs' investment motivation, we have conducted an extensive test to validate the conformity of the long-term nature of CVCs' underlying investment motive. Briefly, using the *Wayback Machine* (Hackett et al. 2004), we gathered the historic mission statements of all retrospectively accessible CVC websites. To observe the longevity of CVCs' investment motivation, we then chose the very first participation of a particular corporate investor within our sample as a reference point for the data collection. Furthermore, we draw on the *Directory*

of Venture Capital and Private Equity Firms (Gottlieb 2008) and historical press releases to identify variances of URL addresses. For instance, Comcast Ventures was initially incorporated under the name of Comcast Interactive Capital. Unfortunately, not all CVC websites could be restored. Hence, this procedure resulted in a total subsample of 44 clearly identified CVCs. In a final step, we analyzed the narrowed subsample by correlating the historic and current investment motives, indicating strong support for CVCs' stable investment motivation. In detail, we found a high correlation between both points in time for the financial ($r = .921$; $p \leq .01$) and strategic dimension ($r = .651$; $p \leq .01$).

3.3 Clustering CVCs based on their investment motivation

To classify the different levels of CVCs' strategic and financial investment motivation, we employed cluster analysis to identify mutually exclusive segments of CVCs with a comparable investment motivation (Chiu et al. 2001). The clustering method used is based on a two-step procedure, where subclusters are initially defined and subsequently merged until an optimal number of clusters is reached. We chose this method because within the second step, a standard agglomerative clustering algorithm estimates myriad solutions that are reduced to an optimal number of clusters. To do this, we applied Schwarz's Bayesian inference criterion (BIC, Schwarz 1978) that features less subjectivity than other clustering methods (see Ketchen and Shook (1996) for an overview of alternative clustering methods and criteria). Based on the BIC, we then clustered the 52 CVCs into four mutually exclusive subgroups.

Figure 1 depicts the results of the cluster analysis. Overall, the box plots of our cluster analysis reveal that CVCs in general are more strategically motivated (see also Dushnitsky and Lenox 2006). Nonetheless, the box plots also point to significant intra-group differences. Thus, to better grasp the varying investment motivation and to clarify the following empirical discussion, we assigned each CVC cluster a label encapsulating its specific characteristics. The labeling process was based on the argument that CVCs' strategic and financial investment motivations are two ends of a continuum, while an analytic motivation shows moderate levels of the two. Accordingly, CVCs with a *strategic motivation* (15 CVCs) score very highly on our strategic dimension, meaning that these CVCs have an exceptionally strong focus on achieving strategic benefits. In contrast, their counterparts with a *financial motivation* (13 CVCs) are characterized by a strong financial focus in their investment motivation. CVCs with an *analytic motivation* (15 CVCs), on the other hand, exhibit more moderate levels of the two criteria with a greater tendency toward the strategic dimension. CVCs with an *unfocused motivation* (9 CVCs) are ranked in the moderate bracket of our financial criteria, but substantially underperform their counterparts on the strategic side, and are moreover comparable to the residual strategy type called *reactors* by Miles et al. (1978).

To further verify our resulting clusters, we followed Ketchen and Shook (1996) and sought expert opinion on them from two anonymous executives with relevant experience in the field of corporate investments. Their feedback was that our findings aligned with their perception of the actual CVC landscape. Illustrative text

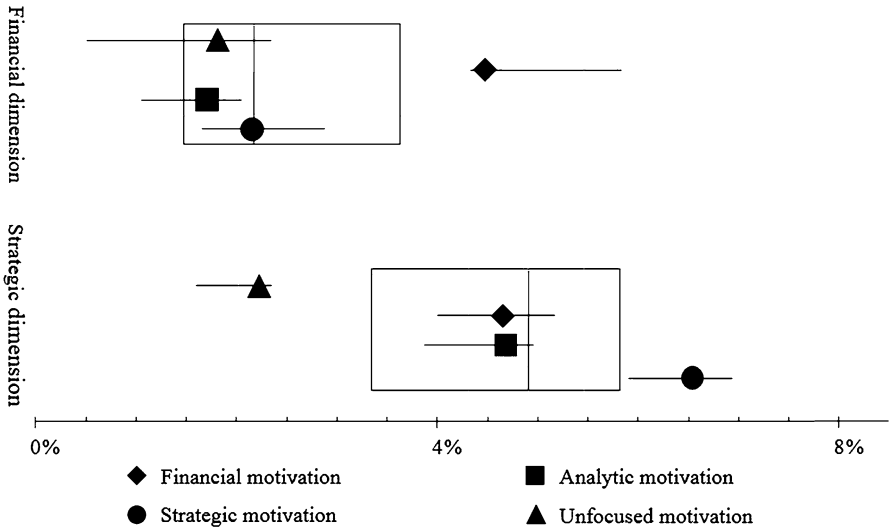

Fig. 1 Results of the two-step cluster analysis approach. This table depicts the resulting box plots of the cluster analysis. While the box plots represent the distribution of the overall sample, the within cluster distribution is shown as whiskers. Thus, the depicted cluster symbols represent the corresponding median values. The x-axis states the calculated ratio of all words that match our predefined word lists and the total word count of the underlying text document, thereby controlling for size effects. CVCs with a *strategic motivation* score very high on the strategic dimension, while their counterparts with a *financial motivation* do so on the financial side. Their counterparts with an *analytic motivation* show moderate levels of both dimensions, whereas CVCs with an *unfocused motivation* lack a clear investment motivation, considerably underperforming their peers on the strategic dimension

excerpts are used to exemplify the types of CVC investment motivation identified (see Table 2).

4 Validating the identified clusters: CVCs' investment motivation and startup valuation

To empirically test the cogency of clusters, Ketchen and Shook (1996) strongly recommend applying multivariate analysis using external variables that were not considered in the cluster analysis itself, but that have a theoretical connection with the resulting clusters. In our case, relying on the work of Heughebaert and Manigart (2012), the valuation of the CVC-backed startups provides such an external benchmark variable. Accordingly, the theory-testing section of this paper draws from the extant literature to hypothesize how the identified CVC types might affect startup valuations. Regarding the hypotheses development, it should be noted that we use the CVC cluster with an *analytic motivation* as reference group since this allows us to derive more accessible *intra-group* suppositions relating to the other CVC types with either a *strategic* and *financial* or an *unfocused motivation*.

Table 2 Illustrative text excerpts of the identified clusters

	● Strategic motivation	◆ Financial motivation	■ Analytic motivation	▲ Unfocused motivation
Illustrative text excerpts	We work with our investment candidates and portfolio companies to ensure that any synergies are explored and developed	(…) attractive financial return potential commensurate to the risk profile of the investment	Our approach reflects our understanding of the limitations of both traditional corporate and financial venture capital models	(…) provides seed, venture, and growth-stage funding to the best companies not strategic investments (…)
	(…) focuses on emerging (…) technology companies that have the potential to provide long-term strategic growth options (…)	We invest for financial return (…)	We offer entrepreneurs all the strengths of a strategic investor (…). But, like a traditional or independent fund, we measure our success by the returns of our portfolio companies (…)	We started (…) with a mission to help entrepreneurs make the world better
Number of CVCs	15	13	15	9

This table shows illustrative text excerpts from the mission statements of each CVC type. It also states the total number of the respective cluster

4.1 Theoretical development and hypotheses

From a strategic point of view, CVC investments, in contrast to IVC investments, are typically marked by dual reciprocity and thus represent a triad between CVC unit, startup, and the CVC's parent company (Chesbrough 2002; Weber and Weber 2011). The literature distinguishes between the absorptive capacity entailed by the use of CVC as well as CVCs' value-added services supplied to startups (e.g., Dushnitsky and Lenox 2005a, b; Ivanov and Xie 2010; Maula et al. 2005; Zu Knyphausen-Aufseß 2005). Absorptive capacity means that CVCs' parent organizations exploit knowledge through their venture investments, primarily to gain a window on innovative technology but also to explore new products and industry trends (Keil 2000; Maula 2007; Winters and Murfin 1988). In fact, there is some empirical evidence reporting higher CVC investment activity is associated with an increase in CVCs' parent firms' levels of patenting (Dushnitsky and Lenox 2005b). Similarly, Dushnitsky and Lenox (2005a) found that CVCs' parent companies capitalize on the knowledge base of startups to complement their own innovativeness.

The majority of papers, however, analyze the opposite value transfer within the CVC triad, namely the value-adding services CVCs' parent organizations provide to startups (e.g., McNally 1995). In this regard, the findings of Maula et al. (2005) highlight that CVCs' value-adding contributions differ from those of IVCs, suggesting that there are probably circumstances when entrepreneurs consciously accept the involvement of CVCs. Specifically, startups have been found to be able to capitalize on an incumbent's brand name to establish their trustworthiness by gaining access to a corporation's network of cooperation partners (Zu Knyphausen-Aufseß 2005). Additionally, Maula et al. (2005) found evidence that corporates are particularly valuable for startups due to their capability to offer technological support and attract foreign customers, which allows the startups to scale their business internationally more rapidly. Moreover, Alvarez-Garrido and Dushnitsky (2015), Chemmanur et al. (2014) and Park and Steensma (2013) showed that after CVC involvement, ventures' innovativeness rates measured in terms of numbers of patents were higher than those of their counterparts backed by IVCs. In this regard, Ivanov and Xie (2010) found that CVCs only add value to startups that have a strategic fit with their parent organizations. Interestingly, from a CVC *intra-group* perspective, Gompers and Lerner (2000) reported that startup investments with a strategic fit with CVCs' parent firms, on average received a lower valuation than startup investments lacking such a relationship. Therefore, we suggest that CVCs with a *strategic motivation* should have and provide more value-added support capabilities than their *analytic* peers. In sum, all this implies that there are reasonable grounds to assume that (just as with more reputable IVCs who are expected to provide more value-adding services) there could be circumstances when entrepreneurs tolerate lower valuations. This in turn implies that entrepreneurs are willing to accept valuation discounts in exchange for more comprehensive value-adding contributions through highly strategically motivated CVCs (Hsu 2004).

Hypothesis 1 Everything else being equal, CVCs with a *strategic motivation* assign lower valuations to startups than CVCs with an *analytic motivation* do.

Our cluster analysis confirmed current research revealing that there are CVCs who invest in startups primarily for financial reasons (e.g., Gompers and Lerner 2000; Masulis and Nahata 2009). This means that financially motivated CVCs stand in direct competition with IVCs (Heughebaert and Manigart 2012). However, IVCs are financial professionals who look for attractive risk-return profiles when investing in startups and, among other things, add value through their networks within the financial services community (Maula et al. 2005). Financially motivated CVCs in contrast, might lack such broad connections within the financial services community as they generally have less experience of startup investments. This, in turn, could put these CVCs in an adverse position in terms of both value-add potential and credibility (Hill and Birkinshaw 2014; Maula et al. 2005). Accordingly, financially motivated CVCs might lack the capabilities to select the startups that are most attractive from a pure risk-return perspective, and furthermore might lack the necessary valuation expertise. It follows that financially motivated CVCs, as opposed to strategically motivated ones, could, at least in part, fail to have a comparative advantage and a well-defined position within the VC industry and thus,

potentially only offer a second-best solution for entrepreneurs seeking a financial investor. Therefore, we predict that CVCs with a *financial motivation* pay higher purchase prices than CVCs with an *analytic motivation*.

Hypothesis 2 Everything else being equal CVCs with a *financial motivation* assign higher valuations to startups than CVCs with an *analytic motivation* do.

Our CATA and cluster analysis identified a CVC cluster with an *unfocused motivation,* something we consider particularly interesting. CVCs with an *unfocused motivation* lack a focus on a specific investment motive. This type of CVC investor lacks the commitment to seek out strategic investments. One reason for this weak strategic motivation could be that these CVCs do not receive sufficient backing from their corporate parents, which could negatively influence the CVC-startup relationship. Close relationships between CVCs and entrepreneurs and a mutual understanding of the investment motivation is an important factor in CVC investments (Hardymon et al. 1983; Sykes 1990). However, in the case of CVCs with an *unfocused motivation*, a lack of a clearly defined investment motive might cause entrepreneurs to be wary of agency problems stemming from a potential lack of alignment on goals between themselves and the CVCs. Consequently, that potential goal incongruence could cause entrepreneurs severe moral hazard concerns, because rather unfocused CVCs could lack the effort and serious intentions necessary to support their portfolio firms (Eisenhardt 1989; Maula 2001). Hellmann (2002) and Masulis and Nahata (2009) have pointed out that entrepreneurs facing severe moral hazard issues extract higher valuations from CVCs. In other words, this is in line with standard bargaining theory implying that entrepreneurs demand a valuation premium in anticipation of potential moral hazard problems. From a CVC perspective, this valuation premium, in turn, could point to a liability of vacillation as these CVCs lack a consistent and tangible investment motivation. Consequently, we hypothesize that CVCs with an *unfocused motivation* in comparison to their *analytic* counterparts, who are likely to have a substantially more tactile investment motivation, pay higher purchase prices for startups.

Hypothesis 3 Everything else being equal, CVCs with an *unfocused motivation* assign higher valuations to startups than CVCs with an *analytic motivation* do.

4.2 Measures and descriptive statistics

We obtained the data underlying the analysis from the sample described in Sect. 3.1 and supplemented it with additional information on startups' and CVCs' parent firms' SIC code classifications from the Thomson One database. We further followed Bernerth and Aguinis (2015) and Raudenbush and Bryk (2002) in limiting our predictor variables to those we considered most relevant. Table 3 provides an overview of the underlying variables and their respective definitions.

The outcome variable of our multilevel analysis is a startup's post-money valuation (i.e., the valuation after a financing round, including the amount invested); a variable regularly used in the VC literature (e.g., Block et al. 2014; Yang et al. 2009). We included with level 1 (startups), startup characteristics related to

financing round, startup age at CVC investment, industry and location as predictor variables (e.g., Heughebaert and Manigart 2012). In view of CVCs' fears of supporting a future competitor, we controlled for a startup's financing round. In addition, future payoffs of startups are more stable in their later than in their early stages leading to an increasing valuation as they age. Moreover, considering the fact that fast growing industries attract more solvent and reputable investors, we controlled for a startup's industry. In so doing, we relied on a dummy variable to determine whether a startup operates in a high-technology industry (see also Antonczyk et al. 2007), by using the SIC code classifications of Bhojraj and Charles (2002) and the extended version of Klobucnik and Sievers (2013).[2] We included the geographical location dummy variable because startups headquartered within the three main U.S. VC clusters, California (Silicon Valley), Massachusetts (Route 128) and New York, might benefit from better access to VC funding (Gaba and Meyer 2008; Inderst and Müller 2004; Zheng et al. 2010) and a higher level of interorganizational knowledge spillover (Jaffe et al. 1993). At level 2 (CVCs), we considered CVC reputation, the industry of a CVC's parent firm and the identified CVC clusters as predictor variables. As a proxy for CVC reputation, we took a CVC's aggregated number of startups that went public up until January 2016 (e.g., Masulis and Nahata 2009). This predictor variable allowed us to take into consideration startup entrepreneurs preferring the offers of more reputable investors at lower prices (Hsu 2004). Additionally, and analogous to level 1, we coded a dummy variable to distinguish whether a CVC's parent organization operates in a high-technology sector. Moreover, as the identified CVC subgroups form the key interest of our analysis, we operationalized three dummy variables: *strategic motivation*, *financial motivation,* and *unfocused motivation* to account for a CVC's cluster membership. A fourth dummy variable, *analytic motivation*, was chosen as the reference category.

Table 4 summarizes the means, standard deviations, and intercorrelations of all variables used in this study. Given the fact that CVCs tend to be later-stage investors (Masulis and Nahatan 2009), our sample's average CVC investment takes place between the third and fourth financing round with a mean post-money valuation of $263.67 million (median = $65.00 million, SD = $663.40 million). At the time of the first CVC investment, the startups were at most 16 years old and on average were four years old. Unsurprisingly, 71% of our sample's CVC investments were related to startups headquartered in either California, Massachusetts, or New York. Notably in our sample, CVC programs are equally divided among parent companies from high-technology industries and parent firms from sectors other than high-technology. The CVCs in our sample prefer to invest in startups from high-technology sectors (mean = .72, SD = .45). With respect to the intercorrelation matrix, on level 1 we found evidence that the financing round ($r = .44$, $p \leq .001$), as well as startup age ($r = .34$, $p \leq .001$) are positively related to the post-money valuation. Obviously, this coherence is driven by the fact that, over time, a startup's

[2] We therefore considered startups and CVCs' parent companies with the following SIC codes to operate in high-technology industries: biotechnology (SIC codes 2833–2836 and 8731–8734), computers, computer programming, data process (SIC codes 3570–3577 and 7370–7379), electronics (SIC codes 3600–3674) and telecommunication (SIC codes 4810–4841).

Table 3 List of variables and their definitions

Variable	Definition
Dependent variable	
Startup valuation	Natural logarithm of a startup's post-money valuation, i.e., the valuation after a financing round including the amount invested
Independent variables	
Level 1: startup level	
Startup financing round	Financing round in which a startup raised money from a CVC investor
Startup industry	Dummy variable indicating the affiliation of a startup to a high-technology industry
Startup location	Dummy variable referring to the geographical affiliation of a startup's headquarters to the predominating VC ecosystems of California (Silicon Valley), Massachusetts (Route 128) and New York
Startup age	Startup age in years at the year of CVC funding
Level 2: CVC level	
CVC reputation	Aggregated number of a CVC's performed IPOs
CVC industry	Dummy variable indicating the affiliation of a CVC's corporate parent to a high-technology industry
Strategic motivation	Dummy variable representing CVCs with a strategic investment motivation
Unfocused motivation	Dummy variable representing CVCs with an unfocused investment motivation
Analytic motivation	Dummy variable representing CVCs with an analytic investment motivation
Financial motivation	Dummy variable representing CVCs with a financial investment motivation

payoffs typically reach a less volatile level, with the consequence that the observed valuations increase substantially. Moreover, on level 2, only investment vehicles with corporate parents operating in high-technology industries ($r = .23$, $p \leq .05$) and CVCs with an *unfocused motivation* ($r = .30$, $p \leq .05$) are related to the total number of IPOs initiated.

4.3 Method of analysis

To analyze the underlying data, we used HLM, a statistical method that allows researchers to explain the variance of the dependent variable with predictor variables from two or more different levels, that is, the individual level (startups) and the contextual level (CVCs). Accordingly, HLM surpasses the feasibility of standard OLS regressions (Raudenbush and Bryk 2002). In general, nested data structures, where the objects of investigations are hierarchically separated, are frequently observed in the fields of management (e.g., Misangyi et al. 2006; Van Der Vegt et al. 2005) and finance (e.g., Engelen and van Essen 2010; Kayo and Kimura 2011). In light of the fact that our research design assessed the impact of

investor related predictors on startup related ones, we consequently applied a two-level HLM approach (see Fig. 2).

We consider it appropriate to assume that startups receiving funding from a particular CVC are generally more readily comparable than portfolio companies from another corporate investor. This means that a CVC following a particular investment motivation also targets startups that are more similar to each other, indicating a natural hierarchical nesting. Usually, studies within the VC context ignore the hierarchical nature of such investor-investee relationships, thereby alleging that the estimated effects between two variables are constant across the whole data sample. Thus, the problems associated with standard OLS methods dealing with nested data in the VC context are twofold: First, by disaggregating all investor related variables to the startup level, the assumption of independence between the observations is violated, contradicting the prerequisites of the OLS regression. Subsequently, by ignoring the differences between the investor related variables on level 2, OLS regressions tend to underestimate the standard errors which, in turn, are positively associated with more statistically significant coherences. Second, by aggregating the startup related variables to the less specific investor level, researchers are unable to observe the within-group variation because all startups are implicitly treated as homogeneous entities (Osborne 2000). In this regard, Roberts (2004) found evidence that the presence of nested structures can affect the findings of an empirical analysis dramatically. Hence, to avoid such a bias in our results, we formally accounted for the presence of nested structures employing an unconditional model to determine the amount of variance of the dependent variable that exists within and between the groups of CVCs. The analysis used *HLM7*, a software package by SSI that applies a sequential procedure. In a first step, for each level 2 entity (CVCs) the effects of all level 1 (startups) predictors are estimated separately, producing intercepts and slopes that directly link the predictors to the dependent variable. Within the second step, those randomly varying intercepts and slopes are used as outcome variables themselves and are predicted with level 2 variables (Raudenbush and Bryk 2002).

Following Raudenbush and Bryk (2002), an iterative process was conducted to calculate all HLM models (see Table 5). First, as mentioned above, we estimated a conditional null model that revealed a significant intercept component ($\gamma_{00} = 17.941$, $p < .001$) and, in turn, a significant intra-class correlation coefficient (ICC) of .102, underscoring that the application of multilevel analysis is suitable and required for our data structure (Erkan Ozkaya et al. 2013; Hofmann 1997). After that, we estimated a random coefficient model addressing only level 1 variables and an intercept-as-outcome model including all level 1 and level 2 variables. The following equations illustrate the intercept-as-outcome model that we applied to test Hypothesis 1 to 3 and that accounts for both fixed (γ) and random effects (r, u):

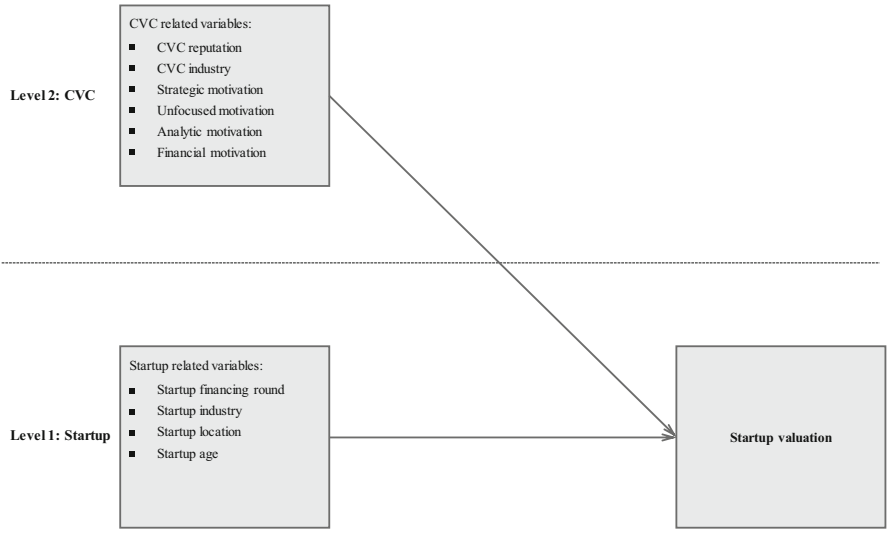

Fig. 2 Underlying conceptual model. The figure visualizes the paper's HLM approach, summarizing the predictor variables of the contextual level of the CVCs (level 2) as well as predictor variables together with the dependent variable, i.e., startup valuation, on the individual level of the startup (level 1). The arrows depict the influence of both the level 2 and level 1 predictor variables on a startup's post-money valuation

Level 1 model:

$$\begin{aligned}\text{Startup valuation}_{ij} = {} & \beta_{0j} + \beta_{1j} \times (\text{Startup financing round}) + \beta_{2j} \\ & \times (\text{Startup industry}) + \beta_{3j} \times (\text{Startup location}) + \beta_{4j} \\ & \times (\text{Startup age}) + r_{ij}\end{aligned}$$

Level 2 model:

$$\begin{aligned}\beta_{0j} = {} & \gamma_{00} + \gamma_{01} \times (\text{CVC reputation}) + \gamma_{02} \times (\text{Strategic motivation}) \\ & + \gamma_{03} \times (\text{Unfocused motivation}) \\ & + \gamma_{04} \times (\text{Financial motivation}) + \gamma_{05} \times (\text{CVC industry}) + u_{0j} \\ \beta_{1j} = {} & \gamma_{10} + u_{1j} \\ \beta_{2j} = {} & \gamma_{20} + u_{2j} \\ \beta_{3j} = {} & \gamma_{30} + u_{3j} \\ \beta_{4j} = {} & \gamma_{40} + u_{4j}\end{aligned}$$

4.4 Results

The findings of the HLM framework are presented in Table 5. Of key interest was the relationship between the post-money valuation of startups (level 1 outcome variable) and the CVC subgroups (level 2 predictor variables) identified in the

Table 4 Descriptive statistics and intercorrelations

Variable	Max	Mean	SD	1.	2.	3.	4.	5.	6.
Level 1: startup level									
1. Startup valuation [m]	4500	263.67	663.40	–					
2. Startup financing round	16.00	3.62	2.46	.44***	–				
3. Startup industry	1.00	.72	.45	−.13	−.18*	–			
4. Startup location	1.00	.76	.43	.03	−.14†	.04	–		
5. Startup age	16.00	4.39	3.37	.34***	.62***	−.07	−.11	–	
Level 2: CVC level									
1. CVC reputation	125.00	7.77	18.81	–					
2. CVC industry	1.00	.50	.51	.23*	–				
3. Strategic motivation	1.00	.29	.46	−.09	.21	–			
4. Unfocused motivation	1.00	.17	.38	.30*	−.05	n.a.	–		
5. Analytic motivation	1.00	.29	.46	−.12	.04	n.a.	n.a.	–	
6. Financial motivation	1.00	.25	.44	−.05	−.22	n.a.	n.a.	n.a.	–

This table reports the descriptive statistics and intercorrelations for a sample of 147 startups and 52 CVCs. *Startup valuation* is the valuation after a financing round including the amount invested. *Startup financing round* reflects the financing round in which a startup raised money from a CVC investor. *Startup industry* reports whether a startup operates in a high-technology industry. As mentioned in footnote 2, the following SIC codes were considered high-technology industries: biotechnology (SIC codes 2833–2836 and 8731–8734), computers, computer programming, data process (SIC codes 3570–3577 and 7370–7379), electronics (SIC codes 3600–3674) and telecommunication (SIC codes 4810–4841). *Startup location* indicates whether a startup is headquartered in one of the predominating U.S. VC clusters, that is, California (Silicon Valley), Massachusetts (Route 128), and New York. *Startup age* is calculated as the startup's age in years in the year it received CVC funding. *CVC reputation* serves as a proxy for a CVC's reputation, measured as a CVC's aggregated number of performed IPOs. *CVC industry* states whether a CVC's corporate parent operates in a high-technology industry, and is determined analogously to *Startup industry*. *Strategic motivation* is a dummy variable for CVCs with a highly strategically motivated investment motive. *Unfocused motivation* is a dummy variable for CVCs lacking a consistent and tangible investment motivation. *Analytic motivation* is a dummy variable representing CVCs with moderate levels on the strategic and financial dimensions. *Financial motivation* is a dummy variable standing for CVCs with a high financial investment motivation

n.a. not applicable

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; † $p \leq .1$

course of the CATA and cluster analysis. To assess the overall goodness of fit, we estimated our models using the full maximum likelihood approach (Luo and Azen 2013). The calculated deviance as well as the pseudo R^2 statistics for level 1 (Snijders and Bosker 1999) and level 2 (Kreft et al. 1998; Singer 1998) indicate a satisfactory model (see Table 5). Consequently, our final model explains 65% of the within-CVC variance and 50% of the between-CVC variance.

The control variables of the intercept-as-outcomes model (Model III) show the expected signs and except for *Startup industry* and *Startup location* are statistically significant at the startup level. At level 1 (startups), in line with Heughebaert and Manigart (2012), the high-technology industry dummy, however, is negative and not statistically significant ($\gamma_{20} = -.246$, $p = .278$). Additionally, we find that consistent with prior research, CVCs assign higher valuations to startups

Table 5 Hierarchical linear models and estimated results

	Model I		Model II		Model III	
	Null model		Random coefficient model		Intercept-as-outcome model	
	γ	SE	γ	SE	γ	SE
Fixed effects						
Level 1: startup level						
Intercept (γ_{00})	17.941***	.149	16.371***	.305	16.170***	.338
Startup financing round (γ_{10})			.291***	.073	.317***	.073
Startup industry (γ_{20})			−.072	.226	−.246	.224
Startup location (γ_{30})			.250	.231	.202	.228
Startup age (γ_{40})			.080	.060	.117*	.057
Level 2: CVC level						
CVC reputation (γ_{01})					−.008*	.003
CVC industry (γ_{05})					.759**	.228
Strategic motivation (γ_{02})					−.820**	.281
Unfocused motivation (γ_{03})					.600*	.268
Financial motivation (γ_{04})					−.256	.286
Variance components (random effects)						
Level 1 residual variance (σ^2)	2.098		.734		.706	
Level 2 residual variance (τ^2)	.237*		.216*		.118**	
Level 1 slope variance for Startup financing round (u_1)			.037		.047	
Level 1 slope variance for Startup industry (u_2)			.301**		.228**	
Level 1 slope variance for Startup location (u_3)			.367*		.366*	
Level 1 slope variance for Startup age (u_4)			.046*		.040*	
Model fit						
ICC = $\tau^2/(\tau^2 + \sigma^2)$	.102					
$R^2_{\text{Level 1}}$			.593		.647	
$R^2_{\text{Level 2}}$			.089		.502	
Deviance	522.855		438.192		424.852	

This table reports the results of the fixed and random effects HLM model of the level 1 and level 2 predictor variables on a startup's post-money valuation for a sample of 147 startups and 52 CVCs. An iterative process was performed. Model I represents the null model and was used to test if the HLM model is generally appropriable to the underlying data. This model reveals a significant intra-class correlation coefficient (ICC) of .102, therefore the application of HLM is suitable. Model II is a random coefficient model only considering level 1 predictor variables. Model III, the intercept-as-outcome model, considers all level 1 and level 2 predictor variables. Overall, the pseudo R^2 statistics for level 1 with 65% and level 2 with 50% show a satisfying model fit

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; † $p \leq .1$

headquartered in California, Massachusetts, or New York, albeit the coefficient is statistically insignificant ($\gamma_{30} = .202$, $p = .381$). Furthermore, both the financing round and the age of a startup at the point of CVC investment are positively and significantly related to post-money valuations ($\gamma_{10} = .317$, $p < .001$; $\gamma_{40} = .117$, $p = .045$). At level 2 (CVCs), corporate investors with a stronger reputation in terms of companies taken public pay significantly lower purchase prices ($\gamma_{01} = -.008$, $p = .023$). Interestingly, CVCs whose parent companies operate in high-technology industries assign significantly higher valuations to startups ($\gamma_{05} = .759$, $p = .002$). One possible explanation of this finding could be that parent companies operating in high-technology sectors are under more pressure to implement strategic renewal due to the rapidly changing industry environment, and are therefore willing to pay higher purchase prices for startups to avoid disruption sparked by incumbents and new competitors (Keil 2002).

Overall, our hypotheses regarding the impact of CVCs' investment motivation on startup valuations receive substantial support. CVCs with a *strategic motivation* are associated with significantly lower valuations than those with an *analytic motivation* ($\gamma_{02} = -.820$, $p = .005$) supporting Hypothesis 1. Consequently, in line with the findings of Hsu (2004) for IVCs, from a CVC *intra-group* perspective, we found evidence for CVCs having a value-adding role, indicating that startup entrepreneurs also appear to accept valuation discounts from CVCs with a *strategic motivation* in anticipation of more value-adding contributions. In other words, entrepreneurs seem to trade off the higher value-add potential of these CVCs against a lower valuation. As for CVCs with a *financial motivation* our results do not provide a statistically significant coefficient ($\gamma_{04} = -.256$, $p = .376$). Consequently, Hypothesis 2 is not supported, which suggests there is no significant difference between the assigned startup valuations of CVCs with an *analytic motivation* and their peers with a *financial motivation*. In accordance with Hypothesis 3, our results indicate that CVCs with an *unfocused motivation* pay significantly higher purchase prices for startups ($\gamma_{03} = .600$, $p = .030$) than their peers with an *analytic motivation*. This confirms our supposition that CVCs with an *unfocused motivation* are faced with a liability of vacillation as they might lack a tangible investment motive. Thus, entrepreneurs apparently demand a valuation premium in expectation of eventual moral hazard problems.

To confirm our findings, we conducted further analyses by additionally controlling for a startup's business model, that is, whether a startup operates a B2B business model, as well as a CVC's fund size and its age at funding. Owing to the limited data coverage, we created a subsample where we were able to access the above mentioned data, resulting in a narrowed sample of 23 CVCs and their responding 87 startup investments. As expected, the effects of CVCs' investment motivation also hold for our subsample, and therefore confirm the results of our full model.

Overall, our findings show that the different forms of investment motivation among CVCs are important factors in explaining the valuations of startups. We therefore extend the findings of Heughebaert and Manigart (2012) highlighting that research should not only differentiate between VC types like IVCs, CVCs, and governmental VCs, but also between the different subgroups of CVCs.

5 Discussion

5.1 Theoretical and practical implications

Extant research overlooks the possible impact of the divergent degrees of CVCs' investment motivation on the startup valuations they assign. Accordingly, the goal of this study was to explore this effect and it is to the best of the authors' knowledge the first paper addressing this potential interplay in detail. To achieve the above research goal, the current study analyzes 52 CVC mission statements and 147 startup valuations between January 2009 and January 2016, applying CATA and cluster analysis to identify different types of CVCs according to their degree of strategic and financial motivation. We then applied HLM to examine the effects of CVC type on startup valuation. Overall, our findings emphasize that CVCs' characteristics in terms of their investment motivation appear to play a decisive role in explaining startup valuations. Specifically, we found empirical evidence that when all other factors are equal, CVCs with a *strategic motivation* pay significantly lower purchase prices for startups than their counterparts with an *analytic motivation*, supporting our hypothesis about the value-adding role of highly strategically motivated CVCs. For CVCs with a *financial motivation*, on the other hand, we did not find a significant valuation impact. However, we illustrated that entrepreneurs extract higher valuations from CVCs with an *unfocused motivation,* underscoring our notion that these CVCs have a liability of vacillation owing to their potential lack of a tangible investment motivation and entrepreneurs' moral hazard concerns.

In light of these results, our paper makes multiple contributions to the VC and CVC literature. First, we extend previous work by adding to the continuum of CVCs' investment motivation, thereby demonstrating that they form a heterogeneous group (e.g., Dushnitsky and Lenox 2006; Wadhwa and Basu 2013). More specifically, we introduced CATA together with a clustering technique as objectifiable means to measure the divergent levels of CVCs' strategic and financial investment motive. This, in turn, allowed us to overcome the black and white approach of current research, which has so far only differentiated between strategic and financial CVCs. Consequently, we propose a more fine-grained classification of CVCs. Furthermore, in contrast to previous articles that studied the valuation impact of CVCs as opposed to IVCs from an *inter-group* perspective (e.g., Gompers and Lerner 2000; Heughebaert and Manigart 2012), we deliberately shifted the focus to an *intra-group* perspective, which enabled us to effectively scrutinize the valuation effects of different CVC types in a unique empirical setting. We therefore add to the studies of Cumming and Dai (2011) and Heughebaert and Manigart (2012) by explicitly considering CVCs' characteristics in terms of their underlying investment motivation as determinants of the purchase prices they pay. In doing so, our work addresses the current research gap regarding the variability of CVCs' startup valuations. In addition to this, our results are interesting, precisely because they might initially appear counterintuitive. Specifically, we found that the involvement of CVCs with a *strategic motivation* leads to a lower valuation than when their CVC counterparts with an *analytic motivation* are involved. Accordingly, the presence of CVCs with an *unfocused motivation* contradicts the initial idea of corporate investment

practice regarding their non-sufficient-strategic investment motive. Dealing with a liability of vacillation those CVCs seem to lack a clear investment motivation which could be a signal for the absence of comprehensive corporate backing. Nonetheless, when startups actively seek CVC funding, they evaluate the potential value-added contributions resulting from a corporates' unique resource base (Ernst et al. 2005; Maula et al. 2005). Hence, due to the dearth of strategic investment motivation, those CVCs might need to increase their general attractiveness through offering higher purchase prices. Alternatively, CVCs with a *strategic motivation* are expected to provide a broader basis of complementary assets for startups, thereby enabling their portfolio firms to scale their business more rapidly. In this regard, the entrepreneurs behind such startups apparently tend to accept valuation discounts in exchange for more substantial value-add activities from those CVCs than the investment offerings from CVCs with an *analytic motivation*.

Moreover, this study should also be of significant value for entrepreneurs in outlining clusters of CVCs that reflect a specific investment motivation. Our cluster approach, in turn, could help entrepreneurs to segment CVCs and to align their investor choice with their business and exit strategy. Having a CVC with an *unfocused motivation* in the early stage to push for a higher valuation might be helpful in terms of signaling when planning to exit via an IPO in the long run, whereas entrepreneurs seeking value-adding contributions might be interested in maintaining a close relationship with CVCs with a *strategic motivation*.

5.2 Limitations and avenues for future research

Several limitations of this study illuminate promising avenues for future research. In particular, four limitations seem worthy of consideration. First, we applied CATA to measure CVCs' levels of strategic and financial motivation. However, it might be that this approach does not fully capture CVCs' real investment behavior, an inherent drawback of applying CATA (e.g., Moss et al. 2014). More importantly, CVCs' front-stage investment statements might differ from their actual back-stage actions (Fiol 1995). We would therefore encourage future research to benchmark our front-stage findings against CVCs' back-stage statements on their investment motivation by analyzing, for instance, internal memos or meeting transcripts (Zachary et al. 2011a). Second, we differentiated between CVCs' strategic and financial investment motivations. Nevertheless, we are well aware of the fact that there are other differentiating characteristics among CVCs, such as their exploitative and explorative investment motives (Hill and Birkinshaw 2014). Therefore, we propose that future research should study the effects of these other CVC characteristics on startup valuation. Third, we deliberately focused our study on the U.S. CVC market, implying that our findings are geographically limited; however, for a first analysis of the valuation impact of CVCs' heterogeneous investment motivation, the mature and very active U.S. VC market, with its ample data coverage, provides a perfect empirical setting (Da Rin et al. 2013). Nonetheless, this also implies that we consciously scrutinized a common set of institutional and cultural factors. In view of this, we consider it an important second step for scholars to analyze the transferability

of our findings to other VC markets with a range of institutional and cultural settings (Wright et al. 2005). Additionally, we focused on CVC investments between January 2009 and January 2016. However, as already outlined above, CVC activity is very cyclical in nature and we thus leave it up to future work to externally validate our findings for different time periods (Dushnitsky and Lenox 2006; Gompers and Lerner 2000; McNally 1995). Fourth, even though our study sheds light on CVCs' heterogeneous investment motivation, it could not address which particular startup characteristics the identified CVC types consider when making an investment decision. We would therefore encourage future research scrutinizing the matching characteristics between the differing CVC and startup types (e.g., Maula et al. 2009). It would be interesting for instance to understand why startups accept the offers of CVCs with an *unfocused motivation* who seem unable to demonstrate a concrete investment motive. Similarly, as the underlying data cannot answer these questions, future work should address how the identified types of CVCs' investment motivation relate to their particular business practices, such as their holding periods or their proportions of equity stake taken in startups. This, in turn, will help to further validate the paper's findings and to expand the literature on CVC heterogeneity.

6 Conclusion

A rigorous combination of explorative and theory-testing approaches meant we were able to illustrate that the investment motivation of CVCs goes beyond the simplistic assumptions currently dominating the academic discourse. In general, these motivations not only shape how CVCs behave in the market for startup investments, they also determine the startup valuations those CVCs assign. For our research design, we constructed a unique sample of 52 CVCs and their corresponding 147 startup valuations for the time period between January 2009 and January 2016. Owing to the natural hierarchical structure within the CVC-startup reciprocity, we also instituted an HLM regression method. The underlying data identified four differing types of CVC motivation and showed that they affect the startup valuations CVCs assign. The current study challenges the prevailing black and white approach to CVC investment motives, demonstrating that there is a continuum of CVC investment motivation, and thus implying that CVCs form a heterogeneous group, and which explains the variability of their startup valuations.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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