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The landscape of corporate venturing in Germany: Insights on corporate venture capitals and corporate accelerators

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Patrick Haslanger

The Landscape of Corporate Venturing in Germany – Insights on Corporate Venture Capitals and Corporate Accelerators

This paper adds to the literature of external corporate venturing, especially corporate venture capitals (CVCs) and corporate accelerators (CAs) by providing an overview of the German corporate venturing market and by offering first intriguing findings based on a novel and unique hand-collected dataset. It presents insights regarding the set-up, organization and staffing of corporate venturing units, as well as characteristics of start-ups under management. This study distinguishes between the corporate venturing unit's mission, organization, governance and network as well as vehicle leads. Moreover, differences in the characteristics of start-ups supported by corporate venturing units are detected. This work offers unique insights on the German corporate venturing landscape and thereby serves as starting point for future and more elaborate research.

Keywords: Corporate venturing; entrepreneurship; corporate venture capital (CVC); corporate accelerator (CA); Germany

JEL classification: G24, L26, M13, O3

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The Landscape of Corporate Venturing in Germany –

Insights on Corporate Venture Capitals and Corporate Accelerators

Patrick Haslanger[1]

Abstract

This paper adds to the literature of external corporate venturing, especially corporate venture capitals (CVCs) and corporate accelerators (CAs) by providing an overview of the German corporate venturing market and by offering first intriguing findings based on a novel and unique hand-collected dataset. It presents insights regarding the set-up, organization and staffing of corporate venturing units, as well as characteristics of start-ups under management. This study distinguishes between the corporate venturing unit's mission, organization, governance and network as well as vehicle leads. Moreover, differences in the characteristics of start-ups supported by corporate venturing units are detected. This work offers unique insights on the German corporate venturing landscape and thereby serves as starting point for future and more elaborate research.

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1. Introduction

Today, corporate venturing activities are a crucial element of the strategic renewal of large, established firms. In order to overcome internal barriers of innovation, companies set up different organizational modes to absorb innovations both from inside and outside company boundaries. Start-ups, on the other hand, require funding and non-monetary support to bring their idea to life. Although new enterprise creations are above pre-financial crisis levels in most OECD countries (OECD, 2017), the "Gründungsquote"[2] in Germany was at an all-time low of only 1.3% in 2016 and 1/3rd of the founded start-ups failed within the first three years (Metzger, 2017). To tackle this unfortunate trend, hurdles for start-up creation in Germany and limitations of the start-up support ecosystem need to be detected. Corporate venturing is an excellent way of combining the capabilities, resources and needs of corporations with those of start-ups for mutual benefits. Through corporate venturing corporations get a window on technology, screen the market for upcoming innovations, get access to otherwise unreachable talent and can instill a more entrepreneurial mindset in their corporate culture. Start-ups get access to funding, resources and capabilities and receive mentoring and coaching from experienced personnel. On the flipside of the coin, however, corporates need to spend corporate resources in form of both money and time which could also be used elsewhere. In addition, inventions sourced from start-ups are often refused by corporate personnel due to the "not invented here" syndrome. Start-ups run into the risk of drowning in the corporate world or losing its technology and intellectual property. Moreover, collaborating with a corporation might send adverse signals to potential customers that are often direct competitors of these corporations. Corporate venturing, in particular the cooperation between large and mature corporations and young entrepreneurial firms has gathered great reception from practitioners. Across all industries, firms have invested in venture capital funding or launched accelerator programs. Although different corporate

[2] Gründungsquote = Start-up foundation rate

venturing vehicles exist, this paper is focused on corporate venture capital funds (CVC) and corporate accelerator (CA). Well-known corporate venture capitals include GV (formerly Google Ventures), Intel Capital or Alliance Venture, the recently founded 1bn$ CVC fund of Renault, Nissan and Mitsubishi. Notable accelerators include Y Combinator, the first accelerator founded or Citrix accelerator, the oldest corporate accelerator globally. Additionally, well-known firms like AT&T, Microsoft or Walt Disney operate corporate accelerators. Although the examples presented are from the US, corporate venturing is a global phenomenon. Therefore, the objective of this study is to present first insights on corporate venturing in Germany, especially regarding corporate venture capital and accelerator vehicles. These insights are based on a novel and hand-collected dataset, which includes data from 29 corporations operating a total of 36 venturing units in Germany, being invested in almost 800 start-ups. Through giving an overview on the German corporate venturing landscape this paper contributes to existing corporate venturing literature. First, it provides a new perspective on CVCs, especially regarding an under-researched country and regarding the set-up, organization and personnel of such units. Second, this study is – to the author's best knowledge – one of the first to provide empirical insights on corporate acceleration. Third, it moderately contributes to the literature through hinting at differences between the two forms of corporate venturing.

In order to shed light on the German corporate venturing market, this paper is structured as follows: First, it discusses the theoretical origin of corporate venturing as part of innovation strategies, differentiates various corporate venturing vehicles and gives a glimpse on existing studies on Germany. Second, it presents descriptive statistics and preliminary analyses on CV units, start-ups and corporates. This work concludes with a discussion of corporate venturing in Germany and an elaboration on limitations and future research.

2. Theoretical background

2.1. Corporate innovation through start-up collaboration

In the 21st century, technological progress and new trends impact every firm and impede the way business is done. Therefore, the competition among firms to stay on top of far-reaching changes is immense. Although competition characterized the business world since the early days, its level has been rising more recently. One indicator is the lifespan of firms in the S&P 500 index. Whereas it was, on average, 61 years in 1958, it diminished to only 18 years in 2010 (Foster, 2012). Research shows that being innovative helps firms to stay competitive. For example, Brigl, Ross, Schmieg and Watten (2014) find that innovative firms around the world generate a premium over their peers. In Americas, the return premium of competitive firms is 6.7%, whereas it is even 14% in Asia. Key scholarly contributions on innovation research come from Schumpeter (1934, 1943), Drucker (2002) as well as Bower and Christensen (1995). Schumpeter (1934, 1943) stresses that without innovation firms fail to generate profits. Moreover, he argues that entrepreneurs are inevitable for innovation and 'creative destruction'. Drucker (2002) finds that besides hard work, persistence and motivation, especially capabilities and knowledge of key talents are differentiators. Moreover, he detects that sources of innovation can be within a firm or imposed from the broader social environment. Finally, Bower and Christensen (1995) introduce the well-known concept of 'disruptive innovation'. They argue that disruptive innovations have their origin in a small customer niche and only spread out across industries, customers or markets in the course of time. Whereas the traditional linear theory focuses on within-firm innovation, the concept of open innovation highlights the need to collaborate with outside-firm organizations to be innovative (Gallouj & Djellal, 2018). Such organizations can be suppliers, competitors, clients, university-based laboratories and research institutes or young entrepreneurial enterprises. Especially the engagement with start-ups is a regularly applied way for corporates to gain external knowledge (Schildt, Maula, & Keil, 2005).

In doing so, established firms open up to new technologies, learn from a more agile and risk-taking culture and get access to a large talent pool.

Entrepreneurial enterprises or start-ups are young and recently established companies. Venkataraman (1997) refers to them as being lately founded entities with a specific purpose. Often, the founder team has an explicit idea, which can be a new business model, a novel product or service or an innovative technology or the mere improvement of something that already exists. For example, nowadays large and globally known firms whose innovations had a large impact started as small businesses out of a garage, e.g. Microsoft or Apple. In order to successfully develop their idea, start-ups require – among other things – funding, mentoring and access to customers and markets, supplier and expert networks, as well as facilities and talents. Both scholars and practitioners agree that financing is the most pressing need for start-ups (Dushnitsky & Lenox, 2005; Radcliffe & Lehot, 2018). Besides the more traditional sources of funds, like banks, start-ups obtain both financial and non-financial support from more specialized players: the initial funding is often provided by the founder themselves or close relatives and friends. Angel investors and business angels are wealthy individuals that primarily invest in early-stage small start-ups (Wong, Bhatia, & Freeman, 2009). Thereby, they fund start-ups after the founder's capital is used and before venture capital funds come in (R. T. Harrison & Mason, 1999). Often, these wealthy individuals are experienced founders themselves that also offer mentoring and coaching. In contrast to venture capital funds, business angels invest their own funds (Denis, 2004). Venture capitals focus on highly innovative early and expansion stage start-ups. As venture capitalists normally hold equity shares, they often get operationally involved in their portfolio firms. Finally, private equity funds invest in later stage and more established and mature companies (European Private Equity & Venture Capital Association, 2016) in the form of bridge financing, distress funding or leveraged buy-outs (LBOs) and management buy-outs (MBOs) (Christofidis & Debande, 2001; Isaksson, 2006).

2.2. Corporate venturing through corporate venture capitals and accelerators

Corporates often engage in one or the other form of start-up support and investment. Corporate venturing is – among innovation and strategic renewal – one key activity of corporate entrepreneurship and describes the set-up of vehicles that go beyond organizational boarders, often operated with some degree of autonomy (Chua, Chrisman, & Sharma, 1999). Others define (external) corporate venturing as "investments that facilitate the founding and/ or growth of external businesses" (Covin & Miles, 2007, p. 183), or even specific to start-ups as "a corporation making an investment in external start-ups" (Fenwick & Vermeulen, 2016, p. 3). Going beyond the boundaries of a firm, corporations gain access to additional capabilities and resources, which are inevitable to maintain a corporation's innovativeness (Agarwal & Helfat, 2009; Eisenhardt & Martin, 2000). Scholars discuss different modes under the umbrella of corporate venturing including corporate venture capital investments, acquisitions, joint-ventures or alliances (see e.g. Dushnitsky & Lavie, 2010; Keil, Maula, Schildt, & Zahra, 2008; Van De Vrande & Vanhaverbeke, 2013). This paper will follow the more narrow definition by Fenwick and Vermeulen (2016) and look merely at vehicles that support corporate innovation through collaborating with external start-ups. Based on the discussion on corporate innovation and start-up characteristics, selected vehicles are mapped in Figure 1:

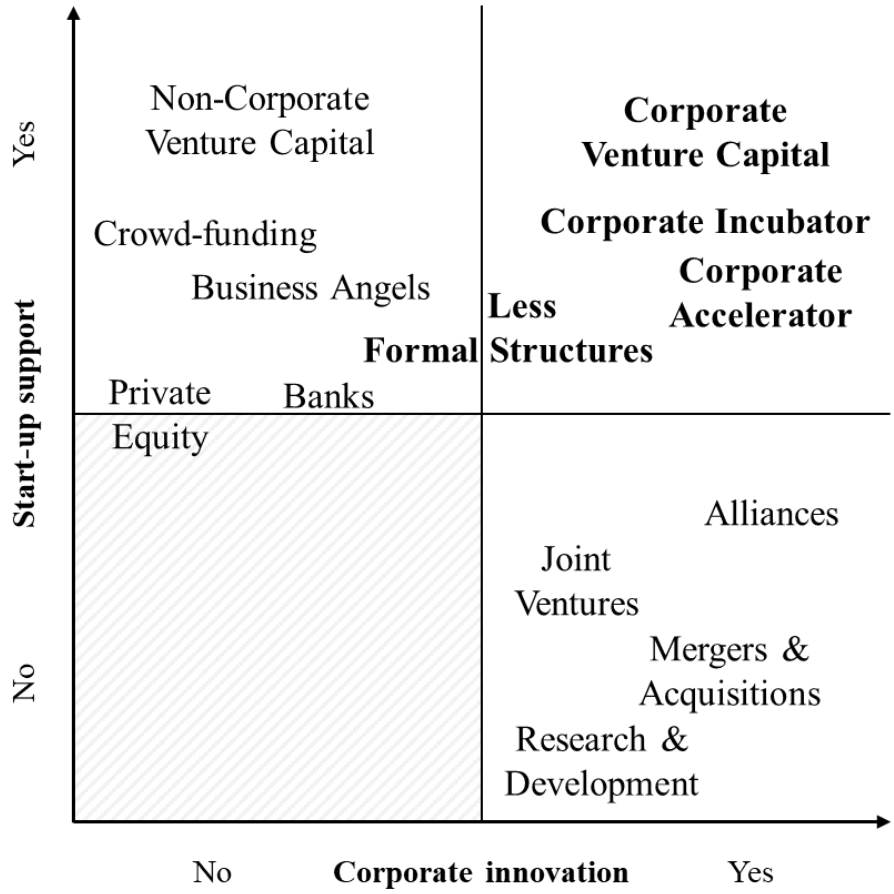

Figure 1: Mapping of selected vehicles for corporate innovation and start-up support (author's research)

The focus lies at the intersection of both corporate innovation and start-up funding, i.e. on the top-right corner. In a nutshell, these corporate venturing units pursue similar financial and strategic objectives regarding corporate innovation and start-up support. Nonetheless, they differ in their focus, the type of start-up supports they offer, the degree and style of collaboration and therefore the vehicle's structure, set-up and organization. Table 1 presents an overview of these four corporate venturing vehicles:

Table 1: Comparison of selected corporate venturing vehicles (author's research)

Vehicle	Objective	Description	Examples
Corporate Venture Capital	Financial return, strategic advantage (e.g. technology)	• Equity investment (up to 20%) over several years (5-7) and often multiple funding rounds • Investment in established, fast-growing, existing small companies with high potential • Often close collaboration with business units, assumptions of board seats, sharing of patents and complementary assets	• BMW iVentures • Renault, Nissan, Mitsubishi Alliance Venture • Alphabet GV
Corporate Accelerator	Rapid screening of a large number of start-ups and search for highly qualified personnel and innovative ideas	• Structured 3-4 months accelerating program for larger batches of early stage start-ups or ideas • Small founding of around 25k$ for small (<10%) or no equity stake • Often mentoring, network access, office space, public relations • Limited/ no interaction with business units • Support of ideas unrelated to core business of the corporation	• Microsoft Ventures Accelerator • Telekom hub:raum • Axel Springers Plug'n'Play
Corporate Incubator	Development and support of (internal) innovative ideas	• Ownership up to 25%, timeframe 1-3 years • Provision of mentoring, coaching, network access, office space, hardware and infrastructure • Often, yet not always external "experts"/ team used to execute on internal ideas • Support of ideas related to core business	• Merck Innovation Center • ATT Foundry • LinkedIn [in]cubator
Other less structured forms	Access to early stage start-ups, bringing together innovative entrepreneurs, creation of positive image for corporation in start-up sphere	• Pure sharing of resources, e.g. co-working spaces • Internal/ external hackathons • Challenges/ contests for specific problem-statements • Scouting missions, innovation platforms or venture clients, digital labs	• Facebook Hackathon • AT&T Developer Summit Hackathon • Unilever Foundry

The oldest and most established form of corporate venturing vehicles are corporate venture capital funds (CVCs) which aim at long-term equity investments. They strategically invest in well-established start-ups linked to their core business. Start-ups benefit from funding and a proximity to business units, nevertheless, the importance of a good cultural fit and the downsides of integration, such as less entrepreneurial freedom, remains crucial for both start-ups and the acquiring corporation (see e.g. Colombo & Murtinu, 2017; Dushnitsky & Shapira, 2010; Gompers & Lerner, 1998; Park & Steensma, 2012; Röhm, Köhn, Kuckertz, & Dehnen, 2018). On the contrary, corporate accelerators (CAs) support early-stage start-ups through standardized programs, which might include financial support and especially mentoring and coaching, often just over a limited timeframe. The objective of corporate accelerators is to screen many start-ups and get access to innovative business ideas and the qualification of personnel. After a short-time frame, start-ups and corporations separate making performance impacts questionable (Cohen, 2013; Dempwolf, Auer, & D'Ippolito, 2014; Hochberg, 2016). For most corporate incubators, the objective is to develop internal ideas and innovations. Internal innovation teams receive coaching to build up start-ups separately from business units. Incubators shelter internal start-ups until they reach a stage where they can become independent of the mother (Cohen, 2013). Besides, less structured forms of corporate start-up engagement exist. Some corporations purely offer co-working spaces, specific demo days or so-called hackathons and start-up nights. Thereby, corporations get a foot into the start-up ecosystem and position themselves as being start-up friendly. Although all four forms fulfill – to some degree – the requirement of supporting corporate innovation and start-ups, this study focuses on CVCs and CAs exclusively. First, these two constitute the most wide-spread (CVC), as well as most recent (CA) forms. Although especially CAs are not clearly defined yet (Colombo, Rossi-Lanastra, & Wright, 2018), the two vehicles have different objectives and structures and

therefore a heterogeneous set of start-ups under management[3]. One can argue that they lie on different ends of a spectrum reaching from a broad and standardized short-term program (CAs) to a narrow and case-specific investment (CVCs). As elaborated by Cohen (2013), incubators mainly have an internal focus. Therefore, they are not suitable to discuss external corporate venturing. Unstructured forms, like hackathons or start-up challenges, are too heterogeneous to analyze them empirically.

Scholars identify several future research streams for CVCs and CAs. Based on an extensive review of the existing corporate venture capital literature, Röhm (2018) identifies five research streams, namely drivers of CVC adoption, governance aspects, investment procedures, value-adding contributions and implications for the corporate mother. Only a limited set of studies discusses governance aspects (e.g. Dokko & Gaba, 2012; Dushnitsky & Shapira, 2010; Hill & Birkinshaw, 2014; Souitaris, Zerbinati, & Liu, 2012), like the organizational set-up or CVC personnel. Moreover, Anokhin, Peck and Wincent (2016) highlight the need to incorporate governance factors in CVC studies. Additionally, the work available on value-adding contributions, e.g. coaching or network access is limited (e.g. Alvarez-Garrido & Dushnitsky, 2016; Park & Steensma, 2012). Similarly, even though the positive effect of CVCs on the corporate mother is examined by several scholars (e.g. Keil, 2004; Keil et al., 2008; Schildt et al., 2005; Wadhwa & Kotha, 2006), more work ought to be done. Due to the newness of the corporate accelerator phenomenon, data for empirical studies is limited and the need for further research is tremendous. According to Kanbach and Stubner (2016, p. 1762) "only three studies in peer-reviewed journals specifically refer to corporate accelerators", namely those of Hochberg (2016), Kohler (2016) and Weiblen and Chesbrough (2015). Therefore, Colombo, Rossi-Lanastra and Wright (2018) dedicate a whole chapter in the recently published book

[3] Start-ups under management describes start-ups that are part of a CVC or CA investment or program, independently of how intense the managerial involvement of corporate or CV personnel in the start-ups actually is

"Accelerators – Successful Venture Creation and Growth" to future accelerator research needs. They propose to compare and differentiate accelerators to other vehicles offering start-up support. Most importantly much more research needs to be done specifically on corporate accelerators, especially focusing on the relationship of a CA to its corporate mother and cross-relationships between CVCs and CAs, as well as on the differentiation between generalist and specialist programs (Colombo et al., 2018; Kohler, 2016).

2.3. Corporate venturing in Germany

This study aims at presenting insights on German corporate venturing units. The availability and success of any form of venturing is influenced by environmental factors. These include fiscal (e.g. taxes), regulatory (e.g. labor market and company laws), infrastructural (e.g. research centers and technology parks) as well as cultural (e.g. risk-taking and entrepreneurial spirit) and stock market (e.g. market liquidity) dimensions (Christofidis & Debande, 2001). In Germany, the "Mittelstand" plays a crucial role for the overall economy and its innovativeness, and thereby differentiates the German economic structure from many other countries. The frequency and intensity of corporate venturing is dependent on the entrepreneurial culture and spirit of a country. Innovativeness, availability of good scientists, motivation and skills of people to found a new start-up, are equally important as failure tolerance, a supporting infrastructure and legal framework (Christofidis & Debande, 2001; National Venture Capital Association, 2015). Moreover, Germany has a long history of successful innovations, especially driven by the economy's engineering capabilities. Innovations from Germany tend to be more technical and exploitative, whereas breathtaking explorative innovations are rare. Therefore, no German pendants to e.g. Microsoft, Google, Facebook and Amazon exist. As a consequence, the German start-up ecosystem is less developed than what is observed in regions like the Silicon Valley and the Boston area. Consequently, most studies on corporate venturing refer to the US. Being the largest entrepreneurship market, sufficient data is available (J. S. Harrison &

Fitza, 2014), whereas scholars find that the German market only offers a limited number of observations (Ernst et al., 2005; Weber & Weber, 2003). Similarly, most of the European market is poorly covered in major venture capital databases (Colombo & Murtinu, 2017). Therefore, Röhm (2018) criticizes that 70% of CVC articles exclusively focus on US data and highlights that further databases besides the heavily used ThomsonOne and VentureSource would offer additional insights. In fact, only a handful of studies on the German corporate venturing market exists. For CVCs, Ernst, Witt, Brachtendorf (2005) as well as Weber and Weber (2003) offer empirical yet outdated insights exclusively on the German market. To the author's best knowledge, no empirical studies on the German corporate accelerator market exist. Information on the German corporate venturing landscape is mainly available from venture capital market reports written by consultancies or venture capital magazines (e.g. Ernst and Young, 2017; VentureCapital Magazin, 2017).

3. Descriptive statistics and preliminary analyses

The following chapter presents descriptive statistics and preliminary analyses to give the reader a first impression of CVCs and CAs in Germany. Thereby, it offers an overview of the German corporate venturing market including first hypotheses and potential explanations for the presented findings. The description helps to identify initial trends and tendencies as starting point for further research. The insights presented are based on a novel unique hand-collected dataset. The data comes from multiple databases, listings and publicly available sources. Data on *CV units* is obtained from publicly available sources, e.g. websites, company blogs and Crunchbase. Data on the CV network is based on likes, followers and hits of the well-known and fully accepted social networks and online sources LinkedIn, Facebook, Twitter and Google. Finally, more complete profiles of CV personnel regarding education and previous experience are obtained LinkedIn, as done by other scholars (e.g. Garg & Furr, 2017; Hallen, Bingham, & Cohen, 2017). For data on *start-ups*, this study falls back on Pitchbook, a Morningstar-owned

Venture Capital, Private Equity and Mergers & Acquisition database. Data on *corporations* is mainly sourced from publicly available databases and company publications. The information from different sources is combined manually to an extensive unique dataset. Due to the ongoing increase in the number of CV units in Germany and issues of data availability, the dataset will – most probably – not provide a complete coverage of all existing CVs in Germany. Nonetheless, the sample offers a representative view on the German CV landscape.

3.1. Corporate venturing units

The following section, describes characteristics regarding organizational set-up, offerings and key personnel of CV units. A CV unit is owned by a corporate parent. Additional corporations might act as partner. Moreover, a CV unit has multiple start-ups under management. One corporation might own two CV units and a start-up might also be connected to multiple CV units. For example, the corporation Axel Springer owns the two different venturing units Axel Springer Digital Ventures (CVC) and Axel Springer Plug and Play Accelerator (CA), which have multiple start-ups under management, some of which are under the management of both CVs[4], e.g. Zizoo:

[4] Going forward, the term corporate venturing vehicle (CV) is used to only describe CVCs and CAs without referring to other forms like corporate incubators

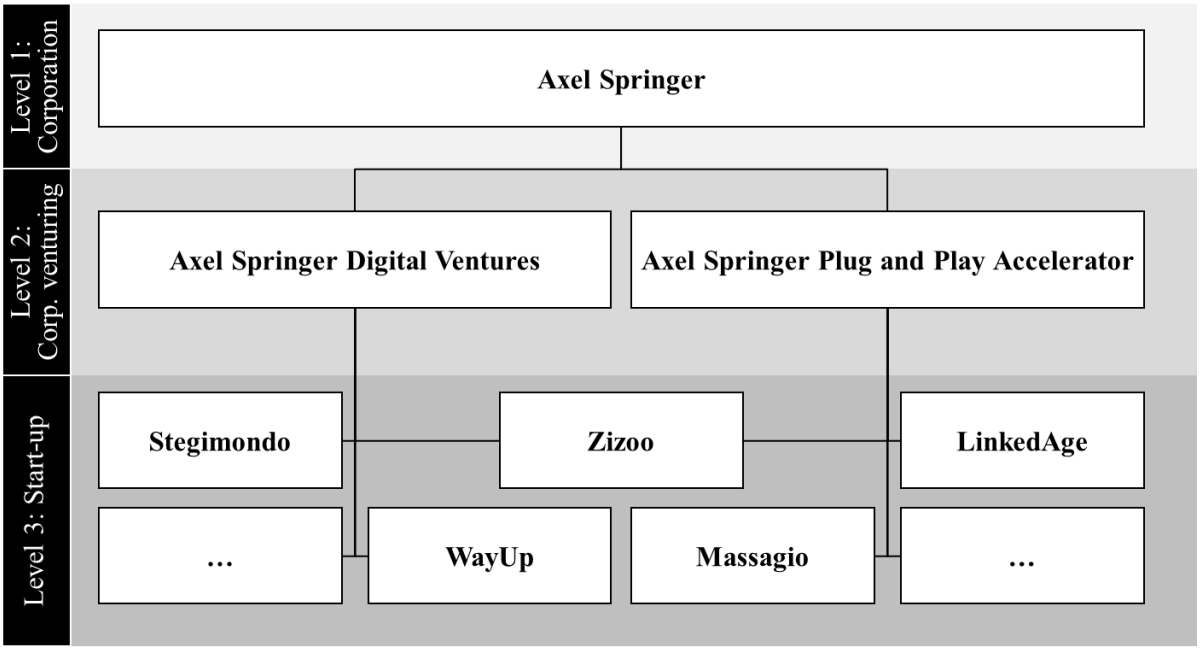

Figure 2: Example of multi-level set-up (author's dataset)

As several corporations run multiple CV units, the 29 corporations in the sample operate a total of 36 venturing units. As Figure 3 demonstrates, 58% of these units are CVCs and the remaining 42% are CAs:

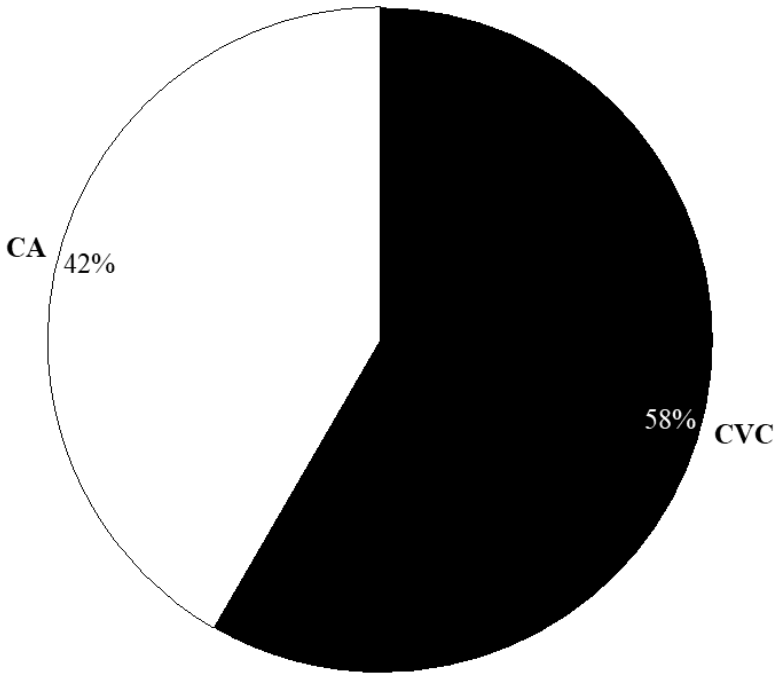

Figure 3: Split in CVCs and CAs (author's dataset)

This split gives a reasonable picture on the current corporate venturing landscape. The skewness towards CVCs can especially be explained by a look back in history. As CVCs are the older phenomenon, it is not surprising that they comprise the larger share. In the US as the leading market, CVCs can be traced back to shortly after the second World War, experiencing a strong boost in the 1970s (Christofidis & Debande, 2001). Selected business analysts even consider the 1914 investment of the chemicals company DuPont in the back then six year old car manufacturer General Motors as first corporate venturing activity (Jafar, 2018). Although the first European CVCs were founded in the 1980s, the fast spread of the internet in the 2000s changed the way of corporate innovation and thereby increased the importance of corporation venturing (Christofidis & Debande, 2001). A key turning point happened in 2009 when the CVC market was growing although the overall economy was on a decline. According to Radcliffe and Lehot (2018), this signals the increased strategic importance of corporate venturing. Since the early days, CVC investments are of cyclical nature with the most recent wave having started in early 2000 (Dushnitsky & Lenox, 2006; Gompers & Lerner, 1998). In line with Ernst, Witt and Brachtendorf (2005) the data on Germany does not include any CVCs of earlier waves, demonstrating a lack of still ongoing early CVC activity. The three oldest CVCs in the dataset are those of BASF, Dieter von Holtzbrink and Audi.

Historically, accelerators developed out of incubator programs, although they differ in their mission and structure. The first accelerator, Y Combinator, was founded in 2005, while the Citrix accelerator founded in 2010 constitutes the first corporate accelerator globally (Kohler, 2016). Nowadays, accelerators play a prominent role for the entrepreneurial landscape, with well-known companies like AirBnB or Dropbox graduating from accelerator programs (Hallen et al., 2017). Analyzing US data on accelerators in general, Regmi, Ahmed and Quinn (2015) find that the growth in the number of newly established accelerators slowed down significantly after 2012. As expected, the data shows a lagging behavior for German corporate

accelerators, with the majority being incorporated from 2013 onwards. The uptick in both CVCs and CAs since 2013 is driven by the digitization agenda of corporates. Firms accept and appreciate the disrupting nature of new technological advances. Moreover, the German start-up ecosystem is more healthy nowadays than it was during the internet bubble, accelerating the set-up of CVCs and CAs, especially for companies of the German Mittelstand (VentureCapital Magazin, 2017). Figure 4 confirms the general trends of CVC and CA investments for Germany and demonstrates two waves of CVCs, as well as the more recent occurrence of CAs since 2012 onwards:

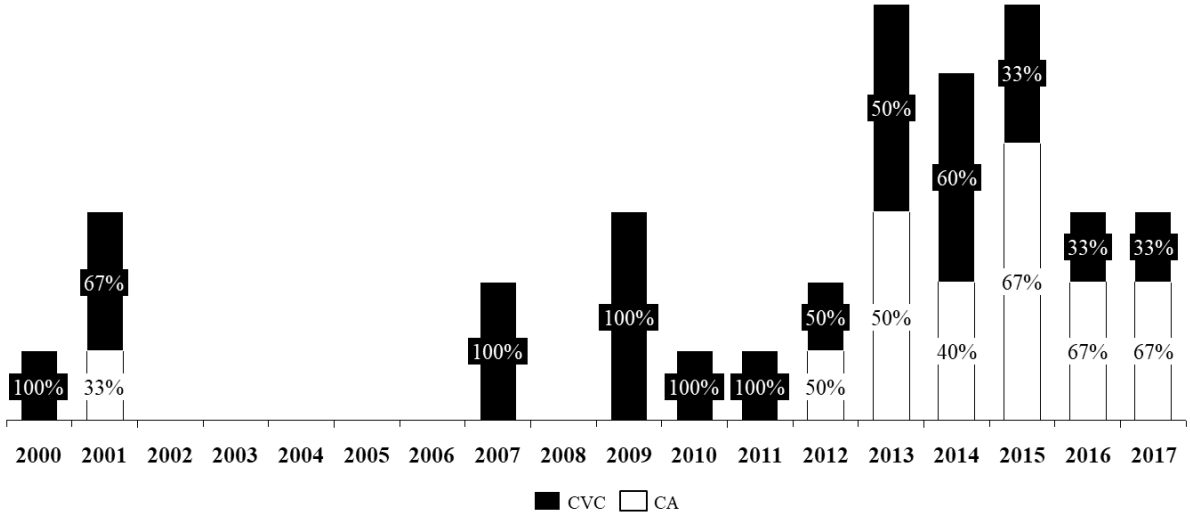

Figure 4: Share of CVs by establishment date (author's dataset)

Since the financial crisis in 2007 and 2008, CVCs have remained an attractive tool for corporations to source external innovations. Most recently, Henkel Ventures was founded in 2017. The trend to still set-up CVCs is not limited to Germany but occurs globally. Beginning of 2018, Renault, Nissan and Mitsubishi announced the establishment of a 1bn$ corporate venture capital fund for the next five years. The so-called *Alliance Ventures* has the goal of "investing globally in next-generation mobility"[5]. Clearly, CAs in general and specifically in Germany are a more recent trend, with Siemens Technology Accelerator, being an exception.

[5] See https://www.alliance-2022.com/ventures/

The accelerator was founded in 2001 with the goal of detecting and commercializing external non-core innovative technologies. As both the name and the focus on providing funds and especially know-how to early stage start-ups show, the Siemens Technology Accelerator follows the definition of a CA. However, it also offers access to innovative Siemens technologies to external parties. Moreover, it regularly co-invests with other CVCs, for example its joint investment with Robert Bosch Venture Capital in the infrared sensor components company Pyreos.

Figure 5 shows the cities the German corporate venturing units in the sample are based in[6]:

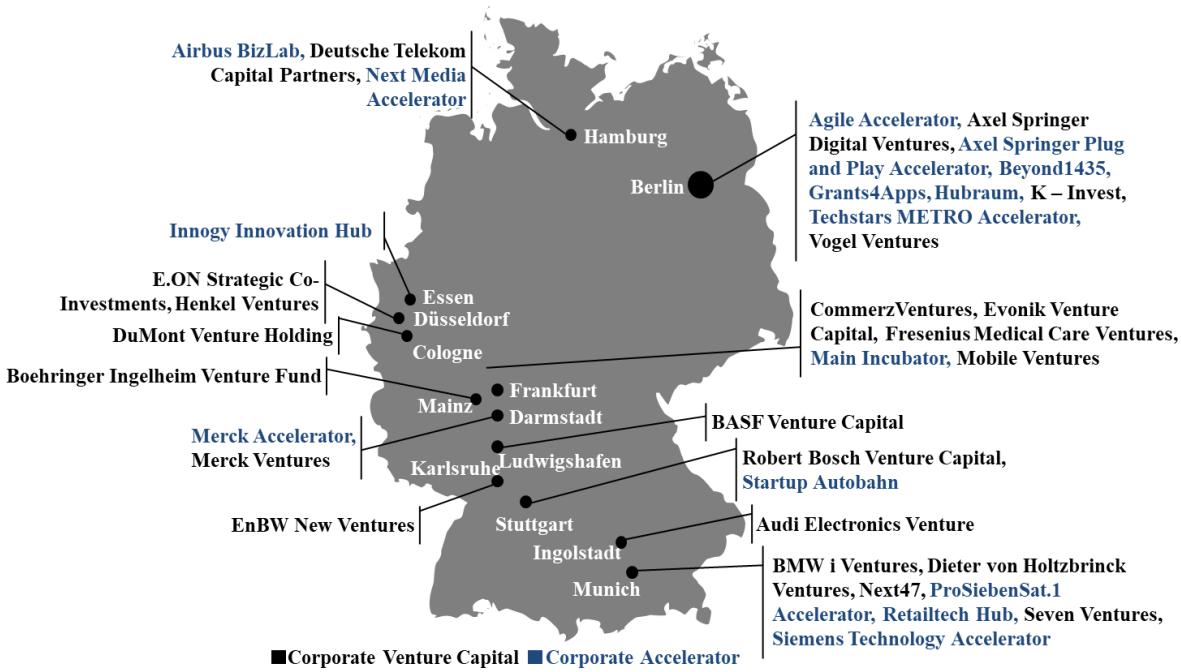

Figure 5: Location of CV units (author's dataset)

As expected, the venturing units are either based in large cities or close to the corporate parent. CVCs are located exclusively in the city where the corporation is headquartered. This can be in cities with a large existing start-up ecosystem, as e.g. the case for Siemens in Munich, but also in smaller cities that are on first view not attractive to start-ups, like Ludwigshafen, where the BASF headquarters are. For CAs, there is a tendency to be located in a start-up hub,

[6] A tabular listing of all CV units included in the dataset can be found in Appendix 1

primarily Berlin and Munich. Existence and growth of accelerators is especially high in cities like London in the UK or Berlin in Germany, as CAs serve as a link between start-ups and the entrepreneurial ecosystem (Drori & Wright, 2018).

In line with the findings of Kohler (2016), the data suggests that corporations across industries use both CVCs and CAs as innovation vehicles. Similar to the location of the CV unit, its industrial focus sheds light on the proximity of the CVs to both corporate parent and start-ups. As shown in Figure 6, 38% of CVCs and 20% of CAs are active in multiple industries and report themselves as investing in start-ups with heterogeneous backgrounds:

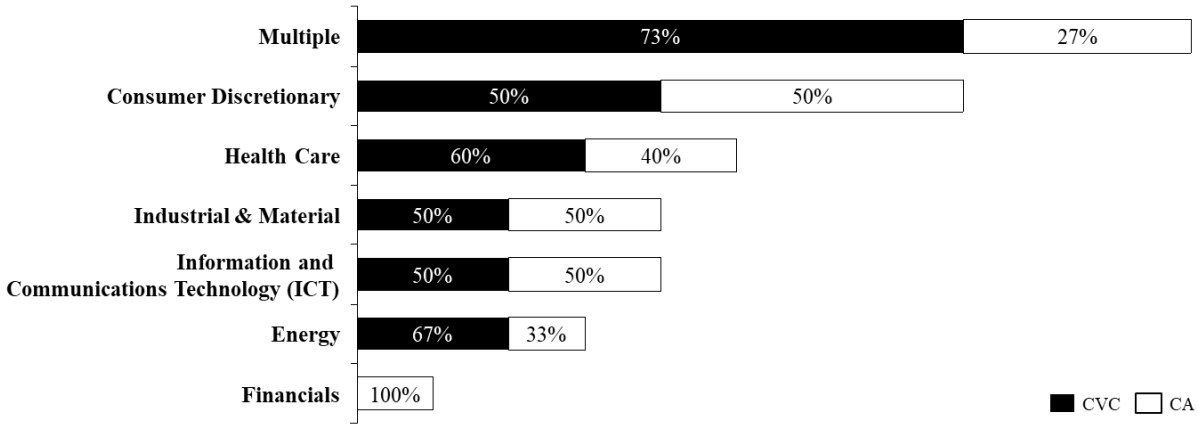

Figure 6: Split of CV units by industry (author's dataset)

For the majority of all CVs and especially for CAs, a focus on one industry, normally the core industry of the corporate parent, exists. However, a word of caution is required. Figure 6 represents what the CVs publicly report themselves. Start-ups in their portfolio are also from different industries, especially if the corporation aims to build up a specific capability. For example, BASF Corporate Venture is active in the Industrial & Material industry. Nonetheless, they also invested e.g. in Kimeta.de, an artificial intelligence-based online job search portal.

Going further, CVCs and CAs are differentiated along selected key characteristics to give some insights and trigger thoughts for future research. One has to be aware that average

values are reported across CVCs and CAs and that differences within groups are also detected. Table 2 presents selected variables:

Table 2: Summary statistics on selected corporate venturing variables by type (author's dataset)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Employees	**724**	**29.6**	**27.5**	**3**	**131**
Employees (CVC)	383	33.6	33.5	3	131
Employees (CA)	341	25.1	17.7	5	62
Start-ups under management	**808**	**44.2**	**27.4**	**1**	**87**
Start-ups under management (CVC)	402	39.5	29.1	1	87
Start-ups under management (CA)	406	48.8	24.7	3	75
Corporate partners	**808**	**5.6**	**5.6**	**0**	**17**
Corporate partners (CVC)	402	3.3	4.1	0	11
Corporate partners (CA)	406	7.9	5.9	1	17
Independent BU	**776**	**0.9**	**0.3**	**0**	**1**
Independent BU (CVC)	402	0.9	0.2	0	1
Independent BU (CA)	374	0.9	0.3	0	1
Number of mentors	**143**	**154.1**	**94.6**	**21**	**238**
Number of mentors (CVC)	0	0.0	0.0	0	0
Number of mentors (CA)	143	154.1	94.6	21	238
Provision of co-working space	**808**	**0.5**	**0.5**	**0**	**1**
Provision of co-working space (CVC)	402	0.0	0.0	0	0
Provision of co-working space (CA)	406	0.9	0.3	0	1

First, the number of employees active in the venturing units is considered. CVCs (34 employees) tend to have more employees than CAs (25 employees). The CVC results are, however, heavily impacted by the outliers Audi (131 employees) and Siemens' Next47 (100

employees). This high number of employees can be traced back to the additional tasks the two CVCs perform that go above and beyond what other CVCs tend to do. With regards to start-ups under management, differences between CVCs and CAs are larger. Although the CVC Deutsche Telekom Capital Partners has almost 90 start-ups under management, CVCs tend to be more focused on an average of 40 start-ups. In contrast, CAs tend to have almost 10 more start-ups under management. Similarly, CAs tend to have more corporate partners (8), whereas CVCs have an average of only three corporate partners. Again, this result is influenced by the outlier Deutsche Telekom Capital Partners having eleven corporate partners. In contrast, Seven Ventures reports no corporate partner at all. Several CAs, e.g. the Siemens Technology Accelerator or Bayer's Grants4Apps, only have one corporate partner. In contrast, Daimlers Startup Autobahn developed from a focused CA with only having Daimler, the University of Stuttgart and Plug & Play as corporate partners to a larger network accelerator, collaborating with companies like Porsche, BASF, HP or ZF Friedrichshafen. Most CV units are organized as independent business units. Only few are part of another unit, for example some R&D function or the like. In line with Weiblen and Chesbrough (2015), Kohler (2016), as well as Hallen, Bingham and Cohen (2017), this study finds that CVCs and CAs differ in their offerings. CAs are much closer to the start-up through offering specific mentoring. Moreover, CAs often supply office-space to start-ups, allowing for co-working possibilities with other entrepreneurial enterprises. Finally, a rich pool of information on the leaders and management of the CV units is presented. To give a first impression, Figure 7 and Figure 8 summarize the information on the academic background and prior experience of the CV leads:

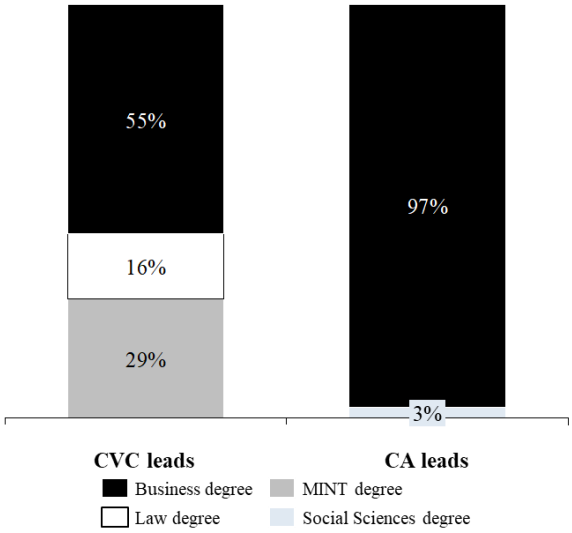

Figure 7: Share of academic background of CV leads by CV type (author's dataset)

Clearly, the majority of CV leads has a business degree. For CVCs, 16% have a law degree and almost 30% a MINT (Mathematics, Informatics, Natural Sciences and Technology) degree. In contrast, CA leads almost exclusively have a business background.

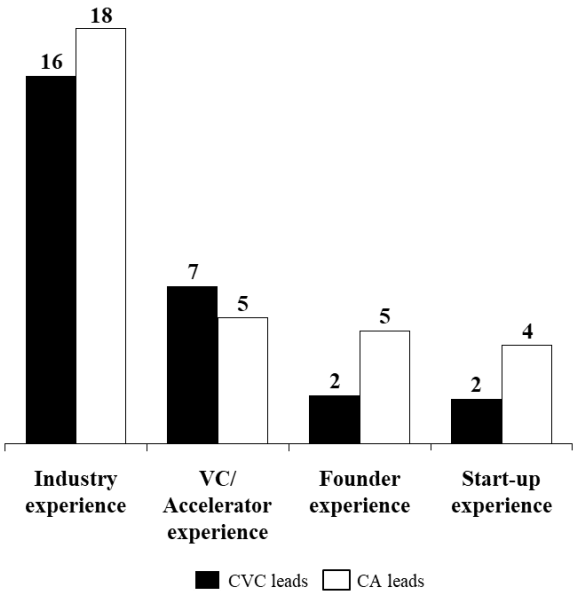

Figure 8: Average years of experience of CV leads by CV type (author's dataset)

As the focus is on *corporate* venturing activities, it is not surprising that the majority of leads has industry experience. Often, leads collect prior experience in the same company before they take over responsibilities within the CV unit. Although leaders have a long-lasting industry

history, experience from the start-up ecosystem is also valued. CVCs seem to value founder and start-up experience less than CAs. Summing up, the previous graphs and discussions provide transparency on German CV units. The next section will turn to the start-ups and give an overview on key characteristics.

3.2. Start-ups

In the sample, a total of 765 distinct start-ups are under the management of German CVCs or CAs. As explained earlier, several start-ups are included multiple times as they are under the management of two or even three CVs in parallel. Some variables like revenue are, however, not available for all start-ups[7]. Figure 9 shows the establishment year of the start-ups. As expected, the majority is between two and ten years old. Some start-ups are young and were established only in 2017. One can see that CVCs manage more seasoned start-ups, whereas younger start-ups are rather under CA management, which is completely in line with expectations. Interestingly, some of the "start-ups" were established more than 30 years ago, e.g. Dalim Software and Locanis in 1985 or Transparent Energy Systems in 1986. Transparent Energy Systems, for example, is an India-based provider of systems designed for power cogeneration, waste heat recovery, effluent water recycling and ammonia absorption refrigeration. Although the company was established in 1986 already, they received their first financing from Next47 in 2009. Having only around 50 employees, they still operate in a start-up like manner.

[7] If no N is reported specifically, N = 765, i.e. information on all start-ups is available

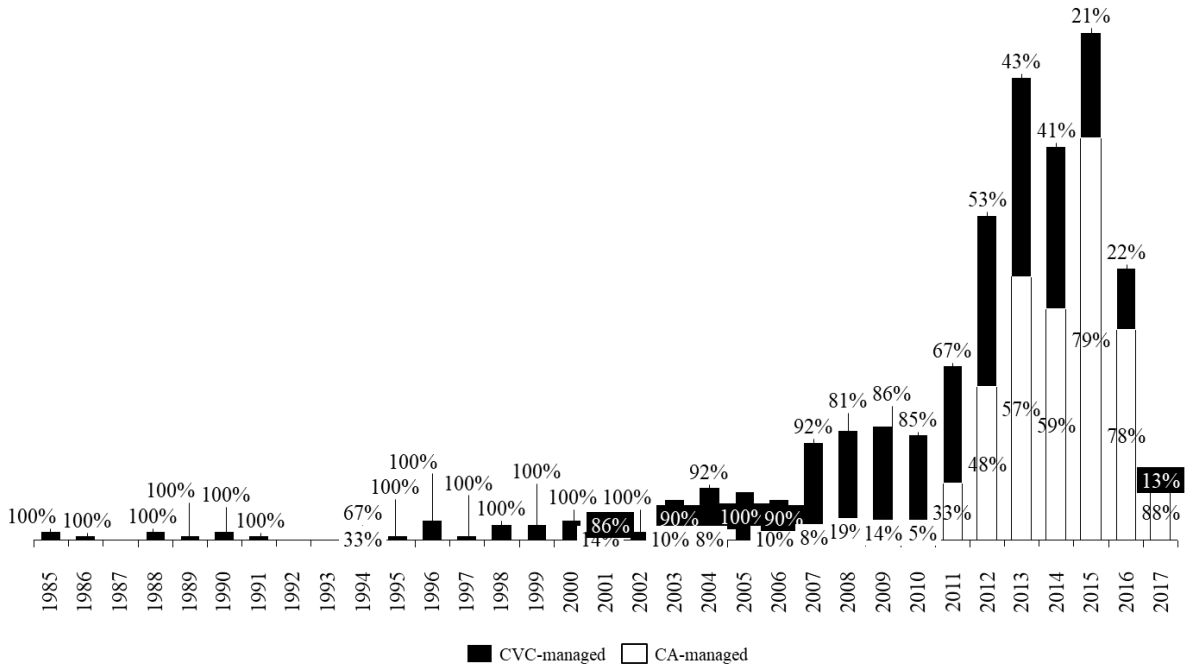

Figure 9: Share of start-ups by establishment date (author's dataset), N = 733

The example of Transparent Energy Systems shows that the age of a start-up alone is not a sufficient indicator for its lifecycle stage. Therefore, start-ups are clustered according to well-established lifecycle categories, as shown in Figure 10:

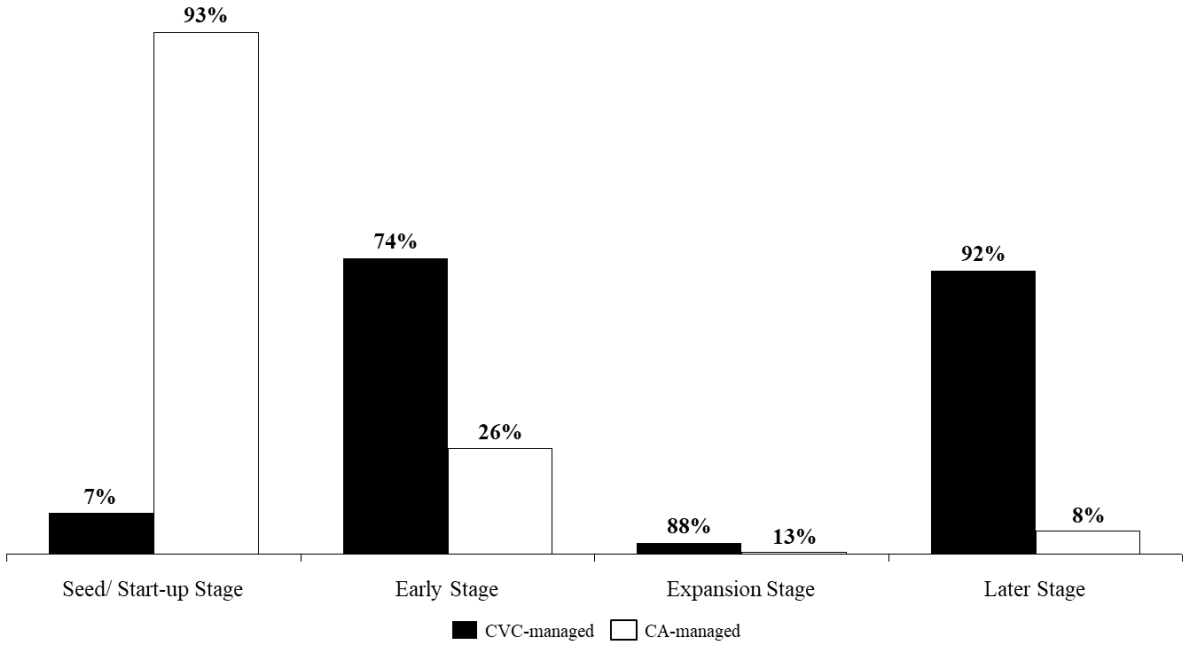

Figure 10: Share of start-ups by lifecycle stage (author's dataset)

As expected, CVCs tend to invest in early and later stage start-ups, whereas CAs focus on start-ups in the seed and start-up phases. This is fully in line with the different missions of the corporate venturing vehicles. Surprisingly, hardly any of the start-ups are reported as being in the expansion stage. Despite thorough analysis and discussions with other scholars, no compelling explanation for this phenomenon is found.

Although the sample focuses on Germany-based venturing vehicles only, start-ups are headquartered all around the world. Figure 11 presents the location of the start-ups:

Figure 11: Location of start-ups, bubble size represents number of start-ups (author's dataset)

The start-ups are founded in 41 different countries, with a large number coming either from Europe or the US and Canada. The high number of European start-ups can be explained by a selection bias. Corporations and especially CV units that are based in Germany know the European market much better and will have closer links to the local start-up environment. The large number of start-ups from the US, especially from Silicon Valley and the Boston-area, is due to the high number of (especially tech-driven) start-ups that are situated in these hubs. Besides Europe and North America, the third largest number of start-ups is located in Israel.

Although this might be surprising to some, the knowledgeable reader will be aware of the entrepreneurial potential, especially in Tel Aviv. The city is often seen as one of the major start-up hubs outside the US, mainly due to its open culture, the strong talent pool and the fact that almost everyone speaks English. In contrast, several countries are the location of only one start-up in the sample. For example, ES Media, a provider of an online news platform is the only start-up from Egypt. Furthermore, Mainland China and Hong Kong are underrepresented with only one start-up each. Although start-ups come from different parts of the world, there is a clear tendency with regards to the industry they operate in:

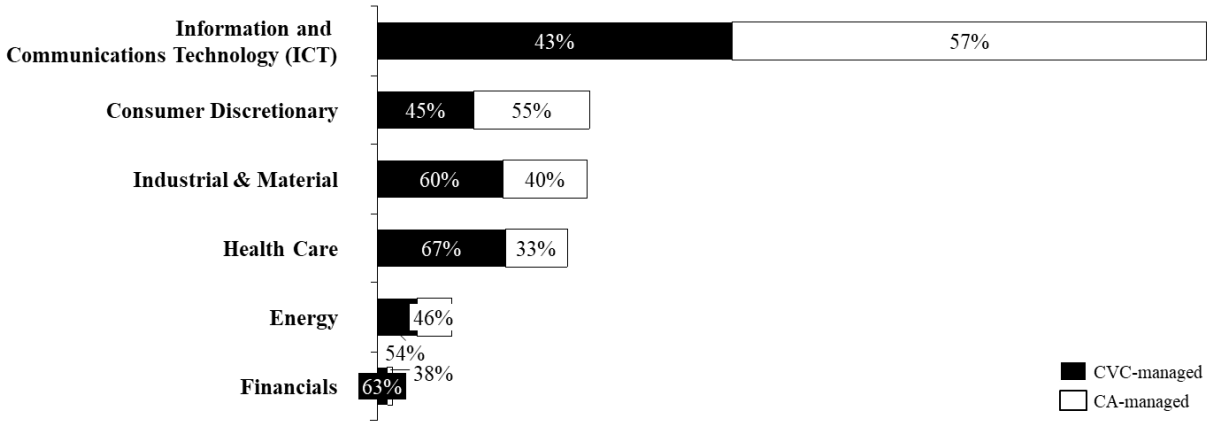

Figure 12: Industry split of start-ups by CV type (author's dataset)

More than half of all start-ups are active in the Information and Communications Technology (ICT) industry. This finding can be traced to the fact that all corporations, independently of their own industry, follow the trend of digitization. Especially with regards to state-of-the art innovation, ICT capabilities, e.g. big-data analytics, are required. The ICT start-ups range from Bio Check Technologies, a cloud-based food distribution software for retailers, over Easycheck, a platform for comparing energy costs of electric devices, to Watt Works, a grid optimization software or JustPark, a provider of car parking applications. No big differences between CVCs and CAs seem to exist with regards to the industries of start-ups under managements. The low share of Energy and Financials start-ups can be explained by the low number of respective CV units under consideration.

The following Table 3 provides insights on the size, financials and social media activities of start-ups and reports the minimum, maximum and the averages of the respective indicators:

Table 3: Summary statistics on selected start-up variables by type (author's dataset)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Employees	**579**	**170.7**	**2,137.6**	**1**	**50,000**
Employees (CVC-managed)	332	288.3	2,818.8	2	50,000
Employees (CA-managed)	247	12.6	25.1	1	290
Revenue	**90**	**42.5**	**139.7**	**0.01**	**1,047.1**
Revenue (CVC-managed)	74	51.6	152.8	0.01	1,047.1
Revenue (CA-managed)	16	0.6	0.6	0.01	1.84
Total raised	**603**	**29.5**	**99.9**	**0.01**	**1,008.0**
Total raised (CVC-managed)	325	52.8	131.6	0.02	1,008.0
Total raised (CA-managed)	278	2.3	8.4	0.01	70.18
Facebook likes[8]	**538**	**10,741.7**	**88,504.0**	**1**	**1,708,117**
Facebook likes (CVC-managed)	260	21,939.8	126,477.0	1	1,708,117
Facebook likes (CA-managed)	278	268.7	685.2	1	10,298
Twitter followers[9]	**597**	**5,121.4**	**90,002.2**	**1**	**2,193,656**
Twitter followers (CVC-managed)	294	10,155.9	128,167.3	1	2,193,656
Twitter followers (CA-managed)	303	236.5	528.7	1	7,729

On average, CVC-backed start-ups have 288 employees, whereas CA-backed start-ups only have 13. The extreme outlier with 50,000 employees (the next smaller start-up only has 9,100 employees) is the Merck Venture-backed Alcan Systems, a provider of smart antenna technology. The largest CA-backed start-up is N26, a well-known mobile banking provider

[8] Excluding start-ups without Facebook presence
[9] Excluding start-ups without Twitter presence

backed by the Axel Springer Plug and Play Accelerator. For revenue hardly any information is available, as many start-ups either fail to generate any or do not report the revenue they make. Nonetheless, CVC-backed start-ups are larger in size, thus are more likely to generate and report revenues than CA-backed start-ups. One key financial indicator of start-up success is the total money the start-up raised in various financing rounds. First, CVC-managed start-ups raise, as expected, more money than CA-managed start-ups. Secondly, the average amount raised is surprisingly similar to the average revenue. However, one cannot derive a 1x revenue valuation multiple from that. First, the number of observations for revenue is too small. Second and more important, the total raised does not refer to a 100% equity stake, but lower shares. Therefore, the revenue multiple of the start-ups is clearly higher than 1x. In fact, a back-of-the-envelope calculation of revenue multiples based on the last financing information available leads to multiples of around 4x-5x for CVC-managed start-ups and 7x for CA-backed enterprises. Lastly, a short glance on the start-ups' social media activities, if any, is presented. CVC-managed start-ups have both more Facebook likes and more Twitter followers than CA-managed ventures. Interestingly, CVC-managed start-ups have more than 80 times as many Facebook likes than CA-managed start-ups in average, whereas they only have around 40 times as many Twitter followers.

3.3. Corporations

In the sample, a total of 29 different corporations operate CV units in Germany. Almost half of the corporations are active in the Consumer Discretionary industry. Nonetheless, the data also covers industries like Industrial & Material (17%), Health Care (14%), Energy (10%), ICT (7%) and Financials (3%). One corporation, namely Siemens, is active in multiple industries in parallel. The corporations differ widely in age. Some of the oldest companies, like Siemens, Deutsche Bahn (more precisely its predecessor organization) and DuMont Schaumberg were founded in the first half of the 19th century. Younger corporations include E.ON, Evonik or

Innogy. The majority of corporations has their headquarters in Germany, only Merck (US) and Airbus (France) are exceptions. As expected there is some local concentration around cities like Munich, Stuttgart, Berlin, Cologne or Essen. Moreover, some companies are located in smaller cities due to their heritage, like BASF in Ludwigshafen or Klingel in Pforzheim. As corporate venturing is a costly endeavor, most of the corporations are of larger size. For example, Siemens, Robert Bosch and Deutsche Bahn are the largest companies, having generated revenues above 300bn€ in 2017. Nonetheless, smaller players are also included, e.g. the Drillisch AG with revenues only slightly above 3bn€ and almost 3,000 employees. For the number of employees, the car manufacturer Daimler and BMW are on top of the list. Corporate venturing is an avenue for corporate innovation. As expected, the corporations with the highest R&D spend all operate in the Health Care industry. Boehringer Ingelheim (17%), Merck (14%) and Bayer (13%) all spend more than 10% of their annual revenue on R&D. However, the dataset shows that it is not limited to research and development (R&D) heavy corporations. For example, the energy provider E.ON and EnBW hardly spend anything on R&D but still operate CV units.

4. Discussion and limitations

4.1. Corporate venturing in Germany

Recently, the topic of corporate venturing experienced a rise in interest from both scholars and practitioners. Especially the new topic of accelerators has only been discussed for a few years (see e.g. Cohen, 2013; Cohen & Hochberg, 2014; Dempwolf et al., 2014; Kohler, 2016). Although CVCs are a more established form of corporate venturing, a large array of studies has been published since the early 2000s (see Röhm, 2018 for a review of the recent CVC literature). Across industries, firms have launched accelerator programs or invested in corporate venture capital funds. This trend is strongly driven by the raise in start-up creations and fast-paced changes induced by digitization. For example, Alliance Ventures, the joint 1bn$ CVC of

Renault, Nissan and Mitsubishi was only established in beginning of 2018. Moreover, nowadays well-established companies like Airbnb or Dropbox were once supported by accelerators[10]. In line with previous research and current trends, this study sheds further light on different corporate venturing forms. Moreover, this work focuses on the German corporate venturing market, compared to many US focused publications (J. S. Harrison & Fitza, 2014). This skewedness is due to the fact that the US is seen as the leading venturing market (Christofidis & Debande, 2001) and that the European market is covered poorly in the major databases (Colombo & Murtinu, 2017). By bringing in a German perspective, this paper contributes to the development of more generalizable findings and conclusions. Looking at the characteristics and specifics of corporate venturing units, this study extends prior research by offering a new set of variables. As this paper also discusses how corporations should design their CAs regarding autonomy, internal and external relations, as well as network considerations, the CA study of Kohler (2016) is extended through looking at more than only CA objectives. Moreover, this study offers new insights on the role the management of venturing vehicles plays and the educational background and prior experience that proves beneficial. Another advantage of this study is the multi-level data structure, as recommended by Colombo, Rossi-Lanastra and Wright (2018). The dataset includes information on three levels, namely the corporate mother, the corporate venturing vehicle and the start-ups under management. Additionally, the study helps scholars and practitioners to get a better understanding of the corporate venturing market in Germany. Corporate executives can learn about the structure, organization and staffing of other CVCs and CAs and draw their conclusions for their own units. Start-up founders obtain a clear picture of the start-up support system offered by corporates, which will help them in identifying suitable corporate partners. From a scholarly perspective, this study analyzes multiple research problems as both CVCs and

[10] In the case of Airbnb and Dropbox specifically Y Combinator, the oldest and one of the most prestigious independent accelerators globally

CAs are considered separately in more detail. For example, characteristics of the CV management team are discussed thereby providing insights on the dependency of firms on key personnel and developing recommendations for practitioners on the hiring process. Summing up, this study complements prior research in multiple directions, including regional focus on Germany, comparison of different corporate venturing forms and discussion of all three layers involved in corporate venturing, namely corporate venturing units, start-ups and corporations.

4.2. Limitations and directions for future research

While this study offers unique insights on corporate venturing units in Germany, it comes with limitations. Although the country focus helps to mitigate the effect of differences in legal or tax regimes, culture or specifics of the economy, like a large share of small- and medium-sized companies, it also restricts the possibility to compare derived findings across countries. Therefore, the generalizability of findings derived from this dataset to other countries is limited. The novel hand-collected multi-level dataset is based on various public sources and start-up specific databases. Although this serves as a strong foundation for meticulous analytical research, further insights on corporate venturing could be drawn from a combination of quantitative and qualitative research. For example, one could enhance the data by performing surveys and interviews with experts from both the corporate and the start-up world. Such an approach could unveil insights regarding non-published information, e.g. the pay and incentive structure of CV leads or the veridical corporate objectives for engaging in corporate venturing activities. This dataset is limited to corporate venturing units, their start-ups under management as well as their parent corporation. In line with existing literature on venture capital, a differentiation of corporate venturing, i.e. CVCs and CAs, with venturing done by non-corporate players, e.g. independent VC funds or stand-alone accelerators, would enable to identify the advantages and drawbacks corporate venturing has in comparison to other players in the start-up support ecosystem. Moreover, start-ups that do not enjoy the merits of corporate

support could be used as control group to highlight differences. In the author's opinion, the most unfortunate limitation comes from not having time-series data. This limitation is heavily driven by the newness of especially CAs, limiting the available data to few years only. Therefore, the long-term evolvement of corporate venturing on both the corporate and the start-up side cannot be determined yet.

Despite the first insights gained, this paper and the underlying dataset are a door opener for future research. First, deep-dives on both types individually will help to answer questions such as whether accelerators really accelerate start-ups and whether corporates perform venturing for altruistic motives or their own advantage. Moreover, the collected dataset can be used to differentiate CVCs and CAs more specifically. Resulting from their different objectives, one can hypothesize that different structures, personnel and network characteristics are required for a superior performance. Secondly, well-established theories in management science can be reviewed analytically for a specific area. Foremost, topics of corporate governance should be reviewed and the impact of varying degrees of autonomy or integration of both the CV unit towards the corporation and the start-up towards the CV unit shall be explored. Thereby, researchers can give hints on whether performance differences exist between an internal and external orientation of the venturing unit, and if so, which outperforms the other. Furthermore, practitioners benefit if scholars find out whether generalist programs outperform specialist corporate venturing programs or vice versa. Third, and in accordance with Colombo, Rossi-Lanastra and Wright (2018), this study urges scholars to take a multi-level lifecycle approach and differentiate especially CAs from adjacent players like business angels or VCs. Future research should examine whether CAs serve as pre-selection tool for CVCs, how the two different firms collaborate or compete within one corporation and whether different forms of corporate venturing will successfully co-exist in the long-run. Scholars ought to detect, whether

corporations first use CAs as a broad funnel to screen multiple start-ups in their batches and then later invest in the most promising cases through their CVCs.

5. Conclusion

To conclude, this paper provides unique insights on German corporate venturing units. Descriptive statistics give a first impression on the corporations involved in corporate venturing, the set-up, organization and teaming of CV units and characteristics of start-ups under management. In line with theory and expectations, there appear to be differences between CVCs and CAs with regards to both the organizational structure and set-up as well as their start-ups under management. These differences are observable in the majority of analyzed variables. CVCs tend to have more established, i.e. older and larger, start-ups under management. In line with the heterogeneity of start-ups, the personnel of the venturing units differs accordingly. Whereas CVCs tend to offer more law and MINT knowledge, CA-personnel is more experienced in founding a start-up themselves. The surprising finding that CAs have a larger social network, e.g. more Twitter and LinkedIn followers as well as more Facebook likes, helps to explain the broader orientation of CAs. This paper is a mere starting point for a series of research topics evolving around corporate venturing. CVCs and CAs need to be compared regarding their set-up, start-ups under management as well as performance for both the corporate and the start-up. As already several studies regarding CVC performance are available, these mainly US-focused findings can be challenged with German data. Additionally, this paper is a starting point to go further and analyze sub-topics of interest, e.g. the impact of a vehicle lead's characteristics on the success of the corporate venturing vehicle.

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Appendix

Appendix 1: Overview of CV units (author's dataset)

Name	Type	Location	Establishment	Industry	Employees	Start-ups under management
Agile Accelerator	CA	Berlin	2013	Energy	10	62
Airbus BizLab	CA	Hamburg	2016	Industrial & Material	.	10
Audi Electronics Venture	CVC	Ingolstadt	2001	Consumer Discretionary	131	7
Axel Springer Digital Ventures	CVC	Berlin	2014	Multiple	.	8
Axel Springer Plug and Play Accelerator	CA	Berlin	2013	Multiple	51	75
BASF Venture Capital	CVC	Ludwigshafen	2001	Industrial & Material	14	23
Beyond1435	CA	Berlin	2017	Industrial & Material	14	3
BMW i Ventures	CVC	München	2011	Multiple	14	28
Boehringer Ingelheim Venture Fund	CVC	Mainz	2010	Health Care	8	20
CommerzVentures	CVC	Frankfurt am Main	2014	Multiple	6	11
Deutsche Telekom Capital Partners	CVC	Hamburg	2014	Information and Communications Technology (ICT)	31	87
Dieter von Holtzbrinck Ventures	CVC	München	2000	Consumer Discretionary	21	16
DuMont Venture Holding	CVC	Köln/Bonn	2007	Consumer Discretionary	3	10
E.ON Strategic Co-Investments	CVC	Düsseldorf	2013	Energy	8	12
EnBW New Ventures	CVC	Karlsruhe	2015	Energy	6	4
Evonik Venture Capital	CVC	Frankfurt am Main	2012	Industrial & Material	12	10
Fresenius Medical Care Ventures	CVC	Frankfurt am Main	2015	Health Care	.	1
Grants4Apps	CA	Berlin	2014	Health Care	.	32
Henkel Ventures	CVC	Düsseldorf	2017	Multiple	4	4
Hubraum	CA	Berlin	2012	Multiple	15	74
Innogy Innovation Hub	CA	Essen	2015	Multiple	62	4
K – Invest	CVC	Berlin	2009	Consumer Discretionary	5	13
Main Incubator	CA	Frankfurt am Main	2014	Financials	14	14
Merck Accelerator	CA	Darmstadt	2015	Health Care	.	23
Merck Ventures	CVC	Darmstadt	2009	Health Care	29	29
Mobile Ventures (Frankfurt)	CVC	Frankfurt am Main	2013	Information and Communications Technology (ICT)	4	2
Next Media Accelerator	CA	Hamburg	2015	Consumer Discretionary	24	16
Next47	CVC	München	2016	Multiple	100	58
ProSiebenSat.1 Accelerator	CA	München	2013	Consumer Discretionary	5	31
Retailtech Hub	CA	München	2017	Consumer Discretionary	11	8
Robert Bosch Venture Capital	CVC	Stuttgart	2007	Multiple	8	30
Seven Ventures	CVC	München	2009	Multiple	39	19
Siemens Technology Accelerator	CA	München	2001	Information and Communications Technology (ICT)	9	5
Startup Autobahn	CA	Stuttgart	2016	Information and Communications Technology (ICT)	42	40
Techstars METRO Accelerator	CA	Berlin	2015	Consumer Discretionary	19	9
Vogel Ventures	CVC	Berlin	2013	Multiple	.	10