

Essays on Entrepreneurial Finance

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“The best way to predict the future is to create it“

(Peter Drucker)

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INTRODUCTION

Early-stage start-ups face high uncertainty and risk of failure (Cantamessa et al., 2018), making access to traditional financing mechanisms, such as bank loans, particularly challenging (Colombo & Grilli, 2007; Ueda, 2004). Entrepreneurial finance investors fill this gap by providing capital and value-added services tailored to the unique needs and profiles of new ventures. These investors supply high-risk start-ups with critical resources needed to convert innovative ideas into marketable products and services. Beyond funding, they deliver mentorship and access to their networks, increasing the likelihood of success for the new ventures (Bottazzi et al., 2008; Sapienza, 1992). At the same time, funding start-ups is attractive for entrepreneurial finance investors, as they anticipate substantial returns on their investment (Zider, 1998). By supporting and stimulating entrepreneurial activity, start-up investors play an essential role in driving macroeconomic indicators such as economic growth, innovation, and job creation (Samila & Sorenson, 2011).

Over the past few decades, the entrepreneurial finance landscape has undergone substantial transformation. Various types of start-up funding, such as corporate venture capital, governmental venture capital, crowdfunding platforms, and accelerators, have emerged alongside more traditional forms like independent venture capital and angel investing (Drover et al., 2017). Figure 1 provides an overview of the different sources of entrepreneurial equity financing. These developments have not only expanded the range of funding sources but have also made the entrepreneurial finance industry increasingly dynamic, with the rise of new phenomena such as venture capitalist-business angel syndicates or initial coin offerings (Block et al., 2019; Howell et al., 2020). This growing complexity underscores the importance of gaining a deeper understanding of the entrepreneurial finance ecosystem and its underlying mechanisms.

Insert Figure 1 here.

As suggested by the title, *Essays on Entrepreneurial Finance*, this cumulative dissertation aims to explore the multifaceted nature of start-up financing. The dissertation is organized into three core studies, which are presented in Chapters 2 to 4. The papers are structured in a journal-style format, including an abstract, research motivation and objectives, theoretical framework, methodology, results, and a discussion. Each article represents a separate research project and examines a specific type of entrepreneurial finance investor, advancing ongoing debates and offering new insights into the research field. While Study 1 provides a comprehensive overview of venture capital research, Study 2 focuses on start-up financing by established firms, also known as corporate venture capital. Finally, the personal values of business angel investors and (independent) venture capitalists are compared in Study 3. In academic research, the three investor types discussed in this dissertation are regarded as the primary sources of entrepreneurial finance (Drover et al., 2017), with Figure 1 depicting these forms of start-up funding in blue, while other sources of entrepreneurial equity financing are shown in gray. Chapter 5 concludes by synthesizing the main findings of the studies, highlighting theoretical contributions and implications, addressing their inherent limitations, and offering suggestions for future research.

The initial paper (**Study 1**) visually maps the intellectual structure of venture capital research through an in-depth co-citation analysis. The growth of venture capital investments in recent decades has been accompanied by a substantial rise in academic publications on venture capital (Nguyen et al., 2021), making the research field increasingly complex. This fragmentation highlights the need to advance our understanding of this dynamic field of research by uncovering, analyzing, and classifying its dominant research areas. Accordingly, Study 1 concerns the following research questions: *What is the intellectual structure of venture*

capital research? What are the predominant research clusters, and how has this research field evolved? By conducting a co-citation analysis with a sample of 1,410 papers, this exploratory bibliometric study identifies three broad research areas (venture capital life cycle, interfirm relationships and knowledge exchange as well as economic and policy perspectives) that also reveal the development of the research field. These three overarching research areas consist of 13 thematic clusters. For each cluster, a comprehensive description is provided, exploring its content, evolution, theoretical background, and interrelationships with other clusters. Furthermore, the study establishes the category of connecting and methodology papers, as some studies cannot be assigned to a specific cluster, but instead integrate ("connect") research topics from at least two different fields of research. Thus, this paper highlights the most important articles within venture capital research, shows how research fields interact with each other, and finally identifies promising avenues for future research.

The second essay (**Study 2**) delves into the largest thematic cluster identified in Study 1, exploring the role of corporate venture capital (CVC) in driving the investing firms' strategic change. In today's dynamic business environment, strategic change is essential for firms aiming to sustain a competitive advantage, secure long-term survival, and achieve superior performance (Müller & Kunisch, 2018). This paper examines CVC through the lens of strategic management to assess its effectiveness as a tool for facilitating the strategic change of established companies. Therefore, Study 2 sheds light on the relationship between CVC and strategic change by addressing the following research question: *What is the impact of CVC activity on the parent firm's product portfolio and geographic change?* Consistent with the principles of interorganizational learning theory (Lane & Lubatkin, 1998), CVC is proposed as a learning mechanism that enables incumbent firms to access new technologies and markets. This quantitative study provides empirical evidence demonstrating that CVC investments stimulate both product portfolio and geographic change, which represent key dimensions of strategic change. The analysis relies on a dataset of 1,458 CVC units and 6,751 transactions.

Furthermore, the study emphasizes that the CVC-induced positive change effects diminish with increasing industry and cultural distance, as higher investment uncertainty and risk arise from identifying heterogeneous knowledge. Accordingly, this paper enhances the understanding of CVC-driven interorganizational learning processes and their influence on strategic change.

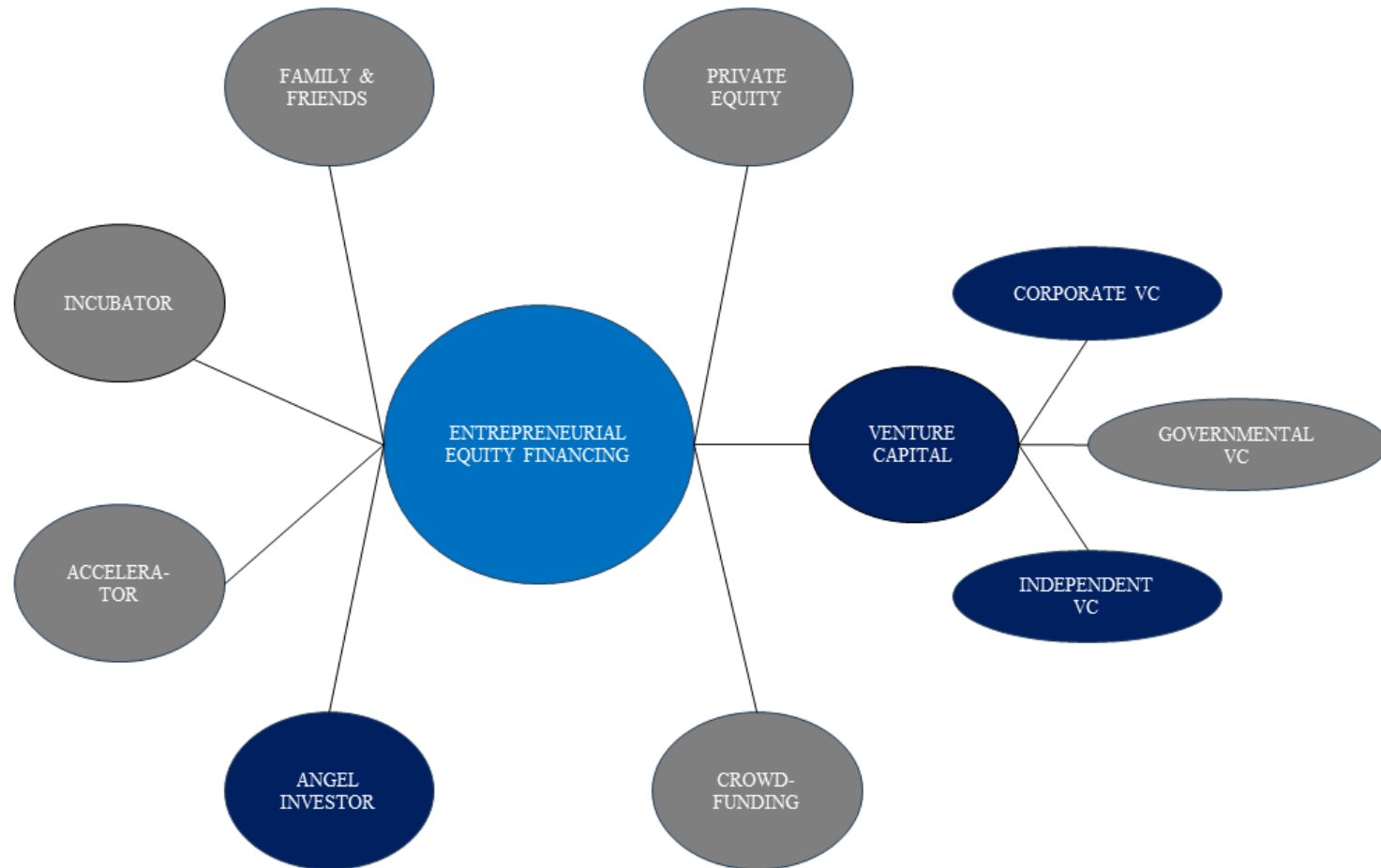
The third study (**Study 3**) addresses a "white spot" in the co-citation map of our first study, as it examines the psychological attributes of entrepreneurial finance investors. While existing research has explored the observable characteristics and differences between business angels (BAs) and venture capitalists (VCs), their psychological dimensions have largely been neglected (Mittens et al., 2012; Morrissette, 2007). That is why the following research question is investigated: *What personal values do VCs and BAs hold, and how do they differ?* Study 3 conducts an empirical analysis of the language used by BAs and VCs on Twitter, providing valuable insights into their psychological profiles. The purpose of this paper is to explore the dominant personal values of both investor types and to identify differences between them, using Schwartz's (1992) value framework. Employing the language-based assessment tool LIWC, the study analyzes and compares the tweets of 500 BAs with those of 478 VCs. The results indicate a substantial degree of commonality between BAs and VCs, with both investor groups showing comparable scores across five value dimensions. However, the study also reveals significant value disparities, with VCs placing more emphasis on the overarching dimension of self-enhancement, scoring higher in power and achievement-orientation values compared to BAs. Regarding the second overarching value dimension, openness to change vs. conservation, the analysis yields unexpected results. While VCs' focus on the value of security aligns with their investment objectives, it was not anticipated that VCs would score higher than BAs on the opposite value of stimulation. Overall, the results suggest that VCs are generally more conservative, risk-averse, and return-oriented, whereas BAs value their autonomy and take on a mentoring role for the start-up team.

Table 1 presents a detailed overview of the three studies, outlining key aspects, such as title, authors, objectives, samples, theoretical frameworks, methods, main findings, conference presentations, and the status of the papers. This cumulative dissertation contributes to the ongoing academic discourse on the nature and impact of the entrepreneurial finance landscape. The essays primarily explore three different forms of entrepreneurial finance, namely (independent) venture capital, angel investments, and corporate venture capital, with both exploratory (Studies 1 and 3) and confirmatory (Study 2) research approaches being employed. Overall, this dissertation advances research on entrepreneurial finance, as it offers a comprehensive and multifaceted overview of start-up financing. In addition to structuring venture capital research through the co-citation analysis in Study 1, the subsequent papers draw on a variety of theoretical frameworks, including interorganizational learning theory and personal values theory, along with a range of methodologies such as regression analysis or text mining. These studies also provide valuable insights for both scholars and practitioners seeking to enhance their understanding of the entrepreneurial finance landscape.

Insert Table 1 here.

FIGURE 1

Forms of entrepreneurial equity financing.



Note. The investor types discussed in this dissertation are highlighted in dark blue. The order of the different forms reflects the typical sequence of start-up financing (counterclockwise), usually beginning with support from family and friends until private equity firms show interest in mature start-ups. Source: the author's own illustration, based on Drover et al. (2017).

TABLE 1

A comprehensive overview of the dissertation

	Study 1	Study 2	Study 3
Title	UNDERSTANDING VENTURE CAPITAL RESEARCH: AN IN-DEPTH-CLUSTER ANALYSIS	CORPORATE VENTURE CAPITAL AS DRIVER OF STRATEGIC CHANGE? AN INTERORGANIZATIONAL LEARNING PERSPECTIVE	EXPLORING THE PERSONAL VALUES OF ENTREPRENEURIAL FINANCE INVESTORS: A TWITTER ANALYSIS
Authors	Christian Schmidt & Prof. Dr. Andreas Bausch	Christian Schmidt, Dr. Christian Kaiser & Prof. Dr. Andreas Bausch	Christian Schmidt & Dr. Erica Engel
Research Objectives	Investigate and visually structure the existing state of venture capital research. Identify research clusters, their evolution, and the interdependencies with other fields of research.	Examine the influence of CVC on geographic and product portfolio strategic change and consider distance measures as moderators. Explore whether CVC serves as an efficient mechanism for interorganizational learning.	Analyze the personal value disparities between business angels (BAs) and venture capitalists (VCs).
Research Questions	What is the intellectual structure of venture capital research? What are the predominant research clusters, and how has this research field evolved?	What is the impact of CVC activity on the parent firm's product portfolio and geographic change?	What personal values do VCs and BAs hold, and how do they differ?
Sample	1,410 publications with 34,478 references	6,751 transactions by 1,458 CVC units	500 BAs & 478 VCs
Theory	-	Organizational learning theory	Personal values theory
Method	Co-citation analysis	Ordinary least square regression	Text mining
Main findings	Venture capital research can be categorized into three broad research areas, consisting of 13 thematic clusters. Connecting and methodology papers have been identified to highlight the interdisciplinary approach of the studies.	CVC activity is positively associated with geographic and product portfolio change. Geographic and industry distance are negatively moderating the relationship. CVC can be used as a learning mechanism, fostering strategic change.	VCs score higher on the values of power, achievement orientation, stimulation, and security. However, both investor groups also exhibit comparable scores in five value dimensions, underscoring a substantial degree of commonality between them.
Conferences	26 th G-Forum 2023, Darmstadt	5 th BFGA 2023, Giessen 7 th ENTFIN 2024, Munich	26 th G-Forum 2023, Darmstadt 44 th BCERC 2024, Munich
Status	Submitted to <i>Venture Capital</i> , Under Review	Published in <i>International Journal of Business Science & Applied Management</i>	Submitted to <i>Science, Technology, & Human Values</i> , Under Review

REFERENCES

- Block, J. H., Fisch, C. O., Obschonka, M., & Sandner, P. G. (2019). A personality perspective on business angel syndication. *Journal of Banking & Finance*, *100*, 306–327.
- Bottazzi, L., Da Rin, M., & Hellmann, T. (2008). Who are the active investors? Evidence from venture capital. *Journal of Financial Economics*, *89*(3), 488–512.
- Cantamessa, M., Gatteschi, V., Perboli, G., & Rosano, M. (2018). Startups' roads to failure. *Sustainability*, *10*(7), 1–19.
- Colombo, M. G., & Grilli, L. (2007). Funding gaps? Access to bank loans by high-tech start-ups. *Small Business Economics*, *29*(1-2), 25–46.
- Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. *Journal of Management*, *43*(6), 1820–1853.
- Howell, S. T., Niessner, M., & Yermack, D. (2020). Initial coin offerings: Financing growth with cryptocurrency token sales. *The Review of Financial Studies*, *33*(9), 3925–3974.
- Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, *19*(5), 461–477.
- Mitteness, C., Sudek, R., & Cardon, M. S. (2012). Angel investor characteristics that determine whether perceived passion leads to higher evaluations of funding potential. *Journal of Business Venturing*, *27*(5), 592–606.
- Morrisette, S. G. (2007). A profile of angel investors. *The Journal of Private Equity*, *10*(3), 52–66.
- Müller, J., & Kunisch, S. (2018). Central perspectives and debates in strategic change research. *International Journal of Management Reviews*, *20*(2), 457–482.

- Nguyen, M.-H., Pham, T.-H., Ho, M.-T., Nguyen, H. T. T., & Vuong, Q.-H. (2021). On the social and conceptual structure of the 50-year research landscape in entrepreneurial finance. *SN Business & Economics*, *1*, 1–29.
- Samila, S., & Sorenson, O. (2011). Venture capital, entrepreneurship, and economic growth. *The Review of Economics and Statistics*, *93*(1), 338–349.
- Sapienza, H. J. (1992). When do venture capitalists add value? *Journal of Business Venturing*, *7*(1), 9–27.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 Countries. In *Advances in Experimental Social Psychology* (pp. 1–65). Elsevier.
- Ueda, M. (2004). Banks versus venture capital: Project evaluation, screening, and expropriation. *The Journal of Finance*, *59*(2), 601–621.
- Zider, B. (1998). How venture capital works. *Harvard Business Review*, *76*(6), 131–139.

STUDY 1:
UNDERSTANDING VENTURE CAPITAL RESEARCH: AN IN-DEPTH-CLUSTER
ANALYSIS

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ABSTRACT

This exploratory bibliometric study reviews and classifies the existing state of venture capital research. By conducting a co-citation analysis with a sample of 1,410 papers, we complement existing qualitative and quantitative studies while visually uncovering the intellectual structure of venture capital research. We identify three broad research areas (venture capital life cycle, interfirm relationships and knowledge exchange as well as economic and policy perspectives) that also reveal the evolution of the research field. These research areas are composed of 13 thematic clusters. In addition, we introduce the idea of connecting and methodology papers: we explore thematic linkages between the respective clusters as these connecting papers bring together research topics from at least two different fields of research. We highlight the most important articles, show how clusters interact with each other and finally identify potential future research directions.

Keywords: Venture capital, co-citation-analysis, entrepreneurial finance, scientific visualization, start-up financing, bibliometric analysis

INTRODUCTION

Despite start-ups significantly contributing to economic growth and innovation (Acs & Mueller, 2008; Jáki & Molnár, 2021; Kortum & Lerner, 2000), new ventures often face a lack of financial resources (Grilli et al., 2018). Therefore, start-ups seek funding from angel investors, crowdfunding or venture capitalists (VCs), representing the key players of entrepreneurial finance (Bessière et al., 2020). For most early-stage firms, venture capital is the preferred form of financing (Drover et al., 2017), as start-ups benefit not only from the funding itself, but also from the VC's expertise and networks (Hochberg et al., 2007). In recent years, both the amount of venture capital investment and the number of published research articles have increased sharply (see Table 1). However, although the first venture capital firm was founded as early as 1946, this funding source did not get much attention until the 1980s (Gompers et al., 1998). Over the past 40 years, venture capital investment has grown to \$739 billion by 2021 (National Venture Capital Association, 2023). The U.S. is clearly the leading nation in terms of venture capital investment (Grilli et al., 2018), but venture capital has also gained substantial traction in Asia and Europe over the past decade (LiPuma & Park, 2014). Although only few start-ups receive venture capital funding (Puri & Zarutskie, 2012), these are often the ventures with the highest growth rates and value. Accordingly, multinational firms such as Google, Starbucks, Airbnb or Uber have been venture capital-backed (Devigne et al., 2018; Gornall & Strebulaev, 2020).

VCs are financial intermediaries providing money (and other value-added services) to new ventures (Cornelius & Persson, 2006; Tykvová, 2018). VCs, respectively the general partners, collect money from both private and institutional investors (Sahlman, 1990), also called limited partners (Grilli et al., 2018). Afterwards, VCs invest in start-ups with high potential that at the same time face a significant risk of failure (Sahlman, 1990). Usually, VCs seek to generate returns over a period of up to 10 years (Drover et al., 2017; Gompers & Lerner, 2000). The demand for venture capital by start-ups is especially strong, as venture capital-

backing leads to higher levels of professionalization (Hellmann & Puri, 2002). Moreover, VCs provide start-ups with mentoring, expertise, and access to their network (Gompers, 1995; Grilli et al., 2018; Hochberg et al., 2007; Hsu, 2006). In most cases, VCs push start-ups to go public in order to achieve a high return on investment. After a successful exit, VCs look for new, promising ventures to invest in and the "venture cycle" starts all over again (Gompers & Lerner, 2001).

Due to the growing economic importance and a multitude of venture capital-backed "success stories", the volume of venture capital-related publications and citations has grown substantially over the past 20 years, as shown in Table 1. More specifically, the rise in venture capital publications is considerably higher compared to papers on similar forms of financing (1,260 publications in the last 20 years), such as private equity (618 publications) or angel investments (169 publications). Publishing journals are typically rooted in the fields of entrepreneurship, finance, or management research. The increasing number of papers makes it difficult to assign the term "venture capital" to a specific discipline (Cornelius & Persson, 2006), and to understand the state of theoretical and empirical knowledge in the field of venture capital research. Our approach of quantitatively reviewing and visually presenting the current state of literature on venture capital will help to further structure this research domain.

Insert Table 1 here.

In addition to literature reviews and meta-analyses, bibliometric analysis is currently establishing itself as a third method for examining existing literature (Zupic & Čater, 2015). Although some bibliometric analyses on venture capital have been published in recent years, these studies have only descriptively analyzed the most influential authors and journals (Cancino et al., 2018; Padilla-Ospina et al., 2018). However, these papers do not address how venture capital research is structured thematically. While Cumming et al. (2022) give an

overview of authors, collaboration patterns and research topics in both venture capital and private equity, we provide an in-depth-cluster analysis on venture capital research. Accordingly, our primary research goal is to deliver a detailed description of each cluster by examining its content, evolution, theoretical foundations, and interrelationships with other clusters. That is why our overarching research questions are: *What is the intellectual structure of venture capital research? What are the predominant research clusters, and how has this research field evolved?*

Therefore, our exploratory study contributes to the existing literature on entrepreneurial finance. First, we complement qualitative and quantitative studies by offering new perspectives on the characteristics of venture capital literature. We visually structure the heterogeneous and fragmented field of research by conducting a co-citation analysis. Our study reviews, classifies, and presents the current state of venture capital research. As a result, we identify three major research areas consisting of 13 thematic clusters. We obtain a holistic understanding of the intellectual structure of venture capital research as we also relate the clusters to their respective theoretical background. Second, we provide a detailed overview of the most influential articles, identify predominant thematic research areas, track their evolution, and derive links between authors, articles, or clusters. At the cluster level, we demonstrate how distinct research paths have evolved around the core concepts of the three research areas. Furthermore, as a novel approach to bibliometric analysis, we introduce the so-called connecting papers that bring together research topics from at least two distinct clusters. The inclusion of this additional category allows us to more accurately assess the relevance and size of each cluster, while also highlighting seminal papers that integrate core concepts from two different research fields. Third, our study stimulates future venture capital research by providing scholars with a systematic understanding of the intellectual landscape and its research frontiers. Hence, to advance the literature on entrepreneurial finance, we highlight future research directions by

analyzing the content of the research areas and, in particular, the interdependencies between the clusters.

METHODOLOGY

Database and Data Collection

In accordance with existing research (Donthu et al., 2021; Reverte & Badillo, 2019), we used the reputable database *Web of Science* to draw the sample for our bibliometric study. In analogy to similar studies, we used the following approach to receive our final sample of studies. First, only studies containing the keywords "venture capital*" and "VC" in their title were included. The sample was not limited in time in order to provide a comprehensive overview of the research field and to show its evolution (Casprini et al., 2020; Lampe et al., 2020). Second, further restrictions were made by selecting English-language publications (Ferasso et al., 2020; Shashi et al., 2021) from the Web of Science research area "Business Economics" (Castillo-Vergara et al., 2018; van Oorschot et al., 2018). Without narrowing, we would have had to include many studies from other disciplines, which would then no longer correspond to a paper from business sciences. In terms of document type, we only considered articles, proceeding papers, reviews and early access papers in order to analyze a uniform database and its citation network (Castillo-Vergara et al., 2018; Shashi et al., 2021). Third, we did a manual review and checked for duplicates. Finally, the names of both authors and journals were standardized to one spelling. In the end, we selected 1,410 articles from 319 journals, containing 34,487 references. The initial search was first conducted in the second week of April 2022 and updated in January 2024.

Bibliometric Analysis

In bibliometrics, a distinction is made between performance analysis and science mapping. The former provides a descriptive overview of a research field, for example, by analyzing publication numbers per author or institution (Noyons et al., 1999). We also begin

with a brief descriptive analysis, primarily using the R-based software tool Bibliometrix (Aria & Cuccurullo, 2017), to identify the main protagonists in venture capital research. However, the focus of the underlying paper is on science mapping as it examines the intellectual structure of the research strand. We track the development of research areas and derive interdependencies between articles, authors or journals (Donthu et al., 2021; Ramos-Rodríguez & Ruíz-Navarro, 2004; Zupic & Čater, 2015). Co-citation analysis is a popular form of science mapping as it indicates which studies are cited together by a primary source (Small, 1973). For example, a particular paper (study C) cites both Porter's work (study A) and Ansoff's paper (study B) - since both references are found in the bibliography of study C, it is assumed that there is some thematic connection between studies A and B, thus creating a link between the two articles. The more frequently two studies are found together (co-cited) in the bibliographies of the publications examined, the more likely their content is related and a tie emerges between both articles (Small, 1973; Zupic & Čater, 2015). If one follows this basic idea and applies the methodology to a multitude of studies, the intellectual structure of a research field can be identified (McCain, 1990; Zupic & Čater, 2015). Therefore, the more often two papers are cited together, the more likely it is that they represent seminal studies in a specific field of research (Small, 1973). Accordingly, co-citation analysis serves to identify the central papers and most influential authors, offering insights into the roots of a research field and its subsequent intellectual development.

VOSViewer is a useful application to quantitatively map and visualize a certain research field (van Eck & Waltman, 2010, 2017). As for the clustering mechanism, VOSViewer applies a smart local moving algorithm solving an optimization problem (van Eck & Waltman, 2014). The distance-based visualization algorithm helps to determine the location and proximities of the respective references in the co-citation map. Economists have already conducted several bibliometric analyses with VOSViewer (Anand et al., 2021; Apriliyanti & Alon, 2017; Castillo-Vergara et al., 2018). Based on the results from VOSViewer, we created a co-citation map (cf.

Figure 1) in which we included other relevant information such as cluster sizes or the distribution of publication years.

Since our sample consists of 1,410 studies with more than 34,450 references, the number of cited papers must be limited. Following comparable bibliometric studies (Raghuram et al., 2010; Schildt et al., 2006), we first chose a threshold of 2% of the database (1,410 studies) as a starting point (a minimum of 30 citations per study; leading to 260 co-cited studies) and then tested different levels to also include more recent works. Ultimately, a minimum threshold of ten citations was set to ensure that we both process a manageable number of publications and select only studies that are sufficiently cited (Zupic & Čater, 2015). In particular, we chose this threshold because it provides both detailed and robust results (across various threshold levels). More precisely, the narrowing down yields 958 cited studies with more than 173,000 co-citation links. Compared to other bibliometric studies, our analysis contains a large number of publications, which in turn leads to an extensive overview of the venture capital literature.

DESCRIPTIVE ANALYSIS

Publication Analysis

To establish a comprehensive understanding of the research field, its key protagonists, and interdependencies in the following co-citation analysis, we begin our bibliometric study by descriptively highlighting the major authors, journals, and publications in the field of venture capital research. Douglas Cumming, Mike Wright, and Josh Lerner are among the most active authors of the sample, having published 15 or more papers on venture capital (see Table 2). It is striking that one third of all publications were (co-)published by American institutions (456 studies in total), with Harvard University taking the leading position with 44 publications. Chinese and British institutions follow with 125 and 115 (co-)authorships respectively. Since the sample also includes early access (43 studies) and proceeding papers (45 studies), the increasing importance of venture capital research is emphasized.

Insert Table 2 here.

The *Journal of Business Venturing (JBV)* is clearly the journal with the most publications (125 papers). In fact, it has twice as many publications as the second-placed journal *Small Business Economics* (57 publications). The *Journal of Corporate Finance* and *Entrepreneurship Theory & Practice* follow in the next places (see Table 3). The journals also vary in terms of journal ranking, with some - such as *Academy of Management Journal* or *Journal of Finance* - recognized for their high quality. Consequently, these journals boast high scores on the SCImago Journal Rank (SJR)¹, which comprises the evaluation of more than 5,000 international publishers. Other journals have a lower ranking but as their publication titles suggest, they place a stronger emphasis on entrepreneurial finance research, such as *Venture Capital*. The SJR indicator assesses the prestige of academic journals by taking into account both the volume of citations a journal receives and the prestige of the journals from which these citations originate (IAES, 2024). Thus, higher SJR values indicate greater prestige of the journal, with a value of one representing the average citation potential.

Insert Table 3 here.

Citation Analysis

We provide a brief overview of the general citation structure of the selected sample (see Table 4). Of the 1,410 studies, the vast majority was cited less than 50 times (1,095 studies). As the literature on venture capital has grown rapidly in recent years, many studies are still new and have therefore been cited relatively little. Nevertheless, 22 % of the selected studies were

¹ SCImago, (n.d.). SJR - SCImago Journal & Country Rank (<http://www.scimagojr.com>).

cited more than 50 times. In addition, 45 studies with over 250 citations serve as seminal papers that form the intellectual foundation of venture capital research.

Insert Table 4 here.

Local citations measure the number of citations the author, paper or journal analyzed has received from the studies included in our sample. When compared to the most publishing authors category, some notable differences become apparent (see Table 5). Wright (582 citations) and Cumming (799 citations) still rank in the top 10, but no longer in the top three of most cited authors. Josh Lerner and Paul Gompers are the only two researchers to exceed the 1,000+ citations threshold, with 1,297 and 1,108 citations respectively. Highlighting the leading role of the US in venture capital research, American scholars have more than 35,900 citations in total. This is almost ten times more than the UK and Canada have, which follow in terms of citations, with 4,357 and 3,692 citations respectively.

Insert Table 5 here.

Not surprisingly, finance and entrepreneurship-related journals top the list of most cited journals (see Table 6). Again, the *Journal of Business Venturing* ranks first with 5,529 citations, followed by the *Journal of Finance* (4,519 citations) and the *Journal of Financial Economics* (3,570 citations). Taken together, these three journals account for about one fifth of all citations, indicating their relevance for venture capital research. However, journals that predominantly have a different focus, such as strategy (*Strategic Management Journal*), management (*Academy of Management Journal*; *Administrative Science Quarterly*), innovation (*Research Policy*) or organizational research (*Organization Science*), follow in the next places. Therefore, venture capital research is much broader in scope and can be classified as interdisciplinary (Cherif & Khalid, 2021). The primary research field of each journal was accessed by the

Academic Journal Guide 2024 (AJG)². A closer examination reveals that the ten most cited journals are without exception of the highest reputation, as indicated by the SJR.

Insert Table 6 here.

The importance of the journals mentioned also stems from the fact that the most cited studies were published in them (see Table 7). It shows the number of citations a paper has received from studies contained in the entire Web of Science database. The papers identified represent seminal studies in the field of venture capital research. Analyzing Table 7, many of the known researchers are listed. While Megginson and Weiss (1991), with 1,091 citations, examine the VC's certification role in IPOs, Sahlman (1990), with 1,079 citations, focuses on VC's relationship with both investors and entrepreneurs and how contracting might resolve agency conflicts. In third place is Hellmann and Puri's (2002) study (856 citations) on the impact of venture capital funding on start-ups' professionalization measures. Since the absolute number of citations provides only limited information about the relevance of the respective studies due to different publication years, we also consider the studies with the most citations per year. While Hochberg et al. (2007) examine the impact of venture capital firms' networks on fund performance, Kaplan and Strömberg (2003) analyze the contracting design.

Insert Table 7 here.

²Chartered Association of Business Schools, (2024). AJG – Academic Journal Guide (<https://charteredabs.org/academic-journal-guide/academic-journal-guide-2024>).

CO-CITATION ANALYSIS

In the following subsection, a co-citation analysis is applied in order to uncover the interdependencies between the publications. In terms of methodology, we switch from performance analysis to science mapping (Chen, 2017; Verma & Gustafsson, 2020), which investigates the intellectual structure of a research field and the relationships among scholars or papers (through co-citations). The algorithm classifies a cluster as independent if the included studies show a clear, divergent research direction and the number of publications amounts to at least 25 papers. In total, we find 13 clusters that are assigned to three major research areas. The foundations of research were laid as early as the 1990s, as the "oldest" clusters have an average publication year around the turn of the millennium.

Since we identify strong interrelationships between several clusters, we introduce two additional groups to categorize the studies: methodology papers and "connecting papers". We develop this new approach within bibliometrics because we have recognized that assigning certain papers to only one cluster would not reflect the actual intellectual structure of venture capital research. We therefore use both categories to better deal with the interdisciplinary nature of the research field. As the name implies, the methodology papers have laid the methodological foundation for several studies from different clusters. For example, sample selection bias (Heckman, 1979) or standard errors (White, 1980) are relevant to many papers, regardless of their thematic focus. Conversely, the connecting papers cover various venture capital-related aspects and cannot be assigned to only one particular cluster. The respective papers bring together key ideas or concepts from (at least two) different fields of research and are therefore often found in the center of our bibliometric map. Thus, these studies represent the foundations of research and are (co-)cited by many researchers with different foci. For example, Gompers and Lerner (2001) contribute a connecting paper, as their work addresses the history, return, and internationalization of venture capital.

The algorithm assigns a study either precisely to a specific cluster or leaves it unclassified. Studies not assigned to any cluster were manually reviewed and then categorized as connecting papers or allocated to an appropriate cluster. Additionally, all studies (within the existing clusters) were double-checked to determine whether they fit thematically with the content of each cluster. If a study's co-citation links to at least two clusters were at least 10% each, or if more than 15 percent of its links were directed to the connecting papers, it was reclassified as a connecting paper. In the end, roughly one sixth of all studies (157 papers) are categorized as connecting papers.

Figure 1 graphically depicts the intellectual structure of venture capital research. The 13 circles correspond to the different thematic clusters. The positioning of the clusters is derived from the network generated by the distance-based algorithm of VOSViewer and has been further refined by the authors. This implies that clusters arranged closer together on the map share co-citation links between their studies, indicating a stronger (thematic) connection to nearby clusters than to those further apart. The total size of each circle symbolizes the number of included studies of the corresponding cluster. Cluster 1 (125 studies) represents the largest group of studies, while cluster 13 consists of only 28 papers. The three color schemes (blue, red, and green) highlight the clusters' affiliation to the respective major research areas (A - C). Similarly, within a cluster, we address the temporal distribution of studies by referring to publication years. Studies are assigned to three different periods (≤ 1999 ; 2000-2010; ≥ 2011), with darker shades corresponding to more recent publication years. We distinguish these three periods because venture capital began to attract greater academic interest around the turn of the millennium, leading to a considerable increase in publications. For example, while we find many older studies in cluster 8 (VC's involvement), cluster 2 (venture capital from an international and institutional perspective) includes more recent studies.

The connecting lines between the circles symbolize which clusters are closely linked, so that there are many co-citations between the respective groups of studies. For each cluster,

the connecting lines highlight the two strongest connections to other clusters. To illustrate the two additional categories of publications in our map, we use the gray boxes in Figure 1. In order to highlight the relevance of the methodology (M) and connecting papers (CP), we have positioned these two boxes in the center of our map, as numerous papers from different clusters refer to both categories. In particular, the CP box (in darker gray) is of considerable size, emphasizing that the connecting papers are also relevant in terms of their number (157 papers). These CP papers integrate aspects from multiple (at least two) clusters. Table 8 provides a detailed description of the research areas and their respective clusters.

Insert Figure 1 & Table 8 here.

In each of the following sections, we first provide a general overview of the three major research areas: A. Venture capital life cycle (LC); B. Interfirm relationships and knowledge exchange (IR); and C. Economic view, policy, and the market for entrepreneurial finance (EP). Then we delve deeper into the associated clusters, exploring their evolution over time and the underlying theories. We start with the LC as the first research area, although it does not have the largest cluster (in terms of number of studies included). In fact, we follow a different logic in order to show the development of the entire research field. We call LC the first major research area because it has the oldest studies, measured by the average year of publication. Accordingly, the third research area (EP) includes studies that are more recent. However, we named each cluster according to the number of included studies, i.e., cluster 1 has the most studies (although it is not part of research area A), whereas cluster 13 includes the fewest studies of the sample. Since we present the intellectual structure chronologically, the following section begins with the largest cluster (in terms of number of studies) of the oldest research area – in this case, cluster 4 dealing with IPO-related issues. Hereinafter, the central research aspects and developments of each cluster are identified and shown. Likewise, the most important papers

(measured by the number of citations and links within the cluster) of the respective research strand are named, summarized, and related to each other.

A. Venture Capital Life Cycle (LC)

This group of clusters deals with the venture capital life cycle. The process usually begins with the VC's **decision-making (cluster 7)** and **venture valuation (11)**. The venture selection process is followed by **contracting issues (5)** and **VC's involvement practices (8)** in the development of the start-up. Finally, going public with the venture is the VC's preferred **exit option (4)**. Since the transitions between the individual phases are fluid, there are also strong links between the respective clusters. This is especially true for the VC's decision-making process and involvement activities, as the VC-entrepreneur relationship begins with the selection process and continues through the subsequent stages. Similarly, clusters 4 and 5 are closely linked, as potential exit scenarios are already recorded when the contract is signed. The strong overlap is also reflected in the fact that similar journals are cited most frequently per cluster. While finance journals (*Journal of Finance*, *Journal of Financial Economics*) clearly dominate clusters 4 and 5, the *Journal of Business Venturing* is by far the leader in clusters 7 and 8 (with more than one-third of all papers in the two clusters) indicating an entrepreneurial focus.

As the studies of this research area are the "oldest" in our sample (average year of publication is around the turn of the millennium), the venture capital life cycle represents the foundation of the underlying field of research. Agency theory (Jensen & Meckling, 1976) and information asymmetries (Akerlof, 1970; Stiglitz & Weiss, 1981) are the dominant explanatory approaches both in these clusters and in the literature as a whole. Since these theories are equally relevant to other clusters, the corresponding papers have been predominantly placed in the "connecting papers" group. However, these theoretical contributions have set the starting point for further research on information asymmetries in the venture capital context. While

entrepreneurs usually act as agents, VCs take on the role of principals, as they mandate the founders to increase the value of the start-up. The agency dilemma becomes apparent here: because of the possibly divergent goals, entrepreneurs might take measures that conflict with the goals of the investors. While VCs aim to maximize their returns (Metrick & Yasuda, 2011; Rosenbusch et al., 2013), entrepreneurs seek long-term stability (Lewis & Churchill, 1983). Agency-specific concepts such as moral hazard or adverse selection offer further theoretical explanations for dealing with information asymmetries (Holmström, 1979). For instance, in terms of the decision-making process or IPO-related investment decisions, adverse selection may occur because investors have less information about the quality of the company than the founders have and therefore may come to wrong decisions.

Cluster 4. VC's exit: issues associated with IPOs. This research cluster focuses on the IPO process of venture capital-backed start-ups. As early as the 1990s, IPO-specific issues were addressed that remain relevant today, such as underpricing, VC's certification, and underwriter reputation. Barry et al. (1990) first analyze whether VCs involvement and monitoring practices affect IPO performance. They conclude that high quality monitoring leads to lower underpricing. Similarly, Megginson and Weiss (1991) examine the benefits of venture capital funding for start-ups going public. Since VCs are better able to reduce information asymmetries among the parties involved in the IPO process, the costs of going public are scaled down and the issuing company can expect higher earnings. This certification role of VCs represents a widely accepted explanation for the performance advantage of venture capital-funded companies. As a VC is engaged in the issuing company, the quality of both the business idea and the management team is confirmed (or certified) to potential investors. In addition, Gompers (1996) finds that new VCs want to take their financed companies public earlier than established VCs, as an IPO is generally assessed positively. This allows VCs to build a good reputation and raise further funds in the future. Therefore, young VCs are more willing to go

public early and to accept higher underpricing. Gompers consequently calls it "grandstanding". Lee and Wahal (2004) support the grandstanding hypothesis, as higher underpricing (and earlier reputation building) will pay off financially for venture capital firms in the future. In subsequent years, Krishnan et al. (2011) observe that start-ups backed by reputable VCs are more successful (in terms of post-IPO performance), for example, because they show strong involvement in the portfolio firms' governance after the public offering. Theoretical background: Information asymmetries and agency-related problems are highly relevant for this cluster as the protagonists are confronted with them during IPOs or reputation building (Leland & Pyle, 1977). Moreover, IPO-specific theories have developed, such as the certification role (Megginson & Weiss, 1991), underwriter reputation (Carter & Manaster, 1990) or the above-mentioned grandstanding hypothesis (Gompers, 1996).

Cluster 5. Financial contracting, venture financing and control mechanisms. In this cluster, the researchers are particularly concerned with information asymmetries, such as agency-related conflicts, moral hazard, monitoring, and contracting. After the theoretical foundations for contract design were laid in the 1980s (Holmström, 1982; Sahlman, 1988), researchers investigated agency-related phenomena in a venture capital context in the 1990s. Accordingly, Admati and Pfleiderer (1994) show how financial contracts between VCs and start-ups must be designed in order to mitigate potential conflicts. Likewise, Bergemann and Hege (1998) examine emerging agency-related problems at several stages in the VC-entrepreneur-relationship ("dynamic agency model"). To resolve such conflicts, the authors recommend the use of a "time-varying share contract which provides intertemporal risk-sharing" between both parties. Kaplan and Strömberg (2003, 2004) analyze the contract design in more detail by examining the VC's allocation of various rights (e.g. cash flow rights, board rights or voting rights). Later, Cumming (2008) addresses the relationship between venture capital contract design and exit options. He investigates how the allocation of ownership,

securities, and rights may affect the respective exit options (e.g., acquisitions, IPOs, and write-off exits). Similar studies continue to this day, with the goal of designing an optimal contract with specific rights (Burchardt et al., 2016). Theoretical background: Again, agency theory and imperfect information provide the theoretical explanation why contracts and control mechanisms are used in start-up financing (Stiglitz & Weiss, 1981; Trester, 1998). For this reason, theories of contracting and corporate finance are relevant in this cluster (Grossman & Hart, 1986; Myers & Majluf, 1984).

Cluster 7. Venture's performance drivers and VC's decision-making. This cluster analyzes both VC's financing decision processes and the selection criteria when assessing new investment opportunities. Tyebjee and Bruno (1984) divide the deal-making activities into five main tasks: deal origination, deal screening, deal evaluation, deal structuring, and post investment activities. Again, Tyebjee and Bruno, along with Macmillan et al. (1985) and Macmillan et al. (1987) identify potential selection criteria for evaluating start-ups, including factors like market attractiveness, product differentiation, managerial capabilities, and the entrepreneur's experience or personality. Other decision-making criteria, such as the venture capital firm's requirements or strategic approaches, have been examined in later studies up to the present (Hall & Hofer, 1993; Muzyka et al., 1996; Petty & Gruber, 2011). Correspondingly, researchers focus primarily on start-ups' human capital (Dimov & Shepherd, 2005) and social capital (Shane & Stuart, 2002) as both selection criteria and success factors. Theoretical background: Since information asymmetries exist to the detriment of the VC, signaling theory (Spence, 1973) is fundamental to understanding the VC's decision-making process. However, as we have identified a separate cluster for signaling within the underlying research area, further explanation is found in cluster 11. As a means of signaling, new ventures highlight the TMT's characteristics or their competitive advantage (Beckman & Burton, 2008; Colombo & Grilli, 2005) - we call them potential "performance drivers". Accordingly, many links to the resource-

based-view (Barney, 1991) are evident because a start-up's resource endowment - particularly resources that are rare or challenging to replicate - can create a competitive advantage and possibly attract investors. Furthermore, upper echelons theory is used as an explanatory approach: the founder's characteristics could predict the venture's outcomes and are therefore highly relevant in the decision-making process.

Cluster 8. VC-entrepreneur-relationship: VC's involvement. Venture capital affects at least two parties - the VC and the start-up's management team. Accordingly, the papers in this cluster between 1980 and 1995 mainly deal with VC-founder interactions and the VC's practices to get involved in the financed start-up. The most common activities of VCs are monitoring, board participation, strategy formulation, financial consultancy and raising additional funds, or recruiting and management selection (Gorman & Sahlman, 1989; Macmillan et al., 1989). According to Sapienza (1992), the more innovative the business idea, the more closely the VC is involved. He also highlights the positive impact of VC's involvement on business development at all stages of the venture. However, this contradicts the work of Busenitz et al. (2004) who find that VC's advice on strategy analysis and formulation, for example, does not add any value to the new venture. Additionally, before the turn of the millennium, there was an increasing number of studies dealing with the importance and development of trust between the two parties and associated CEO dismissals after venture capital investments (Bruton et al., 2000; Das & Teng, 1998). In the 00s (to date), the VC-founder relationship has continued to be studied intensively - especially the value added by the VC, but also conflicts are addressed (Higashide & Birley, 2002). Theoretical background: Agency theory as well as theories of ownership, governance and control are indispensable to this field of research (Eisenhardt, 1989a; Fama & Jensen, 1983). In relation to the ex post agency conflict, one speaks of moral hazard when the agents act in their own interest at the expense of principals, since the principals cannot fully observe or even control the agents'

activities (Elitzur & Gaviious, 2003). Transferred to the VC-entrepreneur relationship after receiving the investment, founders could, for example, reduce their efforts and rely on the VC's network and support. Since this field of research deals with interpersonal relationships, organizational trust also represents an important theoretical explanatory approach (Mayer et al., 1995).

Cluster 11. Signaling & venture valuation. This cluster is closely related to the decision-making process, as it deals with signaling the venture's potential success factors and its valuation. It is only since the turn of the millennium that signals from start-ups to investors have been studied more intensively. In order to convince investors to fund them (and to overcome information asymmetries), founders try to signal the quality of their start-up. Many firm and founder characteristics are explored, such as the importance of an entrepreneur's social capital and reputation (Shane & Cable, 2002), start-up experience and human capital (Hsu, 2007), or patents (Mann & Sager, 2007). This list could be supplemented by many other signals such as board structure (Certo, 2003) or TMT characteristics (Higgins & Gulati, 2006). In the last decade, the aspect of uncertainty in the valuation of new ventures has gained increasing attention (Kollmann & Kuckertz, 2010). Theoretical background: Spence's (1973) signal theory is the central approach in this group of studies, as his paper even gives its name to the cluster. Signaling represents a solution approach for the principal-agent conflict. The agent (founder) has more information about an issue (the venture's quality) than the principal (VC) and therefore tries to send signals to the principal that reduce the principal's uncertainty (investment decision or valuation).

B. Interfirm Relationships and Knowledge Exchange (IR)

This research area examines partnerships in a venture capital context, resulting in both knowledge acquisition and interorganizational learning. **Cluster 1** therefore provides an

overview of **corporate venture capital** as an instrument of knowledge transfer. Similarly, **cluster 3** focuses on **interorganizational networks**, in particular studying venture capital syndication. In addition, **cluster 12** addresses the role of **VC's reputation**. For this reason, journals focusing on (strategic) management and organizational research, such as *Academy of Management Journal*, *Administrative Science Quarterly* and *Strategic Management Journal*, are the most cited in this field. We establish a link between the above clusters and resource-based view (RBV), as both networks and reputation are strategic resources that can provide a competitive advantage (Barney, 1991).

Cluster 1. CVC and interfirm knowledge transfer. This cluster dedicates itself to corporate venture capital, abbreviated as CVC. It represents a variant of venture capital in which an established company funds a start-up in exchange for a minority equity stake (Basu et al., 2011). By establishing a relationship, both parties aim to derive mutual benefits. While the investing company strives to become more efficient through interorganizational learning, the new venture is provided with required resources (Knyphausen-Aufseß, 2005). In the 1980s and early 1990s, researchers primarily focused on various forms of interfirm linkages (Kogut, 1991; Winters & Murfin, 1988). From the mid-1990s onwards, however, the focus has shifted to knowledge transfer and learning through these interfirm linkages (Lane & Lubatkin, 1998), such as alliances or CVC. In terms of CVC research, Gary Dushnitsky and Michael Lenox are the most influential scholars, as they set the starting point for the increasing attention to this research strand with three contributions in 2005 and 2006. These studies mainly analyze the investment strategies of established firms and the value added to the investing parties. Conversely, Katila et al. (2008) examine the decision of new ventures to enter into an investment relationship with a corporate partner. Later, Chemmanur et al. (2014) compare the outcomes of CVC-backed firms with those of independent venture capital backed firms. Moreover, in the 2010s, particular attention has been paid to the extent to which CVC affects

the innovation performance of the investing firms (Wadhwa et al., 2016). Theoretical background: Since one of the main goals of CVC is knowledge transfer and acquisition, the connection to theories such as absorptive capacity (Cohen & Levinthal, 1990), dynamic capabilities (Teece et al., 1997), and organizational learning (Levitt & March, 1988) is little surprising. Consequently, these theories refer to the corporation's ability to adapt to new conditions, to be open to new ideas, and ultimately to incorporate them into its processes. The aforementioned concepts are based on both the knowledge- and resource-based view (Grant, 1996; Wernerfelt, 1984).

Cluster 3. RBV in venture capital: networks and social capital. Following the resource-based view, cluster 3 is concerned with VC's resources that are crucial for success. Social capital and interorganizational networks, particularly in the form of syndication, are examined. Syndication refers to the formation of partnerships between two or more venture capital firms (or other types of investors, such as VC-angel syndicates) to jointly invest in start-ups (Wright & Lockett, 2003). Between the 1960s and the end of the 1980s, most of the research is theoretical, dealing fundamentally with the role of networks and social ties (Granovetter, 1973). Then, Bygrave (1987) notes that venture capital syndication stems from the uncertainty of the projects being funded rather than the financial burden. Although, there is still no strong venture capital focus in the 1990s, Lerner (1994) advances syndication research by confirming the knowledge sharing motive and emphasizing that syndication occurs throughout the entire investment process. Furthermore, Sorenson and Stuart (2001) focus on the spatial distribution of venture capital syndicates. Towards the end of the 2000s, the research focus shifted to the growing importance of partner selection, determinants, and the outcome effects of venture capital syndication (Jääskeläinen, 2012; Sorenson & Stuart, 2008). Theoretical background: As the title of the cluster suggests, the resource-based view (Barney, 1991; Wernerfelt, 1984) represents the central theoretical explanation because valuable resources such as networks and

social capital are analyzed. Moreover, both social network (Granovetter, 1973) and social capital theory (Coleman, 1988) are crucial to examine venture capital partnerships. Granovetter distinguishes between strong and weak social ties, while social capital theory states that building social networks facilitates individual and collective action. Additionally, this cluster includes the work of Wilson (1968), who developed a (not venture capital-specific) theory on syndicates. Forty years later, Sorenson and Stuart (2008) formulated a theory of VC's network formation that addresses the conditions under which relationships are formed with varying degrees of distance.

Cluster 12. RBV in venture capital: the role of reputation. Reputation represents another critical resource for the success of VCs in securing and managing investments. While most of the studies in the 1990s focused on the relevance, development, and management of status and reputation (Fombrun & Shanley, 1990), there was a shift in the 00s toward analyzing the effects of reputation. As such, Dimov et al. (2007) study VC's decision-making. They find that the higher the VC's financial expertise, the lower the probability of an early-stage investment - this relationship is even more pronounced for VCs with a good reputation. Closely related to cluster 3, Pollock et al. (2010) examine how start-ups signal their quality by drawing on their prestigious network partners: both the number and type of new ventures' high-status affiliates affect IPO valuations. Similarly, Lee et al. (2011) analyze how the VC's reputation impacts the post-IPO performance of the funded start-ups. Theoretical background: Reputation represents a resource that takes time and effort to build and maintain. Thus, as for the entire research area, the resource-based view is the central explanatory approach. Due to the peculiarities of reputation and its character as an intangible resource, signaling theory (Spence, 1973) and the attention-based view (Ocasio, 1997), as an advancement of RBV, are of great importance for understanding the theoretical background of this cluster.

C. Economic View, Policy, and the Market for Entrepreneurial Finance (EP)

The third research area focuses on economic, institutional, and international issues, with the **globalization of the venture capital industry** being addressed in **cluster 2**. In a similar vein, studies of this research area deal with the **creation of venture capital markets (6)** and the **business contributions (10)** of such investments. In addition, the research area provides an overview of **private equity investors (9)** and other **players in entrepreneurial finance (13)**, such as business angels or crowdfunding. Despite being a relatively diverse research area, it is little surprise that *Research Policy* and *Journal of Business Venturing* are the most co-cited journals as they cover economic and policy issues, along with the market for start-up financing. Moreover, as rather novel phenomena such as venture capital globalization or crowdfunding are addressed, the average publication years of these clusters are between 2006 and 2009, making this research area by far the most recent. Since this research area is mainly concerned with economic and market-related issues, institutional economics (La Porta et al., 1998), along with economic and public theories, is particularly pertinent in this context.

Cluster 2. Venture capital from an international and institutional perspective. The vast majority of the 94 studies included either deal with venture capital in a cross-country context or with cultural, institutional, and geographic distance. The foundations of this cluster were laid in the 1980s and 1990s, when outstanding seminal papers on internationalization and the role of institutions were published (Hofstede, 1980; La Porta et al., 1998). The first comparisons of venture capital markets between different countries were also made at this time (Ooghe et al., 1991; Sapienza et al., 1996). Since the early 2000s, researchers have mainly concentrated on identifying the institutional frameworks that are most critical for VCs when planning cross-border market entry. For instance, Bruton and Ahlstrom (2003) analyze the institutional differences between venture capital markets in China and the Western world. Similarly, Guler and Guillén (2010) examine institutional factors (rights protection, exit options

or political stability) that are most relevant to VCs when they consider entering foreign markets. Cumming et al. (2010) also note that legislative issues, such as accounting standards or investor protection, could influence VC's cross-cultural investment processes. Accordingly, more recent papers have focused on syndication between domestic and foreign investors, as well as on the determinants and outcomes of cross-border investments (Groh & Wallmeroth, 2016; Tykvová & Schertler, 2014). Theoretical background: Most cross-border studies refer to institutional economics. Consequently, La Porta et al. (1998) contribute the second most co-cited paper within the cluster. Institutional theory explains VC's internationalization behavior, as it highlights the role of different social, political, and economic systems. That is why reference is also made to investor protection, legal and corporate governance theories (La Porta et al., 1998). Furthermore, Hofstede's (1980) essay provides a theoretical starting point for understanding the influence of cultural dimensions on cross-border collaboration. Zaheer's (1995) paper on the liability of foreignness deserves mention, as it explores the costs associated with operating in cross-border contexts.

Cluster 6. Venture capital markets: economy, policy, and market creation. This cluster examines governmental venture capital (GVC) and policy measures designed to stimulate the development of active venture capital markets. Moreover, it explores the impact of venture capital activity on macroeconomic indicators, such as growth and innovation. In the 1980s and 1990s, the focus of academic papers was predominantly on venture capital-related policy measures, including taxation and regional development (Florida & Kenney, 1988a; Poterba, 1989). Correspondingly, Jeng and Wells (2000) examine economic variables (gross domestic product, accounting standards or governmental programs) to see whether they promote the presence of strong venture capital markets. Regarding government intervention in the venture capital market, they note that it can be beneficial by setting a regulatory framework. Since the 2000s, research interest has notably shifted toward investigating governmental

authorities as active participants in the venture capital landscape. As such, Lerner (2000) finds that start-ups funded by an US governmental initiative grow significantly faster and are able to attract private investors more easily than comparable new ventures lacking public support. Consequently, he explains that GVC's motives are twofold: to create spillover effects that positively affect society, and to certify the quality of new ventures to other potential investors. Leleux and Surlemont (2003) confirm that GVC initiatives contribute to market creation, which results in higher overall amounts of venture capital investment. In the ensuing period, researchers analyzed both the measures implemented by the state to develop a robust venture capital market and the outcomes of the state acting as an investor. For this reason, Da Rin et al. (2006) investigate the influence of various policy instruments, such as labor regulations, public R&D investments, and corporate capital gains tax rates, on the creation of venture capital markets. In recent years, governmental and independent venture capital have also been compared in terms of their impact on economic macroeconomic indicators such as growth, job creation or innovation rates (Grilli & Murtinu, 2014). Theoretical background: Due to the diverse research foci within this cluster, no single theoretical framework dominates. Nonetheless, theories from public finance, institutional economics, and regulatory economics are pertinent, as they explore how legislative frameworks shape key outcomes such as innovation capacity, entrepreneurial activity, and unemployment rates.

Cluster 9. Venture capital in the context of private equity. In cluster 9, most papers are devoted to the structure and characteristics of the private equity market (in comparison to venture capital markets). The first papers from this cluster date back to the mid-1990s and are overviews of the private equity industry (Fenn et al., 1997). In subsequent years, the focus has been on the returns and risks of private equity investments. While Phalippou and Gottschalg (2009) examine the performance of portfolio firms, Kaplan and Schoar (2005) compare different types of private equity investors and their impact on fund performance. Private equity

returns are on a comparable level to those of the S&P 500, but venture capital funds perform better in terms of lucrativeness. In principle, this cluster describes and analyzes the private equity market in its various forms, determinants and outcomes (Lerner et al., 2011). Recent studies have increasingly turned their attention to private equity investors and their specific characteristics (Bertoni et al., 2013). Finally, it is worth to mention that the term private equity is often used as an umbrella term or synonym for phenomena such as venture capital or buyouts (Gompers & Lerner, 2000; Phalippou & Gottschalg, 2009). Theoretical background: Highlighting individual theories is challenging due to the multifaceted nature of this cluster. However, since venture capital is (partly) regarded as a subcategory of private equity in the literature, the theories mentioned above, such as agency or contracting theory, are also relevant here.

Cluster 10. Venture capital: business contributions. This group of studies is concerned with the impact of venture capital investments, examining aspects such as innovation capacity, growth, or employment. Until the mid-2000s, the papers primarily focus on the impact of venture capital investments on innovation performance. Accordingly, Kortum and Lerner (2000) find a significant positive correlation between venture capital activity and technological innovation. Similarly, Florida and Kenney (1988b) refer to VCs as "technological gatekeepers". In contrast, Caselli et al. (2009) state that venture capital, at least in Italy, does not foster innovation but rather affects sales growth. Furthermore, venture capital-backed start-ups need less time to bring their products to market (Hellmann & Puri, 2000). From an economic perspective, Samila and Sorenson's (2011) research indicates that venture capital has a positive impact on entrepreneurship and employment. Theoretical background: Like the entire research area, institutional theory plays a central role as an explanatory framework, highlighting the impact of environmental conditions on venture capital outcomes.

Cluster 13. The landscape of entrepreneurial finance. This cluster addresses venture capital in relation to other participants in the field of entrepreneurial finance, such as business angels or crowdfunding platforms. Thus, already known topics, such as contracting (Elitzur & Gavius, 2003) or signaling (Ahlers et al., 2015) are studied in connection with different investor types and compared to venture capital. In the 1980s and 1990s, business angel investors and their specific investment process were primarily analyzed as counterparts to VCs (Freear et al., 1994; Wetzel, 1983). In particular, the 2000s witnessed comparisons between business angels and VCs, highlighting differences in investment performance, governance, and ownership structures (Bruton et al., 2010; van Osnabrugge, 2000). An interesting line of research raises the question of whether venture capital is more of a substitute for or a complement to angel investments (Hellmann & Thiele, 2015). Beginning in the 2010s, research has shifted its focus to new forms of financing, such as crowdfunding (Bruton et al., 2015). Among the most cited papers is the recent study by Drover et al. (2017), which provides an overview of the entrepreneurial finance landscape and even points to emerging financing mechanisms such as accelerators. Theoretical background: Similar to the previous sections, this cluster also deals with different research questions, which is why there is a wide application of theories such as signaling (Ahlers et al., 2015) or game theory (Fairchild, 2011).

D. Connecting Papers (CP) and Methodology Papers (M)

Although most studies (765 of 958) have been assigned to a specific cluster, some papers do not only relate to a single research field. These studies link the clusters either by addressing topics that thematically belong to at least two clusters or by drawing on established methodologies. Consequently, we call them "connecting papers" and "methodology papers". By introducing these additional categories, we are able to provide a more fine-grained analysis of the actual relevance and size of the respective clusters. The connecting papers were identified in two steps. First, the algorithm does not assign some studies to any cluster. These unclassified

studies were reviewed, and most of them - if appropriate - were categorized as connecting papers. Second, all other publications (already placed in clusters) and their co-citation links to papers from other clusters were analyzed. If a paper's co-citation links to at least two clusters were at least 10% each, or if more than 15 % of its links were directed to the connecting papers, it was reclassified as a connecting paper.

CP. Connecting Papers. Six of the identified connecting papers are also among the 15 most cited venture capital documents worldwide representing the foundations of research (cf. Table 7). For example, Sahlman (1990) describes the structure and relationship formation of venture capital firms and emphasizes the importance of contracting. Both Gompers (1995) and Lerner (1995) show how monitoring, board involvement, or contracting can minimize agency costs. The two previously mentioned authors together (2001) provide a prime example of a connecting paper, as their work addresses the history, return, and internationalization of venture capital. Hsu's (2004) study deals with the VC's certification role, value-added and reputation. Sorensen (2007) strongly refers to cluster four and eight, as he finds that the involvement of experienced investors is more likely to lead to an IPO of the funded start-up. In addition, he notes that experienced investors add more value to portfolio firms and that VCs have selection skills to choose higher quality companies in the screening process. Theoretical background: As the preceding sections have already emphasized the central theoretical approaches, it is hardly surprising that Jensen and Meckling's agency theory (1976) as well as Wernerfelt's (1984) and Barney's (1991) resource-based view are among the most important connecting papers. The same is true for Akerlof's study (1970) which was the first to address information asymmetries, or more precisely, hidden characteristics. Among the connecting papers are also essays of world renown that have shaped the theoretical foundations of economic research, such as Schumpeter's (1934) theory of economic development. Equally important, also in the venture capital context, is Knight's study (1921), which elaborated the distinction between risk and

uncertainty that is still valid today. Since more than 34,450 studies are cited in our sample, other major economic theories such as organization theory (Cyert & March, 1963) or transaction cost theory (Williamson, 1985) are classified as connecting papers.

M. Methodology Papers. We identified some outstanding methodological papers, which are categorized separately due to their relevance to numerous studies across various clusters. These studies do not connect the clusters at the content level, but in terms of the selected methodologies. For example, different clusters refer to studies on sample selection bias (Heckman, 1979), standard errors (White, 1980), or case study research (Eisenhardt, 1989b).

DISCUSSION

By visually mapping the literature on venture capital, we uncover the intellectual structure, identify connections among clusters and trace the evolution of this dynamic field of research. The substantial growth in studies, coupled with the exploration of diverse topics within venture capital literature, underscores the necessity of this study to tackle the increasing fragmentation and complexity of the research field. Our study reveals that early venture capital research was primarily structured around the investment process, encompassing milestones such as valuation, decision-making, involvement, and exit options. Afterwards, the second major research area concentrated on the role of relationships in the venture capital context and the associated knowledge transfer. In particular, a specific form of venture capital, CVC, has attracted attention as it is seen as a valuable strategic tool for established companies. Consequently, researchers from both entrepreneurial finance and strategic management disciplines have intensively studied CVC. Finally, the third and most recent research area offers a broader perspective on the venture capital industry, addressing macroeconomic effects, institutional factors, and alternative forms of start-up financing. The research field remains highly dynamic, driven by the emergence of new investor types in entrepreneurial finance, such

as crowdfunding platforms or accelerators, and evolving investment constellations like VC-angel-syndicates (Drover et al., 2017). Regarding the theories applied, venture capital research initially relied on well-established economic frameworks such as the RBV, agency theory, and network theory. Over time, as venture capital research matured, more specific frameworks were developed like Sorenson and Stuart's (2008) theory on venture capital syndication or Megginson and Weiss' (1991) paper on VC's certification role.

Furthermore, one of our main contributions is that we structure the research field into three research areas, each consisting of multiple interconnected clusters. The connecting lines in Figure 1 show, for each cluster, the two strongest co-citation links to other clusters. Within a single research area (A-C), these links are particularly strong. For instance, 12% of the co-citation links for cluster 6 (policy and venture capital market creation) refer to the neighboring cluster 2 (venture capital from an international perspective), both belonging to research area C. This demonstrates the fluid transitions between the research clusters. Referring to the example above, a connection is formed between both clusters, as a target country's legislation may attract or deter foreign investors (Bruton et al., 2005). However, our map indicates that some clusters exhibit strong links with each other, even though they are not part of the same research area. For instance, cluster 8 (VC's involvement) is closely linked to cluster 1 (CVC). Indeed, there is strong research interest in the involvement activities and value-added of CVC investors (Chemmanur et al., 2014; Park & Steensma, 2012), especially in comparison to independent VCs, as CVC firms benefit from a wide range of resources and in-house R&D departments. Overall, the analysis of the strongest co-citation links for each cluster further emphasizes the interdisciplinary nature of venture capital research.

Our findings enhance existing research on venture capital by revealing its primary research themes and theoretical underpinnings. These insights offer a roadmap for researchers to engage with key conversations in venture capital studies, facilitating a deeper understanding of the current knowledge landscape across specific topics. Building on these findings, we

propose avenues for future research in the field, which are detailed in the subsequent sections. Additionally, we address the limitations of our study, offering a nuanced perspective on its scope and implications.

Implications for Future Research

First, we identify 13 thematic clusters, each examining a particular venture capital-related topic. Similar to the research questions addressed in the connecting papers, researchers could investigate the interactions of distant research strands and bring together different phenomena, concepts, and theories. The existing connecting papers have demonstrated that interdisciplinary questions (involving multiple clusters) have contributed to substantial research advancements and have been recognized as pioneering studies (Hsu, 2004; Sahlman, 1990). For example, researchers could select two distant clusters, such as CVC (cluster 1) and venture capital internationalization (2), and explore their potential relationship: Are incumbents investing in new ventures not only to gain insights into technology, but also to test and learn about foreign markets? How do cross-border CVC investments help the incumbent achieve its strategic goals? Does the geographic diversity of a CVC investment portfolio foster or harm the incumbent's performance? Researchers could derive research questions by applying the same procedure to smaller clusters as well. By combining the policy and venture capital market creation perspective (cluster 6) with the concept of VC's reputation (cluster 12), researchers could investigate whether reputation is also crucial for governmental VCs, even though they pursue other (non-financial) investment objectives than those of independent VCs. In this regard, it could be interesting to explore which indicators lead to building GVC's reputation when financial return is not the primary evaluation criterion. Alternatively, researchers could broaden the research scope to examine which policies and legislation promote a region or country's reputation as an attractive location for start-up investors. Consequently, a region's good reputation and the availability of venture capital could attract new ventures to relocate

their operations (Prijs et al., 2019). Since the studies included in our analysis are predominantly from journals in the fields of management, entrepreneurship, and finance, scholars could explore how integrating these disciplines provide novel insights into venture capital research.

Second, we found cluster 9 (private equity) and cluster 13 (business angels, crowdfunding, or accelerators), which deal with other key players of the entrepreneurial finance ecosystem. With respect to these types of start-up financing, we see two potential avenues for further research. On the one hand, scholars could intensify their efforts to study the interplay of venture capital with the various sources of financing. It needs to be clarified in which start-up phases venture capital complements other types of entrepreneurial finance and under which circumstances it tends to substitute them (Capizzi et al., 2022; Hellmann et al., 2021). On the other hand, venture capital remains the most extensively studied form of entrepreneurial finance. Applying similar selection criteria, we found 877 studies on crowdfunding, 519 papers on private equity research and only 95 on business angels, compared to 1,410 studies in our sample. In particular, the scarcity of angel investment research is surprising as in terms of total investment amount it equals venture capital (Organisation for Economic Cooperation and Development, 2011). Since these alternative forms of start-up financing have not yet been sufficiently explored, scholars could adopt venture capital-related research questions and apply them to other sources of entrepreneurial finance. For example, researchers could investigate which policy initiatives favor crowdfunding activities, how corporate accelerators build reputation, or the institutional conditions that influence business angels to invest internationally.

Third, as the number of publications on venture capital is increasing rapidly, separate bibliometric analyses could be conducted for some of the identified clusters. Although we set a threshold of at least ten citations per study to be included in a cluster, the CVC and internationalization clusters have 125 and 94 papers, respectively. Applying a lower threshold and thus analyzing a larger number of studies could provide a more fragmented view of the

research cluster and identify more recent research trends. While we provide a comprehensive bibliometric analysis on the entire field of venture capital research, the proposed procedure would allow focusing on a specific dimension.

Fourth, our analysis reveals that agency theory, RBV and institutional theory are the predominant conceptual frameworks. However, scholars may investigate other theories and their potential relevance to venture capital-related contexts. As such, researchers could link venture capital research to Hambrick and Mason's (1984) upper echelon theory. This theoretical framework could be applied to VCs, CVC managers, and the start-up team to deepen our understanding of how individual characteristics and perceptions influence the funding process, involvement, and performance. Consequently, researchers could build on Dimov et al. (2007) and Patzelt et al. (2009) to further investigate strategic decision-making in the context of venture capital. In a similar vein, scholars could address venture capital-related issues through the lens of stakeholder theory (Freeman, 1984). Although a number of publications in recent years have already dealt with CSR-related topics in the context of entrepreneurial finance (Alakent et al., 2020; Mrkajic et al., 2019), there remains substantial scope for further research in this area. In particular, when focusing on CVC and GVC programs, the stakeholder approach should be considered, as these investment settings impact various groups of interest. Likewise, researchers could explore the tensions that emerge between stakeholders and examine how these conflicts are managed.

Fifth, from a methodological perspective, we see the possibility of conducting more meta-analyses in the future. To date, we are aware of only four meta-analyses on venture capital. While Rosenbusch et al. (2013) study the performance effects of independent venture capital investments, Huang and Madhavan (2021) as well as Haslanger et al. (2022) apply a similar approach for CVC. In addition, Dalal (2022) addresses the determinants of country-level venture capital activity. Therefore, further meta-analyses are needed that examine other outcome effects of venture capital funding such as the start-up's innovation performance.

Similarly, scholars could meta-analyze the determinants that influence the VC's investment decision.

Sixth, it has become apparent that venture capital is a broad and interdisciplinary research field that leaves room for more intensive research. On the one hand, the literature on venture capital is heterogeneous within economics, as it concerns areas such as strategy, management, entrepreneurship, or finance. On the other hand, there has been an evident emergence of connections with other disciplines, including psychology, sociology, and technology research. Accordingly, to identify potential research gaps, scholars could delve deeper into each research area and analyze which topics have been overlooked in the present map. In particular, to address the "white spots" within the intellectual network, it would be interesting to conduct boundary-spanning research projects. In this regard, research examining the gender gap in the venture capital industry has only recently received more attention (Brush et al., 2018; Malmström et al., 2017). Likewise, no study has analyzed the psychological traits of VCs. Conducting such a study would also be of great importance for practitioners, as it would enable a more thorough consideration of how VC's psychology influences funding decisions.

Limitations

Inevitably, the present study is not without limitations. First, by conducting a co-citation analysis, we can indeed identify seminal papers, uncover the intellectual structure, and trace the evolution of the venture capital research field. However, since the analysis of co-citations relies on studies that have been jointly cited in the bibliography of a paper in the past, a weakness of this methodology becomes apparent. Older studies may have been co-cited more often, resulting in a potential overrepresentation, while more recent contributions require some time to accumulate citations and are therefore underrepresented (Zupic & Čater, 2015). To overcome this shortcoming and obtain an understanding of the latest trends in a particular research field, bibliographic coupling can be utilized. This method identifies a link between two publications

when they cite the same third study, meaning both reference a common underlying work in their bibliographies (Kessler, 1963).

Second, the study has limitations due to the complexity of citation practices, as authors cite papers for a variety of reasons. While citations often highlight important research in a specific field, they can also be influenced by journal prestige or author reputation. Accordingly, the Matthew effect skews citation patterns, as widely accepted studies tend to receive more citations over time (García-Lillo et al., 2017). Moreover, co-citation analysis struggles to distinguish whether an article is being cited for its content, its methodology, or simply for the prominence of its authors. To address this shortcoming, we introduced two additional categories: methodology papers and connecting papers. However, citation bias can also be the result of cronyism, where researchers disproportionately cite colleagues and friends (Cole & Cole, 1974). In addition, journal policies regarding the number of references vary, with some requiring extensive bibliographies and others limiting citations, ultimately shaping the selection of references in scholarly works (Hota et al., 2020).

Third, our sample is intentionally selective. In order to conduct a focused economic analysis of venture capital research, we only included papers that have "venture capital*/VC" in their title and are assigned to the Web of Science category "Business Economics". This approach ensures a clear delineation from other research areas. Besides, to maintain a manageable scope of studies and to identify the most important contributions, we set a threshold of at least ten citations per study to be included in a cluster. Consequently, the analysis was conducted on a subset of 958 references, out of a total of 34,500 co-cited references. However, venture capital is a broad and vibrant field of research that overlaps with areas such as technology or engineering. As mentioned earlier, the selection of a lower threshold would enable researchers to obtain a more fragmented perspective of the research area. By either expanding the keyword search (e.g., to include other sources of entrepreneurial finance) or by

refining the selection criteria and thresholds, researchers could undertake more interdisciplinary studies or conduct highly focused bibliometric analyses on venture capital-related topics.

CONCLUSION

Over the past decade, the volume of global venture capital investments has increased sharply, driving a substantial growth in publications on venture capital. Conducting descriptive analysis, the present study provides (future) researchers with a comprehensive overview of the most influential authors and journals in the field of venture capital research. Similarly, we identify and emphasize seminal papers that warrant attention. Through co-citation analysis, we visually structure the heterogeneous nature of research, highlight its evolution, and uncover content overlaps between certain research strands. In total, 13 thematic clusters are found and characterized, assigning them to three major research areas: (A) venture capital life cycle, (B) interfirm relationships and knowledge exchange, (C) economic view, policy, and the market for entrepreneurial finance. Likewise, we illustrate the thematic distances between the respective clusters and explore how they are interconnected. We have also introduced the category of connecting papers, which address phenomena spanning multiple clusters. Accordingly, this exploratory paper complements, organizes and extends the existing venture capital literature, ultimately stimulating future research projects.

REFERENCES

- Acs, Z. J., & Mueller, P. (2008). Employment effects of business dynamics: Mice, gazelles and elephants. *Small Business Economics*, 30(1), 85–100.
- Admati, A., & Pfleiderer, P. (1994). Robust financial contracting and the role of venture capitalists. *Journal of Finance*, 49(2), 371–402.
- Ahlers, G. K., Cumming, D., Günther, C., & Schweizer, D. (2015). Signaling in equity crowdfunding. *Entrepreneurship Theory and Practice*, 39(4), 955–980.
- Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488–500.
- Alakent, E., Goktan, M. S., & Khoury, T. A. (2020). Is venture capital socially responsible? Exploring the imprinting effect of VC funding on CSR practices. *Journal of Business Venturing*, 35(3), 106005.
- Anand, A., Argade, P., Barkemeyer, R., & Salignac, F. (2021). Trends and patterns in sustainable entrepreneurship research: A bibliometric review and research agenda. *Journal of Business Venturing*, 36(3), 106092.
- Apriliyanti, I. D., & Alon, I. (2017). Bibliometric analysis of absorptive capacity. *International Business Review*, 26(5), 896–907.
- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Barry, C. B., Muscarella, C. J., Peavy, J., & Vetsuypens, M. R. (1990). The role of venture capital in the creation of public companies: Evidence from the going-public process. *Journal of Financial Economics*, 27(2), 447–471.

- Basu, S., Phelps, C., & Kotha, S. (2011). Towards understanding who makes corporate venture capital investments and why. *Journal of Business Venturing*, 26(2), 153–171.
- Beckman, C. M., & Burton, M. D. (2008). Founding the future: Path dependence in the evolution of top management teams from founding to IPO. *Organization Science*, 19(1), 3–24.
- Bergemann, D., & Hege, U. (1998). Venture capital financing, moral hazard, and learning. *Journal of Banking & Finance*, 22(6-8), 703–735.
- Bertoni, F., Ferrer, M. A., & Martí, J. (2013). The different roles played by venture capital and private equity investors on the investment activity of their portfolio firms. *Small Business Economics*, 40(3), 607–633.
- Bessière, V., Stéphany, E., & Wirtz, P. (2020). Crowdfunding, business angels, and venture capital: An exploratory study of the concept of the funding trajectory. *Venture Capital*, 22(2), 135–160.
- Black, B. S., & Gilson, R. J. (1998). Venture capital and the structure of capital markets: Banks versus stock markets. *Journal of Financial Economics*, 47(3), 243–277.
- Brush, C., Greene, P., Balachandra, L., & Davis, A. (2018). The gender gap in venture capital-progress, problems, and perspectives. *Venture Capital*, 20(2), 115–136.
- Bruton, G., & Ahlstrom, D. (2003). An institutional view of China's venture capital industry. *Journal of Business Venturing*, 18(2), 233–259.
- Bruton, G., Filatotchev, I., Chahine, S., & Wright, M. (2010). Governance, ownership structure, and performance of IPO firms: The impact of different types of private equity investors and institutional environments. *Strategic Management Journal*, 31(5), 491–509.
- Bruton, G., Fried, V. H., & Hisrich, R. D. (2000). Ceo dismissal in venture capital-backed firms: Further evidence from an agency perspective. *Entrepreneurship Theory and Practice*, 24(4), 69–77.

- Bruton, G., Fried, V. H., & Manigart, S. (2005). Institutional influences on the worldwide expansion of venture capital. *Entrepreneurship Theory and Practice*, 29(6), 737–760.
- Bruton, G., Khavul, S., Siegel, D., & Wright, M. (2015). New financial alternatives in seeding entrepreneurship: Microfinance, crowdfunding, and peer-to-peer innovations. *Entrepreneurship Theory and Practice*, 39(1), 9–26.
- Burchardt, J., Hommel, U., Kamuriwo, D. S., & Billitteri, C. (2016). Venture capital contracting in theory and practice: Implications for entrepreneurship research. *Entrepreneurship Theory and Practice*, 40(1), 25–48.
- Busenitz, L. W., Fiet, J. O., & Moesel, D. D. (2004). Reconsidering the venture capitalists' "value added" proposition: An interorganizational learning perspective. *Journal of Business Venturing*, 19(6), 787–807.
- Bygrave, W. D. (1987). Syndicated investments by venture capital firms: A networking perspective. *Journal of Business Venturing*, 2(2), 139–154.
- Cancino, C. A., Merigo, J. M., Torres, J. P., & Diaz, D. (2018). A bibliometric analysis of venture capital research. *Journal of Economics, Finance and Administrative Science*, 23(45), 182–195.
- Capizzi, V., Croce, A., & Tenca, F. (2022). Do business angels' investments make It easier to raise follow-on venture capital financing? An analysis of the relevance of business angels' investment practices. *British Journal of Management*, 33(1), 306–326.
- Carter, R. B., & Manaster, S. (1990). Initial public offerings and underwriter reputation. *Journal of Finance*, 45(4), 1045–1067.
- Caselli, S., Gatti, S., & Perrini, F. (2009). Are venture capitalists a catalyst for innovation? *European Financial Management*, 15(1), 92–111.

- Casprini, E., Dabic, M., Kotlar, J., & Pucci, T. (2020). A bibliometric analysis of family firm internationalization research: Current themes, theoretical roots, and ways forward. *International Business Review*, 29(5), 101715.
- Castillo-Vergara, M., Alvarez-Marin, A., & Placencio-Hidalgo, D. (2018). A bibliometric analysis of creativity in the field of business economics. *Journal of Business Research*, 85, 1–9.
- Certo, S. T. (2003). Influencing initial public offering investors with prestige: Signaling with board structures. *Academy of Management Review*, 28(3), 432–446.
- Chemmanur, T. J., Krishnan, K., & Nandy, D. K. (2011). How does venture capital financing improve efficiency in private firms? A look beneath the surface. *The Review of Financial Studies*, 24(12), 4037–4090.
- Chemmanur, T. J., Loutskina, E., & Tian, X. (2014). Corporate venture capital, value creation, and innovation. *The Review of Financial Studies*, 27(8), 2434–2473.
- Chen, C. (2017). Science mapping: A systematic review of the literature. *Journal of Data and Information Science*, 2(2), 1–40.
- Chen, X.-P., Yao, X., & Kotha, S. (2009). Entrepreneur passion and preparedness in business plan presentations: A persuasion analysis of venture capitalists' funding decisions. *Academy of Management Journal*, 52(1), 199–214.
- Cherif, B. M., & Khalid, D. (2021). A bibliometric review of research on venture capital. *Asian Academy of Management Journal*, 26(1), 47–88.
- Cochrane, J. H. (2005). The risk and return of venture capital. *Journal of Financial Economics*, 75(1), 3–52.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.

- Cole, J. R., & Cole, S. (1974). Social stratification in science. *American Journal of Physics*, 42(10), 923–924.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95-120.
- Colombo, M. G., & Grilli, L. (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, 34(6), 795–816.
- Cornelius, B., & Persson, O. (2006). Who's who in venture capital research. *Technovation*, 26(2), 142–150.
- Cumming, D. (2008). Contracts and exits in venture capital finance. *The Review of Financial Studies*, 21(5), 1947–1982.
- Cumming, D., Kumar, S., Lim, W. M., & Pandey, N. (2022). Mapping the venture capital and private equity research: A bibliometric review and future research agenda. *Small Business Economics*, 61, 173–221.
- Cumming, D., Schmidt, D., & Walz, U. (2010). Legality and venture capital governance around the world. *Journal of Business Venturing*, 25(1), 54–72.
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Prentice Hall.
- Da Rin, M., Nicodano, G., & Sembenelli, A. (2006). Public policy and the creation of active venture capital markets. *Journal of Public Economics*, 90(8-9), 1699–1723.
- Dai, N., Jo, H., & Kassicieh, S. (2012). Cross-border venture capital investments in Asia: Selection and exit performance. *Journal of Business Venturing*, 27(6), 666–684.
- Dalal, A. (2022). Meta-analysis of determinants of venture capital activity. *Entrepreneurial Business and Economics Review*, 10(1), 113–128.
- Das, T. K., & Teng, B.-S. (1998). Between trust and control: Developing confidence in partner cooperation in alliances. *Academy of Management Review*, 23(3), 491–512.

- Devigne, D., Manigart, S., Vanacker, T., & Mulier, K. (2018). Venture capital internationalization: Synthesis and future research directions. *Journal of Economic Surveys*, 32(5), 1414–1445.
- Dimov, D., & Shepherd, D. A. (2005). Human capital theory and venture capital firms: Exploring “home runs” and “strike outs”. *Journal of Business Venturing*, 20(1), 1–21.
- Dimov, D., Shepherd, D. A., & Sutcliffe, K. M. (2007). Requisite expertise, firm reputation, and status in venture capital investment allocation decisions. *Journal of Business Venturing*, 22(4), 481–502.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296.
- Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. *Journal of Management*, 43(6), 1820–1853.
- Dushnitsky, G., & Lenox, M. J. (2005). When do firms undertake R&D by investing in new ventures? *Strategic Management Journal*, 26(10), 947–965.
- Dushnitsky, G., & Lenox, M. J. (2006). When does corporate venture capital investment create firm value? *Journal of Business Venturing*, 21(6), 753–772.
- Eisenhardt, K. M. (1989a). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57–74.
- Eisenhardt, K. M. (1989b). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.

- Elitzur, R., & Gaviols, A. (2003). Contracting, signaling, and moral hazard: a model of entrepreneurs, 'angels', and venture capitalists. *Journal of Business Venturing*, 18(6), 709–725.
- Fairchild, R. (2011). An entrepreneur's choice of venture capitalist or angel-financing: A behavioral game-theoretic approach. *Journal of Business Venturing*, 26(3), 359–374.
- Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of Law and Economics*, 26(2), 301–325.
- Fenn, G. W., Liang, N., & Prowse, S. (1997). The private equity market: An overview. *Financial Markets, Institutions & Instruments*, 6(4), 1–106.
- Ferasso, M., Beliaeva, T., Kraus, S., Clauss, T., & Ribeiro-Soriano, D. (2020). Circular economy business models: The state of research and avenues ahead. *Business Strategy and the Environment*, 29(8), 3006–3024.
- Florida, R. L., & Kenney, M. (1988a). Venture capital, high technology and regional development. *Regional Studies*, 22(1), 33–48.
- Florida, R. L., & Kenney, M. (1988b). Venture capital-financed innovation and technological change in the USA. *Research Policy*, 17(3), 119–137.
- Fombrun, C., & Shanley, M. (1990). What's in a name? Reputation building and corporate strategy. *Academy of Management Journal*, 33(2), 233–258.
- Freear, J., Sohl, J. E., & Wetzel, W. E. (1994). Angels and non-angels: Are there differences? *Journal of Business Venturing*, 9(2), 109–123.
- Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Cambridge University Press.
- García-Lillo, F., Úbeda-García, M., & Marco-Lajara, B. (2017). The intellectual structure of human resource management research: A bibliometric study of the international journal of

- human resource management 2000–2012. *The International Journal of Human Resource Management*, 28(13), 1786–1815.
- Gompers, P. (1995). Optimal investment, monitoring, and the staging of venture capital. *The Journal of Finance*, 50(5), 1461–1489.
- Gompers, P. (1996). Grandstanding in the venture capital industry. *Journal of Financial Economics*, 42(1), 133–156.
- Gompers, P., Gornall, W., Kaplan, S., & Strebulaev, I. (2020). How do venture capitalists make decisions? *Journal of Financial Economics*, 135(1), 169–190.
- Gompers, P., & Lerner, J. (2000). Money chasing deals? The impact of fund inflows on private equity valuations. *Journal of Financial Economics*, 55(2), 281–325.
- Gompers, P., & Lerner, J. (2001). The venture capital revolution. *Journal of Economic Perspectives*, 15(2), 145–168.
- Gompers, P., Lerner, J., Blair, M. M., & Hellmann, T. (1998). What drives venture capital fundraising? *Brookings Papers on Economic Activity. Microeconomics*, 149–204.
- Gorman, M., & Sahlman, W. A. (1989). What do venture capitalists do? *Journal of Business Venturing*, 4(4), 231–248.
- Gornall, W., & Strebulaev, I. (2020). Squaring venture capital valuations with reality. *Journal of Financial Economics* (135), 120–143.
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360–1380.
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17, 109–122.
- Grilli, L., Mrkajic, B., & Latifi, G. (2018). Venture capital in Europe: Social capital, formal institutions and mediation effects. *Small Business Economics*, 51(2), 393–410.

- Grilli, L., & Murtinu, S. (2014). Government, venture capital and the growth of European high-tech entrepreneurial firms. *Research Policy*, 43(9), 1523–1543.
- Groh, A. P., & Wallmeroth, J. (2016). Determinants of venture capital investments in emerging markets. *Emerging Markets Review*, 29, 104–132.
- Grossman, S. J., & Hart, O. D. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, 94(4), 691–719.
- Guler, I., & Guillén, M. F. (2010). Institutions and the internationalization of US venture capital firms. *Journal of International Business Studies*, 41(2), 185–205.
- Hall, J., & Hofer, C. W. (1993). Venture capitalists' decision criteria in new venture evaluation. *Journal of Business Venturing*, 8(1), 25–42.
- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193–206.
- Hannan, M. T., & Freeman, J. (1977). The population ecology of organizations. *American Journal of Sociology*, 82(5), 929–964.
- Haslanger, P., Lehmann, E. E., & Seitz, N. (2022). The performance effects of corporate venture capital: A meta-analysis. *The Journal of Technology Transfer*, 48(6), 1–29.
- Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153–161.
- Hellmann, T., & Puri, M. (2000). The interaction between product market and financing strategy: The role of venture capital. *The Review of Financial Studies*, 13(4), 959–984.
- Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: Empirical evidence. *The Journal of Finance*, 57(1), 169–197.
- Hellmann, T., Schure, P., & Vo, D. H. (2021). Angels and venture capitalists: Substitutes or complements? *Journal of Financial Economics*, 141(2), 454–478.

- Hellmann, T., & Thiele, V. (2015). Friends or foes? The interrelationship between angel and venture capital markets. *Journal of Financial Economics*, *115*(3), 639–653.
- Higashide, H., & Birley, S. (2002). The consequences of conflict between the venture capitalist and the entrepreneurial team in the United Kingdom from the perspective of the venture capitalist. *Journal of Business Venturing*, *17*(1), 59–81.
- Higgins, M. C., & Gulati, R. (2006). Stacking the deck: The effects of top management backgrounds on investor decisions. *Strategic Management Journal*, *27*(1), 1–25.
- Hochberg, Y. V., Ljungqvist, A., & Lu, Y. (2007). Whom you know matters: Venture capital networks and investment performance. *The Journal of Finance*, *62*(1), 251–301.
- Hofstede, G. H. (1980). *Culture's consequences: International differences in work-related values*. SAGE.
- Holmström, B. (1979). Moral hazard and observability. *The Bell Journal of Economics*, *10*(1), 74–91.
- Holmström, B. (1982). Moral hazard in teams. *Bell Journal of Economics*, *13*(2), 324–340.
- Hota, P. K., Subramanian, B., & Narayanamurthy, G. (2020). Mapping the intellectual structure of social entrepreneurship research: A citation/co-citation analysis. *Journal of Business Ethics*, *166*(1), 89–114.
- Hsu, D. H. (2004). What do entrepreneurs pay for venture capital affiliation? *The Journal of Finance*, *59*(4), 1805–1844.
- Hsu, D. H. (2006). Venture capitalists and cooperative start-up commercialization strategy. *Management Science*, *52*(2), 204–219.
- Hsu, D. H. (2007). Experienced entrepreneurial founders, organizational capital, and venture capital funding. *Research Policy*, *36*(5), 722–741.
- Hsu, D. H., & Ziedonis, R. H. (2013). Resources as dual sources of advantage: Implications for valuing entrepreneurial-firm patents. *Strategic Management Journal*, *34*(7), 761–781.

- Huang, P., & Madhavan, R. (2021). Dumb money or smart money? Meta-analytically unpacking corporate venture capital. *Strategic Entrepreneurship Journal*, 15(3), 403–429.
- IAES. (2024). *SCImago Journal Rank (SJR): An overview*. <https://www.iaesjournal.com/scimago-journal-rank-sjr-an-overview/>
- Jääskeläinen, M. (2012). Venture capital syndication: Synthesis and future directions. *International Journal of Management Reviews*, 14(4), 444–463.
- Jáki, E., & Molnár, E. (2021). Venture capital and government involvement from a qualitative systematic literature review perspective. *Acta Oeconomica*, 71(4), 645–663.
- Jeng, L. A., & Wells, P. C. (2000). The determinants of venture capital funding: Evidence across countries. *Journal of Corporate Finance*, 6(3), 241–289.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360.
- Kaplan, S. N., & Schoar, A. (2005). Private equity performance: Returns, persistence, and capital flows. *The Journal of Finance*, 60(4), 1791–1823.
- Kaplan, S. N., & Strömberg, P. (2003). Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. *The Review of Economic Studies*, 70(2), 281–315.
- Kaplan, S. N., & Strömberg, P. (2004). Characteristics, contracts, and actions: Evidence from venture capitalist analyses. *The Journal of Finance*, 59(5), 2177–2210.
- Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. (2008). Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly*, 53(2), 295–332.
- Kessler, M. M. (1963). Bibliographic coupling between scientific papers. *American Documentation*, 14(1), 10–25.
- Knight, F. H. (1921). *Risk, uncertainty and profit*.

- Knyphausen-Aufseß, D. zu (2005). Corporate venture capital: Who adds value? *Venture Capital*, 7(1), 23–49.
- Kogut, B. (1991). Joint ventures and the option to expand and acquire. *Management Science*, 37(1), 19–33.
- Kollmann, T., & Kuckertz, A. (2010). Evaluation uncertainty of venture capitalists' investment criteria. *Journal of Business Research*, 63(7), 741–747.
- Kortum, S., & Lerner, J. (2000). Assessing the contribution of venture capital to innovation. *The RAND Journal of Economics*, 31(4), 674–692.
- Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, 46(5), 1295–1333.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal determinants of external finance. *The Journal of Finance*, 52(3), 1131–1150.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy*, 106(6), 1113–1155.
- Lampe, J., Kraft, P. S., & Bausch, A. (2020). Mapping the field of research on entrepreneurial organizations (1937–2016): A bibliometric analysis and research agenda. *Entrepreneurship Theory and Practice*, 44(4), 784–816.
- Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19(5), 461–477.
- Lee, P. M., Pollock, T. G., & Jin, K. (2011). The contingent value of venture capitalist reputation. *Strategic Organization*, 9(1), 33–69.
- Lee, P. M., & Wahal, S. (2004). Grandstanding, certification and the underpricing of venture capital backed IPOs. *Journal of Financial Economics*, 73(2), 375–407.

- Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The Journal of Finance*, 32(2), 371–387.
- Leleux, B., & Surlemont, B. (2003). Public versus private venture capital: Seeding or crowding out? A pan-European analysis. *Journal of Business Venturing*, 18(1), 81–104.
- Lerner, J. (1994). The syndication of venture capital investments. *Financial Management*, 23(3), 16–27.
- Lerner, J. (1995). Venture capitalists and the oversight of private firms. *Journal of Finance*, 50(1), 301–318.
- Lerner, J. (2000). The government as venture capitalist. *The Journal of Private Equity*, 3(2), 55–78.
- Lerner, J., Sorensen, M., & Strömberg, P. (2011). Private equity and long-run investment: The case of innovation. *The Journal of Finance*, 66(2), 445–477.
- Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology*, 14(1), 319–338.
- Lewis, V. L., & Churchill, N. C. (1983). *The five stages of small business growth*.
- LiPuma, J. A., & Park, S. (2014). Venture capitalists' risk mitigation of portfolio company internationalization. *Entrepreneurship Theory and Practice*, 38(5), 1–23.
- Macmillan, I. C., Kulow, D. M., & Khoylian, R. (1989). Venture capitalists' involvement in their investments: Extent and performance. *Journal of Business Venturing*, 4(1), 27–47.
- Macmillan, I. C., Siegel, R., & Narasimha, P. (1985). Criteria used by venture capitalists to evaluate new venture proposals. *Journal of Business Venturing*, 1(1), 119–128.
- Macmillan, I. C., Zemann, L., & Subbanarasimha, P. N. (1987). Criteria distinguishing successful from unsuccessful ventures in the venture screening process. *Journal of Business Venturing*, 2(2), 123–137.

- Malmström, M., Johansson, J., & Wincent, J. (2017). Gender stereotypes and venture support decisions: How governmental venture capitalists socially construct entrepreneurs' potential. *Entrepreneurship Theory and Practice*, *41*(5), 833–860.
- Mann, R. J., & Sager, T. W. (2007). Patents, venture capital, and software start-ups. *Research Policy*, *36*(2), 193–208.
- Mason, C. M., & Harrison, R. T. (2002). Is it worth it? The rates of return from informal venture capital investments. *Journal of Business Venturing*, *17*(3), 211–236.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, *20*(3), 709–734.
- McCain, K. W. (1990). Mapping authors in intellectual space: A technical overview. *Journal of the American Society for Information Science*, *41*(6), 433–443.
- Meggison, W. L., & Weiss, K. A. (1991). Venture capitalist certification in initial public offerings. *The Journal of Finance*, *46*(3), 879–903.
- Metrick, A., & Yasuda, A. (2011). Venture capital and other private equity: A survey. *European Financial Management*, *17*(4), 619–654.
- Mrkajic, B., Murtinu, S., & Scalera, V. G. (2019). Is green the new gold? Venture capital and green entrepreneurship. *Small Business Economics*, *52*(4), 929–950.
- Muzyka, D., Birley, S., & Leleux, B. (1996). Trade-offs in the investment decisions of European venture capitalists. *Journal of Business Venturing*, *11*(4), 273–287.
- Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*, 187–221.
- National Venture Capital Association. (2023). *NVCA 2023 yearbook*. https://nvca.org/wp-content/uploads/2023/03/NVCA-2023-Yearbook_final.pdf
- North, D. C. (1989). Institutions and economic growth: An historical introduction. *World Development*, *17*(9), 1319–1332.

- Noyons, E. C. M., Moed, H. F., & van Raan, A. F. J. (1999). Integrating research performance analysis and science mapping. *Scientometrics*, 46(3), 591–604.
- Ocasio, W. (1997). Towards an attention-based view of the firm. *Strategic Management Journal*, 18(1), 187–206.
- Ooghe, H., Manigart, S., & Fassin, Y. (1991). Growth patterns of the European venture capital industry. *Journal of Business Venturing*, 6(6), 381–404.
- Organisation for Economic Cooperation and Development. (2011). *Financing high-growth firms: The role of angel investors - OECD*. <https://www.oecd.org/sti/financinghigh-growthfirmstheroleofangelinvestors.htm>
- Padilla-Ospina, A. M., Medina-Vásquez, J. E., & Rivera-Godoy, J. A. (2018). Financing innovation: A bibliometric analysis of the field. *Journal of Business & Finance Librarianship*, 23(1), 63–102.
- Park, H. D., & Steensma, H. K. (2012). When does corporate venture capital add value for new ventures? *Strategic Management Journal*, 33(1), 1–22.
- Patzelt, H., Knyphausen-Aufseß, D. zu, & Fischer, H. T. (2009). Upper echelons and portfolio strategies of venture capital firms. *Journal of Business Venturing*, 24(6), 558–572.
- Petty, J. S., & Gruber, M. (2011). “In pursuit of the real deal”. *Journal of Business Venturing*, 26(2), 172–188.
- Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. *Stanford business classics*. Stanford University Press.
- Phalippou, L., & Gottschalg, O. (2009). The performance of private equity funds. *The Review of Financial Studies*, 22(4), 1747–1776.
- Pollock, T. G., Chen, G., Jackson, E. M., & Hambrick, D. C. (2010). How much prestige is enough? Assessing the value of multiple types of high-status affiliates for young firms. *Journal of Business Venturing*, 25(1), 6–23.

- Poterba, J. M. (1989). Venture capital and capital gains taxation. *Tax Policy and the Economy*, 3, 47–67.
- Prijcker, S. de, Manigart, S., Collewaert, V., & Vanacker, T. (2019). Relocation to get venture capital: A resource dependence perspective. *Entrepreneurship Theory and Practice*, 43(4), 697–724.
- Puri, M., & Zarutskie, R. (2012). On the life cycle dynamics of venture-capital- and non-venture-capital-financed firms. *The Journal of Finance*, 67(6), 2247–2293.
- Raghuram, S., Tuertscher, P., & Garud, R. (2010). Research note - Mapping the field of virtual work: A cocitation analysis. *Information Systems Research*, 21(4), 983–999.
- Ramos-Rodríguez, A.-R., & Ruíz-Navarro, J. (2004). Changes in the intellectual structure of strategic management research: A bibliometric study of the Strategic Management Journal, 1980–2000. *Strategic Management Journal*, 25(10), 981–1004.
- Reverte, C., & Badillo, R. (2019). Alternative equity financing instruments for entrepreneurial ventures: A bibliometric analysis of research in the last three decades. *Current Science*, 116(6), 926–935.
- Rosenbusch, N., Brinckmann, J., & Müller, V. (2013). Does acquiring venture capital pay off for the funded firms? A meta-analysis on the relationship between venture capital investment and funded firm financial performance. *Journal of Business Venturing*, 28(3), 335–353.
- Sahlman, W. A. (1988). Aspects of financial contracting in venture capital. *Journal of Applied Corporate Finance*, 1(2), 23–36.
- Sahlman, W. A. (1990). The structure and governance of venture-capital organizations. *Journal of Financial Economics*, 27(2), 473–521.
- Samila, S., & Sorenson, O. (2011). Venture capital, entrepreneurship, and economic growth. *The Review of Economics and Statistics*, 93(1), 338–349.

- Sapienza, H. J. (1992). When do venture capitalists add value? *Journal of Business Venturing*, 7(1), 9–27.
- Sapienza, H. J., Manigart, S., & Vermeir, W. (1996). Venture capitalist governance and value added in four countries. *Journal of Business Venturing*, 11(6), 439–469.
- Schildt, H. A., Zahra, S. A., & Sillanpää, A. (2006). Scholarly communities in entrepreneurship research: A co-citation analysis. *Entrepreneurship Theory and Practice*, 30(3), 399–415.
- Schumpeter, J. (1934). *The theory of economic development*. Harvard University Press.
- Shane, S., & Cable, D. (2002). Network ties, reputation, and the financing of new ventures. *Management Science*, 48(3), 364–381.
- Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university start-ups. *Management Science*, 48(1), 154–170.
- Shashi, Centobelli, P., Cerchione, R., & Mittal, A. (2021). Managing sustainability in luxury industry to pursue circular economy strategies. *Business Strategy and the Environment*, 30(1), 432–462.
- Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science*, 24(4), 265–269.
- Sorensen, M. (2007). How smart is smart money? A two-sided matching model of venture capital. *The Journal of Finance*, 62(6), 2725–2762.
- Sorenson, O., & Stuart, T. E. (2001). Syndication networks and the spatial distribution of venture capital investments. *American Journal of Sociology*, 106(6), 1546–1588.
- Sorenson, O., & Stuart, T. E. (2008). Bringing the context back in: Settings and the search for syndicate partners in venture capital investment networks. *Administrative Science Quarterly*, 53(2), 266–294.

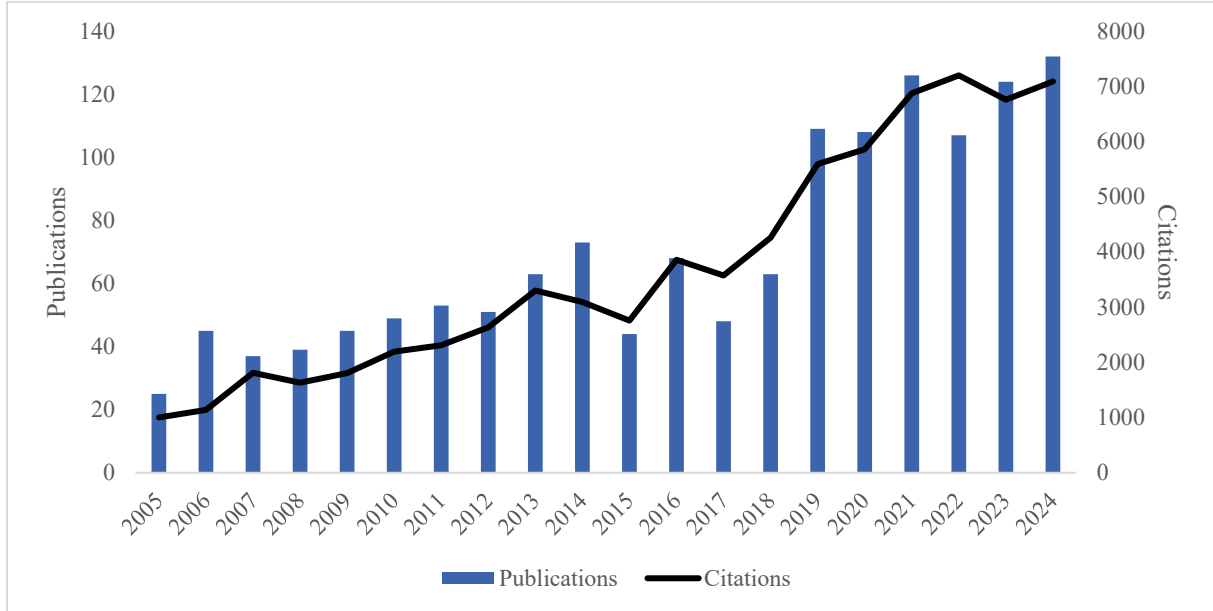
- Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355–374.
- Stiglitz, J., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71(3), 393–410.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- Trester, J. J. (1998). Venture capital contracting under asymmetric information. *Journal of Banking & Finance*, 22(6-8), 675–699.
- Tyebjee, T. T., & Bruno, A. V. (1984). A model of venture capitalist investment activity. *Management Science*, 30(9), 1051–1066.
- Tykvová, T. (2018). Venture capital and private equity financing: An overview of recent literature and an agenda for future research. *Journal of Business Economics*, 88(3-4), 325–362.
- Tykvová, T., & Schertler, A. (2014). Does syndication with local venture capitalists moderate the effects of geographical and institutional distance? *Journal of International Management*, 20(4), 406–420.
- van Eck, N. J., & Waltman, L. (2010). Software survey: Vosviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538.
- van Eck, N. J., & Waltman, L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact* (pp. 285–320). Springer.
- van Eck, N. J., & Waltman, L. (2017). Citation-based clustering of publications using CitNetExplorer and VOSviewer. *Scientometrics*, 111(2), 1053–1070.
- van Oorschot, J. A., Hofman, E., & Halman, J. I. (2018). A bibliometric review of the innovation adoption literature. *Technological Forecasting and Social Change*, 134, 1–21.

- van Osnabrugge, M. (2000). A comparison of business angel and venture capitalist investment procedures: An agency theory-based analysis. *Venture Capital*, 2(2), 91–109.
- Verma, S., & Gustafsson, A. (2020). Investigating the emerging COVID-19 research trends in the field of business and management: A bibliometric analysis approach. *Journal of Business Research*, 118, 253–261.
- Wadhwa, A., Phelps, C., & Kotha, S. (2016). Corporate venture capital portfolios and firm innovation. *Journal of Business Venturing*, 31(1), 95–112.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180.
- Wetzel, W. E. (1983). Angels and informal risk capital. *Sloan Management Review*, 24(4), 23–34.
- White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817–838.
- Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. Free Press.
- Wilson, R. (1968). The theory of syndicates. *Econometrica*, 36(1), 119–132.
- Winters, T. E., & Murfin, D. L. (1988). Venture capital investing for corporate development objectives. *Journal of Business Venturing*, 3(3), 207–222.
- Wright, M., & Lockett, A. (2003). The structure and management of alliances: Syndication in the venture capital industry. *Journal of Management Studies*, 40(8), 2073–2102.
- Zaheer, S. (1995). Overcoming the liability of foreignness. *Academy of Management Journal*, 38(2), 341–363.
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472.

FIGURES AND TABLES

TABLE 1

Number of venture capital-related publications and citations 2005-2024.



Source: Web of Science (2024).

TABLE 2

15 most publishing authors in the field of venture capital.

Author	Number of publications
CUMMING D	33
WRIGHT M	25
LERNER J	18
GOMPERS P	17
MANIGART S	17
ZACHARAKIS A	14
BERTONI F	13
COLOMBO MG	13
MASON CM	13
MAULA M	13
SCHWIENBACHER A	13
CROCE A	12
GRILLI L	12
HELLMANN T	11
LI Y	11

Note. Only publications with the search terms "venture capital*" or "VC" in the **title** are considered.
Source: Web of Science (2024).

TABLE 3**15 most publishing journals in the field of venture capital.**

Journal	Articles	% of Sample	SJR Indicator (2023)
JOURNAL OF BUSINESS VENTURING	125	8.8%	4.813
SMALL BUSINESS ECONOMICS	57	4.0%	2.530
JOURNAL OF CORPORATE FINANCE	45	3.2%	3.182
ENTREPRENEURSHIP THEORY AND PRACTICE	42	3.0%	5.819
RESEARCH POLICY	31	2.2%	3.219
VENTURE CAPITAL	30	2.1%	0.749
JOURNAL OF FINANCIAL ECONOMICS	29	2.1%	13.655
STRATEGIC ENTREPRENEURSHIP JOURNAL	27	1.9%	3.628
JOURNAL OF BUSINESS RESEARCH	25	1.8%	3.128
JOURNAL OF SMALL BUSINESS MANAGEMENT	25	1.8%	1.632
JOURNAL OF BANKING & FINANCE	23	1.6%	1.663
JOURNAL OF FINANCE	23	1.6%	19.139
ACADEMY OF MANAGEMENT JOURNAL	21	1.5%	8.271
FORTUNE	21	1.5%	0.118
STRATEGIC MANAGEMENT JOURNAL	20	1.4%	7.820

Note. Only publications with the search terms "venture capital*" or "VC" in the **title** are considered.

Source: Web of Science (2024).

TABLE 4**Citation structure of the sample.**

Number of citations	Number of studies	% of all papers
≥ 500	13	0.9%
≥ 250	32	2.3%
≥ 100	125	8.8%
≥ 50	145	10.3%
≥ 0	1,095	77.7%
Total:	1,410	100.0%

Source: Web of Science (2024).

TABLE 5**Most local cited authors.**

Author	Local Citations
LERNER J	1,297
GOMPERS PA	1,108
HELLMANN T	894
CUMMING D	799
SAHLMAN WA	635
PURI M	622
WRIGHT M	582
SAPIENZA HJ	520
KAPLAN SN	478
MANIGART S	453
STROMBERG P	449
HOCHBERG YV	416
LOCKETT A	378
DUSHNITSKY G	372
LJUNGQVIST A	362

Source: Web of Science (2024).

TABLE 6**Most local cited sources in the field of venture capital.**

Sources	Total Citations	SJR Indicator (2023)	Research Field (Academic Journal Guide 2024)
JOURNAL OF BUSINESS VENTURING	5,529	4.813	Entrepreneurship and Small Business Management
JOURNAL OF FINANCE	4,519	19.139	Finance
JOURNAL OF FINANCIAL ECONOMICS	3,570	13.655	Finance
STRATEGIC MANAGEMENT JOURNAL	2,804	7.820	Strategy
ACADEMY OF MANAGEMENT JOURNAL	1,933	8.271	General Management, Ethics, Gender and Social Responsibility
ADMINISTRATIVE SCIENCE QUARTERLY	1,588	14.175	General Management, Ethics, Gender and Social Responsibility
RESEARCH POLICY	1,525	3.219	Innovation
ENTREPRENEURSHIP THEORY & PRACTICE	1,389	5.819	Entrepreneurship and Small Business Management
REVIEW OF FINANCIAL STUDIES	1,229	17.654	Finance
MANAGEMENT SCIENCE	1,131	5.438	Operations Research and Management Science
ORGANIZATION SCIENCE	1,072	5.632	Organizational Studies
SMALL BUSINESS ECONOMICS	1,003	2.530	Entrepreneurship and Small Business Management
JOURNAL OF CORPORATE FINANCE	988	3.182	Finance
ACADEMY OF MANAGEMENT REVIEW	963	10.486	General Management, Ethics, Gender and Social Responsibility
VENTURE CAPITAL	954	0.749	Entrepreneurship and Small Business Management

Source: Web of Science (2024).

TABLE 7

Most global cited documents.

Article	Citations (Rank)		Main topic
	Total	per year	
Meggison and Weiss (1991) Venture capitalist certification in initial public offerings. <i>Journal of Finance</i>	1,091 (1)	34 (5)	Certification role of VCs in initial public offerings
Sahlman (1990) The structure and governance of venture-capital organizations. <i>Journal of Financial Economics</i>	1,079 (2)	33 (8)	VC's relationships, agency conflicts, and contracts
Hellmann and Puri (2002) Venture capital and the professionalization of start-up firms: Empirical Evidence. <i>Journal of Finance</i>	856 (3)	41 (2)	Impact of venture capital backing on start-ups
Gompers (1995) Optimal investment, monitoring and the staging of venture capital. <i>Journal of Finance</i>	838 (4)	30 (9)	Agency costs, monitoring, and investment staging in venture capital
Kortum and Lerner (2000) Assessing the contribution of venture capital to innovation. <i>The RAND Journal of Economics</i>	787 (5)	34 (4)	Impact of venture capital on innovation
Hochberg, Ljungqvist and Lu (2007) Whom you know matters: Venture capital networks and investment performance. <i>Journal of Finance</i>	766 (6)	48 (1)	Relevance of VC's networks & syndicates for (IPO) performance
Kaplan and Strömberg (2003) Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. <i>The Review of Economic Studies</i>	739 (7)	37 (3)	Contracting and rights allocation in venture capital industry
Gompers and Lerner (2001) The venture capital revolution. <i>Journal of Economic Perspectives</i>	639 (8)	29 (10)	Overview paper
Black and Gilson (1998) Venture capital and the structure of capital markets: banks versus stock markets. <i>Journal of Financial Economics</i>	618 (9)	25 (16)	Venture capital contracting: exit strategies (IPOs)
Gorman and Sahlman (1989) What do venture capitalists do? <i>Journal of Business Venturing</i>	563 (10)	17 (39)	VC-entrepreneur relationship and VC's involvement
Hsu (2004) What do entrepreneurs pay for venture capital affiliation? <i>Journal of Finance</i>	542 (11)	29 (11)	Certification and value-added roles of VCs
Gompers (1996) Grandstanding in the venture capital industry. <i>Journal of Financial Economics</i>	520 (12)	19 (25)	IPOs, VC's involvement, VC's reputation
Barry et al. (1990) The role of venture capital in the creation of public companies. <i>Journal of Financial Economics</i>	504 (13)	15 (48)	VC's involvement patterns (monitoring) and effects on IPOs

Tyebjee, & Bruno (1984) A model of venture capitalist investment activity. <i>Management Science</i>	486 (14)	12 (74)	the five main tasks of venture capital deal-making
Lerner (2000) The government as venture capitalist. <i>Journal of Business</i>	481 (15)	20 (23)	Governmental venture capital
Chen, Yao and Kotha (2009) Entrepreneur passion and preparedness in business plan presentations: A persuasion analysis of venture capitalists' funding decisions. <i>Academy of Management Journal</i>	476 (16)	34 (6)	VC's decision-making process
Drover et al. (2017) A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. <i>Journal of Management</i>	203 (65)	34 (7)	Review of entrepreneurial finance sources
Gompers et al. (2020) How do venture capitalists make decisions? <i>Journal of Financial Economics</i>	85 (199)	28 (12)	VC's decision-making, valuation, and post-investment value-added
Chemmanur, Loutskina and Tian (2014) Corporate venture capital, value creation, and innovation. <i>The Review of Financial Studies</i>	238 (50)	26 (13)	Impact of corporate venture capital (CVC) on innovation
Sorensen (2007) How smart is smart money? A two-sided matching model of venture capital. <i>Journal of Finance</i>	404 (20)	25 (14)	Agency issues: involvement & matching, going public process

Note. The 15 most cited articles in total and per year (average number of citations per year) are selected. Source: Web of Science (2024).

TABLE 8

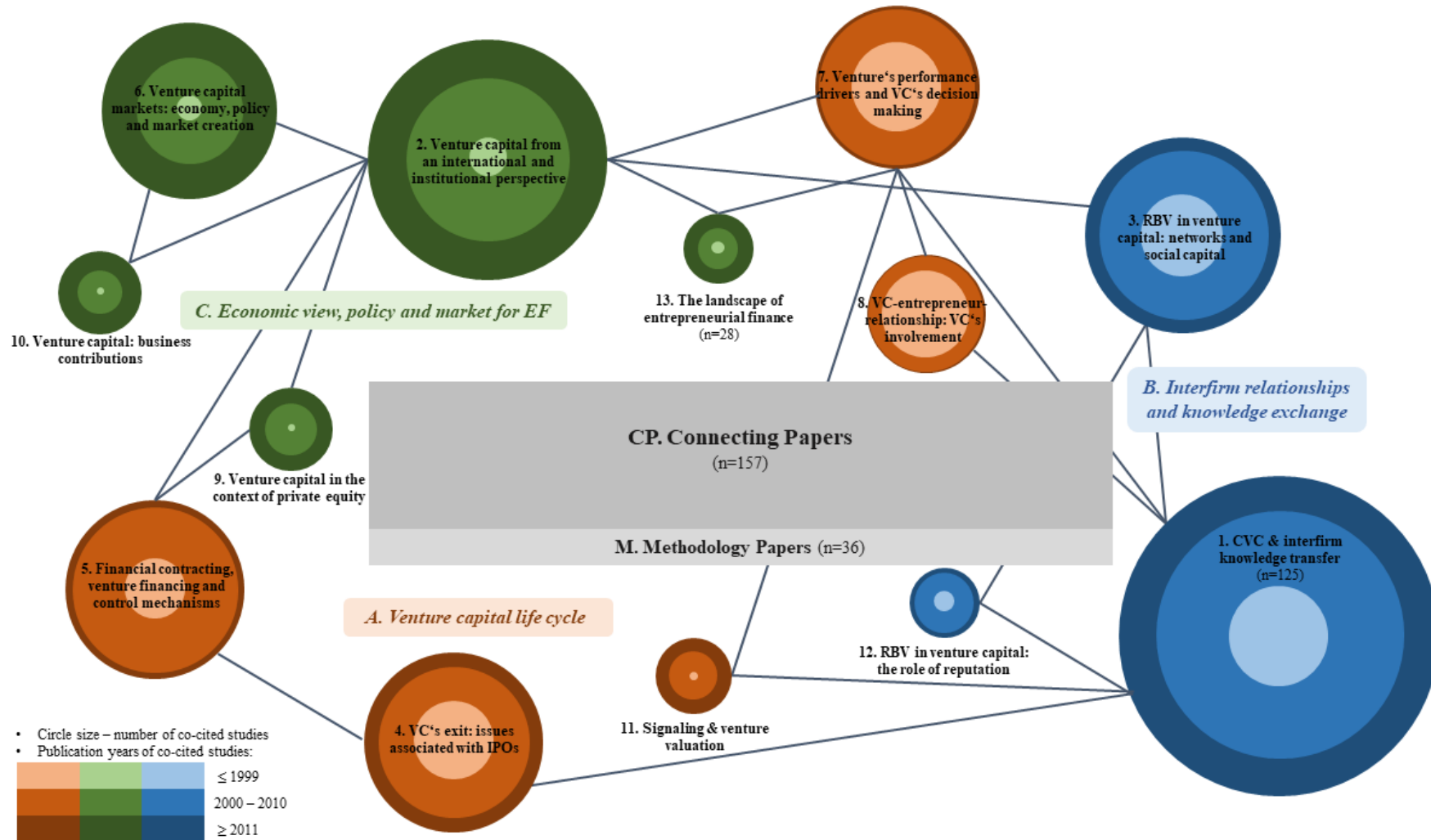
Cluster description of the co-citation network 1921-2020.

Research Area	Cluster No. & Area	Cluster name	Size (Mean year of publication)	Description	Representative Articles	Theoretical Background
A. Venture capital life cycle (LC)	4 (LC)	VC's exit: issues associated with IPOs	70 (2000)	Underpricing, exit choice, VC's certification & reputation, creation of public companies	Meggison & Weiss 1991, Gompers 1996; Barry et al. 1990, Lee & Wahal 2004	Information asymmetries (Leland & Pyle, 1977); Specific concepts: certification role (Meggison & Weiss, 1991), underwriter reputation (Carter & Manaster, 1990), grandstanding hypothesis (Gompers, 1996)
	5 (LC)	Financial contracting, venture financing and control mechanisms	70 (2001)	Information asymmetries, governance, agency problems, hold up, moral hazard, adverse selection, (control) rights, monitoring, contracting, convertible securities, corporate finance	Kaplan & Strömberg 2003; Kaplan & Strömberg 2004; Admati & Pfleiderer 1994; Bergemann & Hege 1998	Agency theory (Jensen & Meckling, 1976), contracting & corp. finance theories (Myers & Majluf, 1984; Grossman & Hart, 1986), moral hazard (Holmström, 1979)
	7 (LC)	Venture's performance drivers and VC's decision-making	64 (1998)	VC's decision-making process, selection criteria and success factors	Tyebjee & Bruno 1984; Macmillan et al. 1985, Fried & Hisrich 1994	Signaling theory (Spence, 1973), resource-based view (Barney, 1991), upper echelon theory (Hambrick & Mason, 1984)
	8 (LC)	VC-E-relationships: VC's involvement	46 (1996)	VC's involvement, monitoring, VC's value adding activities, control & advice, VC's governance, trust	Gorman & Sahlman 1989; Sapienza 1992; Macmillan et al. 1989	Agency theory (Fama & Jensen, 1983; Eisenhardt, 1989a), organizational trust (Mayer et al., 1995)
	11 (LC)	Signaling & venture valuation	30 (2006)	Competitive advantage, quality signals, human capital, social capital, reputation & status	Shane & Cable 2002; Hsu 2007; Hsu & Ziedonis 2013	Signaling theory (Spence, 1973)
B. Interfirm relationships and knowledge exchange (IR)	1 (IR)	CVC and interfirm knowledge transfer & acquisition	125 (2003)	Organizational learning, knowledge transfer, strategic venture investing, interfirm collaboration, innovation strategy	Dushnitsky & Lenox 2005; Dushnitsky & Lenox 2006; Katila et al. 2008	Absorptive capacity (Cohen & Levinthal, 1990), dynamic capabilities (Teece et al., 1997), organizational learning (March & Levitt, 1988), knowledge-based theory (Grant, 1996)
	3 (IR)	RBV in venture capital: the role of networks and social capital	76 (2000)	Syndication networks, interorganizational networks, relationship formation, partnerships,	Sorenson & Stuart 2001; Lerner 1994, Stuart et al. 1999, Wright & Lockett 2003	Resource-based view (Pfeffer & Salancik, 1978), Social network theory (Granovetter, 1973), social capital (Coleman, 1988), organizational

				reputation & status, resource accumulation		ecology (Hannan & Freeman, 1977); theory of syndicates (Wilson, 1968)
	12 (IR)	RBV in venture capital: the role of reputation	28 (2003)	Reputation, status, prestige, information, attention	Dimov, Shepherd & Sutcliffe 2007; Pollock et al. 2010; Lee, Pollock & Jin 2011	Agency & signaling theories, attention-based view (Ocasio, 1997)
C. Economic view, policy, and market for entrepreneurial finance (EP)	2 (EP)	Venture capital from an international and institutional perspective	94 (2006)	Cross-country & cultural distance, VCs in emerging economies, localization, institutional differences; market differences	Cumming, Schmidt & Walz 2010; La Porta et al. 1998; Dai et al. 2012	Institutional economics and legal theory (La Porta et al., 1997; La Porta et al., 1998; North, 1989), cultural dimensions (Hofstede, 1980), liability of foreignness (Zaheer, 1995)
	6 (EP)	Venture capital markets: economy, policy, and market creation	69 (2007)	Government policies, venture capital market creation, legislation and institutional setting, economic impact: growth and employment, governmental venture capital (GVC); macro level perspective	Jeng & Wells 2000; Lerner 2000; Leleux & Surlemont 2003; Grilli & Murtinu 2014	Broad application of different theories such as institutional & legal theory (La Porta et al., 1998), public finance theories, regulatory economics, or information asymmetries (Akerlof, 1970)
	9 (EP)	Venture capital in the context of private equity	33 (2009)	Risk & return, private equity fund structure, fund performance	Kaplan & Schoar 2005; Gompers 2000; Cochrane 2005	Broad application of different theories depending on the research focus of the studies
	10 (EP)	Venture capital: business contributions	32 (2007)	Innovation, growth, performance, professionalization measures, patenting	Kortum & Lerner 2000; Hellmann & Puri 2000; Chemmanur et al. 2011	Broad application of different theories depending on the research focus of the studies
	13 (EP)	The landscape of entrepreneurial finance	28 (2006)	Business angels, crowdfunding, informal venture capital, bank, equity financing,	Elitzur & Gavius 2003; Drover et al. 2017; Mason & Harrison 2002	Broad application of different theories depending on the research focus of the studies
	D. Connecting (CP) and Methodology (M) Papers	M	Methodology Papers	36 (1995)		Heckman 1979; White 1980
CP		Connecting Papers	157 (1996)		Sahlman 1990; Gompers 1995, Hellmann & Puri 2002	Amongst others: agency theory (Jensen & Meckling, 1976), behavioral theory of the firm (Cyert & March, 1963), RBV (Barney, 1991 & Wernerfelt, 1984), information asymmetries and hidden characteristics (Akerlof, 1970), theory of economic development (Schumpeter, 1934), economic and risk theory (Knight, 1921)

FIGURE 1

Co-citation network 1921-2020.



Note. Research Areas (A-C) are named after the average publication year of the included studies, starting with the oldest studies (A.). Clusters are named according to their size in terms of included studies, starting with the largest (1st: CVC). For each cluster, the connecting lines show the two strongest connections to other clusters.

STUDY 2:
**CORPORATE VENTURE CAPITAL AS DRIVER OF STRATEGIC CHANGE? AN
INTERORGANIZATIONAL LEARNING PERSPECTIVE**

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ABSTRACT

Incumbent firms use corporate venture capital (CVC) as an interorganizational learning mechanism to get access to new technologies or to study and enter foreign markets. When companies adapt their product portfolios or expand their business activities geographically, strategic change takes place. Nonetheless, research still lacks an understanding of CVC's impact on both dimensions of strategic change. Building on learning theory, we examine the impact of CVC activity on *product portfolio change* and *geographic change* using a sample of 1,458 CVC units and 6,751 transactions. Our study empirically shows that technology-related CVC investments lead to subsequent product portfolio adjustments, while investments in foreign start-ups drive geographic change. Our paper also finds that these positive change effects diminish with increasing industry and cultural distance, as higher investment uncertainty and risk arise from identifying (excessively) heterogeneous knowledge. Thus, increasing distance reduces the effectiveness of interorganizational learning and impedes strategic change. However, our paper confirms that CVC represents a catalyst for knowledge acquisition and related strategic change, offering practical insights for firms seeking to leverage CVC as a low-cost mechanism for product and geographic diversification.

Keywords: Strategic change, corporate venture capital, product portfolio diversification, internationalization, interorganizational learning, interfirm collaboration

INTRODUCTION

Firms strive for strategic change, an important instrument to achieve competitive advantage, survival, and superior performance (Barker & Duhaime, 1997; Carpenter, 2000). Previous research framed organizational learning as one of various factors that either foster or impede the strategic change of firms (Holmqvist, 2003; Klammer et al., 2017; Mohammad, 2019). In turn, interfirm relationships (such as alliances or joint ventures) represent "a catalyst for learning" (Inkpen, 2000, p. 1019), as they provide the opportunity to observe the partner firm's processes and to transfer relevant knowledge (Huber, 1991; Kogut, 1988).

However, little is known about how one specific form of interfirm collaboration, corporate venture capital (CVC), and its associated learning effects influence an investing company's ("parent firm") ability to change itself. This is even more surprising given that equity-based partnerships are more effective at interorganizational learning and related knowledge sharing than non-equity-based interfirm linkages (Milagres & Burcharth, 2019; Schildt et al., 2005). Thus, CVC is referred to as an "external knowledge acquisition strategy" (Belderbos et al., 2018, p. 20). Consequently, we investigate whether CVC-induced learning outcomes affect the parent firm's product portfolio and geographic change.

In recent years, CVC has gained considerable economic importance and has established itself as one of the most essential sources of entrepreneurial finance. CVC represents a type of venture capital in which established companies fund start-ups in exchange for minority equity stakes (Drover et al., 2017). CVC units are formed because parent firms pursue strategic rather than financial goals. Companies use CVC to study novel technologies and markets or to strengthen and leverage existing capabilities (Haslanger et al., 2022; Narayanan et al., 2009; Pinkow & Iversen, 2020). Since CVC managers have insights into the processes and development of both the start-up and the investing company, they act as knowledge brokers and represent essential sources of information for the established firm's strategic decision-making.

The CVC-induced knowledge acquisition can lead to a transformation of an incumbent firm's corporate strategy – better known as strategic change. Strategic change differs in terms of its form, quality, and duration (Olander Roese & Sikström, 2014), resulting from the company's adaptation to its external environment (Rajagopalan & Spreitzer, 1997). Firms pursue strategic change to optimize the alignment with the business environment (Bourgeois, 1980). Ginsberg (1988) conceptualizes strategic change by differentiating between corporate-level strategies, which focus on product and market domains, and business-level strategies, which address competitive decisions in specific business sectors. This conceptualization emphasizes the wide range of change-related corporate activities, such as the degree of product and geographic diversification, the investment intensity in research and development, or the reallocation of key resources (Finkelstein & Hambrick, 1990; Hoskisson & Hitt, 1988; Sanders & Carpenter, 1998; Wiersema & Bantel, 1992).

CVC transactions and their effects on the investing firm's subsequent strategic change hold great practical relevance. Although CVC investments are only minor in scale compared to other forms of interorganizational collaboration, they are particularly important in overall strategy formulation (Maula et al., 2013). CVC plays an important role in strategic management because it offers a wide range of potential benefits to parent companies, such as being a listening post for product and market developments or identifying acquisition targets (Chesbrough, 2002; Huang & Madhavan, 2021). Through interactions with the funded start-ups, the investing firms gain new knowledge. This inflow of knowledge can lead to substantial adjustments to the investing firm's existing strategy (e.g., product development, diversification, or internationalization), effectively causing strategic change. For instance, new knowledge creation and acquisition methods are compelling for established firms, given the backdrop of increasingly shorter product life cycles (van Iwaarden & van der Wiele, 2012). In this context, our study provides practical insights into whether and to what extent CVC, as a low-cost form of interfirm linkage, serves an efficient strategic instrument.

Despite the growing popularity of CVC investments, there has been little research to date addressing the relationship between CVC, as part of a firm's corporate venturing activities, and strategic change (Basu & Wadhwa, 2013; Narayanan et al., 2009; Sharma & Chrisman, 1999). This research gap is surprising, as a primary motive for CVC investment is to identify promising knowledge resources and promote interorganizational learning (Pinkow & Iversen, 2020). Learning, in turn, represents a key determinant of a firm's strategic change level (Klammer et al., 2017). Therefore, the CVC-related learning effects are expected to influence the subsequent strategic change of the investing firm. Nonetheless, existing research lacks an understanding of CVC's impact on the various dimensions of strategic change: only Basu and Wadhwa (2013) have analyzed the relationship between CVC investments and discontinuous strategic change. Since this represents just one facet of strategic change, we address the research gap by examining the impact of CVC investments on two major dimensions of strategic change. As the product market and geographic diversification are essential elements of a firm's strategic approach, our overarching research question is: *What is the impact of CVC activity on the parent firm's product portfolio and geographic change?*

We investigate the impact of CVC investments on both change dimensions, as incumbents use CVC to learn about technological developments or geographic markets (Belderbos et al., 2018; Dushnitsky, 2008). However, the success of the CVC-induced interorganizational learning depends on the distances between the parties involved (investing firm and venture) because aspects such as the heterogeneity of knowledge, uncertainty, and mutual trust are closely related to distance (Baldi et al., 2015; Lane & Lubatkin, 1998; Pak et al., 2009; Weber & Weber, 2007). Thus, we also examine the moderating effects of industry distance on the CVC activity-product portfolio change relationship. Similarly, we analyze the impact of cultural distance on the incumbent's geographic change. Using a sample of 1,458 CVC units, we examine 6,751 individual CVC transactions from 1999 to 2019. Our research model is summarized in Figure 1.

Insert Figure 1 here.

To address the previously identified research gaps, this study sets out to accomplish several key objectives. First, we investigate whether CVC functions as an external growth strategy for acquiring knowledge despite being one of the low-cost forms of interfirm linkages. Two types of strategic change are examined (product portfolio change and geographic change) to determine whether CVC investments are generally conducive to change or may have opposing effects. We focus on these change dimensions as the product market and geographic diversification are crucial elements of a company's strategy formulation (Westphal & Fredrickson, 2001). By analyzing two distinct types of change, we are able to draw conclusions about whether the effectiveness of interorganizational learning varies depending on the strategic goal of the CVC transaction. Second, we enhance the understanding of the temporal aspect of CVC-induced learning. Thus, we apply a time-lagged analysis to assess how long the learning process takes before notable changes in the investing firm's strategic approach become apparent. Third, we aim to gain insight into how the efficacy of CVC-related learning is affected by increasing distance from the funded start-up. By examining two distance measures, we can offer practitioners guidance on the required technological or geographic overlap level between the venture and the investing firm to optimize the success of learning outcomes.

Our study contributes to the growing literature on corporate entrepreneurship and strategic management in multiple ways. First, we are among the first researchers to analyze CVC's causal effects on the parent firm's strategic change. In recent years, CVC investments and research publications on CVC have increased considerably, underscoring its importance in incumbents' strategy formulation. Consequently, we are particularly interested in examining how CVC and associated learning influence a critical aspect of a firm's strategic planning: changes in a firm's strategy. Indeed, our study provides empirical evidence that CVC

investments act as a catalyst for strategic change. Technology-related CVC investments lead to subsequent product portfolio change, and CVC investments in foreign start-ups promote geographic change. However, these positive change effects become weaker when investing in more culturally or industry-distant ventures, as investment uncertainty and risk increase due to the identification of (excessively) heterogeneous knowledge.

Second, our study provides theoretical contributions by constructing a framework that applies interorganizational learning theory to connect CVC with strategic change. Although the literature on CVC, strategic change, and interfirm linkages deals with learning theory, the interplay of these phenomena has not yet been examined in relation to interorganizational learning. Therefore, we present the first interdisciplinary work linking the research fields of CVC and strategic change through the lens of learning theory. To gain a more pronounced understanding of the learning effects and expand the boundaries of interorganizational learning theory, we also investigate how industry and cultural distance affect learning success and subsequent change. Indeed, the existing literature emphasizes that the efficacy of interorganizational learning is affected by the various forms of distance between two parties, because aspects such as knowledge heterogeneity, cultural disparities, or uncertainty depend on distance. Thus, our study is highly interdisciplinary, as it refers to several distance-related phenomena that need to be thoroughly analyzed for their impact on the learning process.

Third, in line with learning theory, we consider time-lagged effects by examining the strategic change level following a CVC transaction over four years. In the context of our research model, it is particularly interesting to explore time-lagged effects, as we assume that the CVC-induced learning process takes place over several periods. This means that the investing firms gain a better understanding of the newly acquired technologies, integrate them into their operations, and may decide to expand their business activities into another segment over time. Similarly, the incumbents' internationalization practices increase after the foreign

venture's funding as the investing firms learn more about the target region's characteristics and institutions.

CONCEPTUAL BACKGROUND

Corporate Venture Capital

In addition to the more familiar forms of interorganizational collaboration, minority equity investments in promising start-ups, also known as CVC, have gained considerable importance within corporate entrepreneurship (Henley, 2007). CVC-backed financing increased fivefold to \$170 billion between 2016 and 2021 (CB Insights, 2022), indicating that CVC has become an essential strategic tool (Anokhin et al., 2016). By now, incumbent firms make more than 25% of all venture capital transactions (Haslanger et al., 2022). CVC is especially interesting for established firms because they typically require smaller investments than both acquisitions and internal R&D and can be terminated more easily (Folta, 1998).

Asel et al. (2015) note that firms rely on various strategic instruments to enhance their existing knowledge or to acquire new knowledge: they build, buy, partner, and invest. CVC investments can be assigned to both the partnership and the investment approach as they are located between alliances and acquisitions: in return for both access to the funded venture's technologies and the opportunity to learn about a new region, CVC units provide value-added services (consulting, networking, etc.) to the start-up in addition to the equity investment (Dushnitsky, 2008; Maula et al., 2005). Sometimes, incumbents invest a minority stake first and acquire the whole venture later, especially when uncertainty is high (Kim & Park, 2017).

Although some established firms launch CVC programs primarily seeking financial returns (like independent venture capitalists or private equity firms), most corporate parents pursue strategic objectives by applying learning mechanisms (Drover et al., 2017; Schildt et al., 2005). CVC investments can play an important role for parent firms in identifying and acquiring unknown technologies or monitoring market developments. Accordingly, both parties share

knowledge by interacting and communicating frequently. For example, corporate investors are often given a seat on the board or specific rights that enable them to gather technological or market-related information (Wadhwa et al., 2009). Hence, CVC serves as an effective mechanism for interorganizational learning (Keil et al., 2018), which determines strategic change (Klammer et al., 2017).

Strategic Change

Due to dynamic (and often unpredictable) environments, it is inevitable that firms pursue change to remain competitive (Ginsberg, 1988), although the processes of formulating and implementing such strategic change are inherently complex and challenging (Olander Roesse & Olsson, 2012). However, in the literature, the understanding of strategic change is quite broad. There are a variety of different terms that are used interchangeably, e.g., strategic transformation, strategic renewal, strategic variation, strategic deviation, corporate refocusing, organizational change, strategic experimentation, strategic adjustment, and strategic flexibility (Carpenter, 2000; Huff et al., 1992; Müller & Kunisch, 2018; Nicholls-Nixon et al., 2000; Pathak et al., 2014; Snow & Hambrick, 1980). Correspondingly, Greiner and Bhambri (1989) provide a broad and well-established definition of strategic change: "a shifting interplay between deliberate and emergent processes that receive their relative emphasis under certain environmental and organizational conditions, leading radically or gradually to major changes in strategy (e.g., mission, product/market mix), and/or organization (e.g., structure, systems, culture, people), and which result in a realignment between the firm and its environment" (p. 68). Therefore, strategic change is a significant corporate transformation process in which firms shift their business activities, product scope, resource deployments, goals, or strategic orientation (Klammer et al., 2017; Müller & Kunisch, 2018; Rajagopalan & Spreitzer, 1997).

Since product market and geographic diversification represent key elements of a firm's strategy formulation (Westphal & Fredrickson, 2001), we examine the impact of CVC

investments on two essential dimensions of strategic change: *product portfolio change* and *geographic change*. We focus on both change dimensions by drawing on interorganizational learning theory (Lane & Lubatkin, 1998) and linking them with specific measures (Table 1).

Insert Table 1 here.

Product portfolio change. A firm's core task is to continuously adjust its product portfolio, for instance, when the environment changes or a product nears the end of its life cycle. In line with this, Floyd and Lane (2000) define strategic change as a frequent process in which incumbents foster and process new knowledge to modify their product portfolio. Thus, we focus on an investing firm's product- and technology-related learning effects and label this as product portfolio change (Westphal & Fredrickson, 2001). In accordance with existing literature, we link this dimension with Palepu's (1985) entropy measure, which considers the annual change in the number of segments or industries in which parent firms operate. More specifically, this dimension of change refers to the adjustment of a firm's product diversification strategy from one year to another (Wiersema & Bantel, 1992).

Geographic change. The degree of a firm's international engagement indicates its dependence on foreign markets and in how many countries it operates (Sullivan, 1994). When firms decide to go international, this affects their resources, sales, or customer orientation. Therefore, geographic change is an action that companies take to alter the scope of their international operations. In this vein, we conceptualize geographic change as the strategic (annual) shift of firms towards more substantial (or diminished) international commitment, encompassing foreign assets or the number of subsidiaries abroad (Westphal & Fredrickson, 2001). We link this approach with Sanders and Carpenter's (1998) geographic diversification measure.

THEORY AND HYPOTHESIS DEVELOPMENT

Interorganizational learning theory, as part of both the resource- (RBV) and knowledge-based view (KBV) (Barney, 1991; Grant, 1996), represents the primary theoretical approach in our study to explain how firms renew themselves using interfirm linkages (Das & Teng, 2000; Narayanan et al., 2009; Schmitt et al., 2018). Although the literature on both CVC and strategic change draws on learning theory, little research has combined these phenomena by applying the interorganizational learning framework. Our theoretical model (Figure 2) suggests that CVC-induced interorganizational learning subsequently affects the parent firm's strategic change (Crossan et al., 1999).

Insert Figure 2 here.

Corresponding to the basic ideas of the RBV and KBV, a firm is defined as a set of different resource bundles (such as product- or market-related knowledge). Companies possessing scarce, non-substitutable, difficult-to-imitate, and value-creating resources can achieve a competitive advantage by leveraging and combining these firm-specific, unique resources (Barney, 1991; Wernerfelt, 1984). However, when firms identify resource gaps in their processes, they either need to develop resources internally or acquire external ones and combine them with existing resources to create new resource bundles and remain competitive (Ahuja, 2000; Das & Teng, 2000; Lai et al., 2010). Thus, interfirm collaborations provide external options to find relevant (knowledge) resources, integrate them into corporate processes, and create value (Basu et al., 2011; Das & Teng, 2000).

The knowledge transfer process is divided into searching for and identifying relevant knowledge, its acquisition, subsequent assimilation, and finally, its integration (Milagres & Burcharth, 2019). Thus, when knowledge gaps become apparent, companies should seek out, discover, evaluate, and incorporate external knowledge using interorganizational learning to

leverage the newly created knowledge base (Ahn et al., 2021). In this context, firms interact and communicate with partner firms or analyze the partner's core processes and key resources. Next, companies assess and interpret the partner's identified knowledge resources to determine whether integrating them into their processes could be advantageous. In this case, the firms become active in eventually transferring and implementing the potentially valuable knowledge into their own knowledge base (Levitt & March, 1988; Tamayo-Torres et al., 2016). For example, when companies build interfirm relationships and monitor the partner firm's processes, they can identify novel knowledge about technologies, strategies, or markets (Bruneel et al., 2010; Wadhwa & Basu, 2013). Moreover, the acquired knowledge can be internalized, accumulated, and stored for future use (Narayanan et al., 2009).

The literature emphasizes that the efficacy of interorganizational learning is affected by the various forms of distance between incumbents and ventures, because aspects such as the heterogeneity of knowledge, cultural disparities, or uncertainty depend on distance (Baldi et al., 2015; Pak et al., 2009; Wadhwa & Basu, 2013). As far as product portfolio change is concerned, it is particularly interesting whether investments are made into ventures operating in the same, similar, or in an unfamiliar industry. This concept is called industry distance (Keil et al., 2008). For the geographic change dimension, it is relevant whether CVC units invest in culturally close or distant ventures (cultural distance). To address these aspects, we examine the moderating effects of industry distance on product portfolio change and cultural distance on the geographic change level.

Product Portfolio Change

Firms make CVC investments to monitor emerging markets, pool (or exchange) technology-related knowledge, and refine their product range (Pinkow & Iversen, 2020; Yang, 2012). Through interactions with the venture, investing firms identify and process attractive complementary knowledge and learn about novel technologies. Subsequently, based on the

learning outcomes, the investing firms can either adjust an existing product or expand their activities into another segment by launching an entirely new product (Pinkow & Iversen, 2020; Wadhwa & Basu, 2013; Wiersema & Bantel, 1992).

As regards product portfolio-related change effects, incumbents use CVC investments as an interorganizational learning mechanism to identify knowledge about new technologies (Haslanger et al., 2022), which is then integrated into the parent firm's processes, business models, and product development (Lee et al., 2015; Wadhwa & Basu, 2013; Wadhwa et al., 2009). By investing in promising ventures, CVC parent firms are able to discover novel and profitable markets and technologies for future operations and business activities (Yang, 2012). With higher CVC activity, parent firms consequently gain more insights into a larger number of potential product markets. If the parent firms increase their business activities in these previously unknown markets (by launching new products) in subsequent periods, this will be equivalent to product portfolio change.

Acquiring, understanding, and implementing new technological knowledge can result in a product portfolio change of the investing firm. By analyzing unfamiliar technologies and customer markets, CVC units and the parent firm's internal R&D assess their potential to generate future value. For instance, the identified technologies are utilized to enhance existing products, or the investing companies decide to enter the target's customer market themselves. Increased CVC activity, reflected in larger amounts invested or a higher number of portfolio ventures, is accompanied by a more intensive or diverse exchange of technological knowledge. As more opportunities exist to discover and integrate promising technologies, to interact closely with the respective ventures, and to expand the product range, higher CVC activity should lead to changes in the existing product portfolio. In short, parent firms that are more active in CVC investments have a better chance of effectively transferring knowledge, which is equivalent to product portfolio change. Conversely, when CVC activity is low, firms either invest in a few

ventures or only small amounts. Both scenarios offer less potential for interorganizational learning, resulting in less (or no) change.

Eventually, we expect the effects of CVC on the subsequent change level to become more potent in the post-investment periods as the technological knowledge acquired must first be identified and understood, which will take some time (Milagres & Burcharth, 2019). Afterwards, the new knowledge is (gradually) integrated into the firm's activities and processes, leading to stronger product portfolio change in subsequent years. Therefore, we propose:

Hypothesis 1 (H1): *CVC activity positively influences the parent firm's product portfolio change.*

Moderator: Industry Distance

Following our theoretical framework, we examine the moderating effects of *industry distance* on changes in the product portfolio following CVC investments. Industry distance refers to how close firms are in terms of their products, i.e., whether they operate in similar or different product markets (Keil et al., 2008). The industry distance between investing firms and the ventures will play a major role in the CVC-strategic change relationship, as investments in more distant start-ups involve technologies and customer markets about which the investing parent firm only has little prior knowledge.

CVC investments in ventures from distant industries should result in less product portfolio change due to more severe technological uncertainties (Baldi et al., 2015). After investing in and subsequently exchanging knowledge with ventures from unrelated industries, the investing firms realize that they lack the required knowledge to successfully integrate the most promising technologies into their own processes, or at least to identify them (Hill & Birkinshaw, 2014). The parent firm's limited familiarity with the distant venture's customer markets and technologies, which lie beyond the incumbent's boundaries and previous knowledge base (Wadhwa & Basu, 2013), makes it challenging to accurately assess the

potential benefits of integrating the novel knowledge. In particular, investing companies face two key uncertainties: first, whether they possess the capabilities to understand, integrate, and develop unfamiliar technologies, and second, whether the venture's technologies can deliver value in the future (Wadhwa & Basu, 2013). Thus, the greater the industry distance between the two partners, the more difficult it becomes to establish a successful learning relationship and to integrate knowledge into the investing firm's knowledge base (Inkpen, 2000; Yang, 2012). Accordingly, when investing in industry-distant ventures, there are fewer adjustments to the product portfolio and fewer entries into new product markets, leading to less change.

Conversely, the impact on product portfolio change is expected to be more pronounced for investments in ventures from similar, complementary industries (low distance) due to lower technological uncertainties and risks. Thus, investments in close ventures lead to change, as the parent firms and their R&D department can more effectively evaluate, learn, and quickly comprehend the acquired knowledge due to similar knowledge bases (Dushnitsky & Shaver, 2009; Hill & Birkinshaw, 2014), which simplifies the learning process. Promising technologies are then further developed, which may lead to the introduction of new products, for example, in neighboring customer markets, reflecting a change in the product portfolio. Consistent with our argument, existing research suggests that interorganizational learning success is maximized among technologically similar firms (Katila & Ahuja, 2002; Lane & Lubatkin, 1998). This learning efficiency stems from two factors: first, the incumbent's existing knowledge helps with identifying, interpreting, and integrating new technologies (Cohen & Levinthal, 1990; Schildt et al., 2005). Second, the similar knowledge bases of both parties result in fewer conflicts and better alignment. By combining the parent firm's existing knowledge base with insights from complementary industries (Pinkow & Iversen, 2020), new knowledge can be created, leading to the development and launch of innovative products. Consequently, firms are likely to experience more efficient learning when investing in technologically similar ventures and are

more inclined to expand into adjacent segments (Lennerts et al., 2020; Schildt et al., 2005), implying product portfolio change. Overall, we propose:

Hypothesis 2 (H2): *Industry distance between the parent firm and start-up negatively moderates the CVC activity-product portfolio change relationship.*

Geographic Change

CVC investments can be used to discover, learn about, and evaluate foreign markets (Anokhin et al., 2016; Wadhwa & Basu, 2013; Zahra & Hayton, 2008). Once an attractive region has been identified, CVC units scan the market for suitable start-ups in which to invest. After the investment, CVC units regularly interact with the start-up to gain a more comprehensive picture of relevant institutions or regional characteristics (Dushnitsky, 2008). Thus, establishing CVC units is a strategic means of market exploration to study foreign habits, to find lucrative regions and international business opportunities, and to access location-specific knowledge (Belderbos et al., 2018; Winters & Murfin, 1988). Ideally, and depending on the learning results, CVC investments contribute to a parent firm's strategic decision to pursue further activities in the target country or to refrain from doing so.

Consequently, higher CVC activity is positively associated with increasing geographic change practices in later periods as companies seek to obtain a coherent picture of the target country and subsequently expand their activities. Research has shown that the primary obstacle to not engaging in international expansion is a lack of understanding of foreign markets (Bruneel et al., 2010; Lamb & Liesch, 2002). On these grounds, we expect that the more internationally active CVC units are, the more seriously willing the parent firms will be to intensify their business activities abroad in subsequent years. Hence, they exchange information with the funded start-up to screen, observe, and test the market conditions. Moreover, CVC, as a comparatively resource-efficient approach, can be used to identify suppliers and partner firms to establish initial business relationships in the target region (Hill & Birkinshaw, 2008; Magni

et al., 2022). Similarly, CVC is often used to find and assess promising foreign acquisition targets (Zahra & Hayton, 2008). Parent firms first invest a minority stake to better evaluate a venture's potential, and when they improve their understanding, they acquire the funded start-up. Thus, the more money that is spent on foreign targets, and the larger the international portfolio, the stronger the subsequent geographic change effect should be.

The CVC-related learning process should increase internationalization practices that span multiple periods of the post-investment phase, as the uncertainty and perceived risk related to the target country are relatively high at the time of investment (Titus et al., 2017). After the initial transaction, CVC units accumulate foreign market-related information and incorporate it into their knowledge base (Bruneel et al., 2010; Narayanan et al., 2009). By learning best practices and adapting to the region's characteristics (Zahra & Hayton, 2008), companies assess the potential to succeed in the country, learn how to set up international activities, and they may decide to become more involved in the foreign target market (Du et al., 2020; Wadhwa & Basu, 2013). Likewise, when CVC is used to test start-up candidates for subsequent M&A activity (Lee & Kang, 2015), it also takes several periods to close major internationalization deals. Therefore, we propose:

Hypothesis 3 (H3): *CVC activity positively influences the parent firm's geographic change.*

Moderator: Cultural Distance

Due to considerations similar to those in the industry distance hypothesis (H2), we address *cultural distance* as a moderator variable and examine whether it influences the relationship between CVC activity and geographic change. Cultural distance refers to the divergence in norms, attitudes, institutions, work habits, or values between one country and another (Kogut & Singh, 1988; Slangen, 2006). Companies require instruments to identify and better understand cultural disparities before intensifying international operations. As marketing

or labor relations practices, for example, heavily depend on culture, the prior acquisition of local competencies is essential if firms subsequently plan to expand geographically (Datta & Puia, 1995). Thus, investing firms strive to assess whether the cultural challenges for future international business activities can be overcome. In this vein, firms often select low-commitment entry modes when exploring culturally distant countries to mitigate investment uncertainty and risk (Brouthers & Brouthers, 2001; Hutzschenreuter et al., 2016; Moalla & Mayrhofer, 2020).

Indeed, investments in more distant ventures are both riskier and less certain in terms of their prospects of success, as increased cultural distance correlates with higher transaction and information acquisition costs, diminishing cooperation, and less efficient interorganizational learning (Hong et al., 2006; Pla-Barber et al., 2010). Analogously, Roy et al. (2016) find that culture and language pose major obstacles to a firm's internationalization process. Correspondingly, divergent cultures between investing firms and the target entities can impede efficient communication and mutual trust building (Pak et al., 2009; Pesch & Bouncken, 2017). Therefore, the process of acquiring knowledge about new markets is adversely affected when the cultural distance between both parties becomes too substantial (Beugelsdijk et al., 2018; Wu et al., 2007). Due to these challenges in identifying and processing knowledge about the potential target market, incumbents will refrain from diversifying their activities abroad. With a larger distance, similar mechanisms are at play as with other forms of cross-border interfirm linkages (such as acquisitions or alliances), often leading to their failure (Barkema & Vermeulen, 1998; Oh & Yoo, 2022). Therefore, cultural distance will negatively affect the relationship between CVC activity and geographic change. We anticipate this effect to be even more pronounced in the immediate post-investment period as parent firms swiftly recognize significant cultural differences and considerable challenges in pursuing further business opportunities abroad. Consequently, incumbents are likely to make a rapid strategic decision to

halt further investments in distant regions, amplifying the negative moderation effect in the first periods.

In contrast, the negative moderating effects on geographic change should be less pronounced when investments are made in proximate ventures. When incumbents select ventures with low cultural distance, substantial parallels emerge, e.g., in language, institutions, work practices, or dominant habits. These commonalities facilitate communication, knowledge sharing, and the interorganizational learning process. The convergence of these factors results in a profound comprehension of the target region, minimizing uncertainties concerning the subsequent expansion of international business activities. Thus, it is more likely that there will be expansion into culturally close countries, as incumbents perceive similar regions as less risky. This implies that more internationalization practices (higher change levels) are adopted when the cultural distance is low.

Overall, although CVC companies acquire location-specific knowledge and seek to understand the target region's peculiarities, cultural disparities result in higher (investment) complexity, risk, and uncertainty (Kraus et al., 2015; Tihanyi et al., 2005). Thus, the investing firms realize that the cultural differences are too substantial to successfully overcome in subsequent periods and refrain from further internationalization practices. Correspondingly, the geographic change level decreases with cultural distance. Therefore, we propose:

Hypothesis 4 (H4): *Cultural distance between the parent firm and start-up negatively moderates the CVC activity-geographic change relationship.*

METHODOLOGY

Sample

The sample comprises 6,751 individual transactions from 1,458 CVC units worldwide between 1999 and 2019. Their parent companies are located in North America (51.0%), Asia (25.0%), Europe (23.1%) and the rest of the world (0.9%). Using Capital IQ as the primary source, we retrieved data on CVC units by selecting "Corporate Investment Arm" and matched these units with their ultimate corporate parents (UCP). Subsequently, we extracted the required data on the UCPs directly from Capital IQ, ensuring a comprehensive and consistent dataset for our analysis. Our analysis is subject to several exclusions: first, we only focused on closed transactions. Second, we excluded data from parent firms listed under SIC code six, which corresponds to the finance and insurance sector, as we assume that these companies are pursuing financial rather than strategic objectives. Finally, we manually verified the plausibility of the unit names to ensure that they were CVC units of established firms.

Variables

Independent variable: CVC activity

This study employs the CVC activity as the independent variable (e.g., Basu & Wadhwa, 2013). CVC activity equals the logarithmized accumulated value of individual transactions of CVC units divided by the parent firm size and age of the CVC unit on a yearly basis and is measured as follows:

$$CVC\ activity = \frac{\frac{\sum H_{Tx}}{S_{Tx}}}{Year_{Tx-T_0}}$$

H equals the logarithmized cumulative value of a CVC unit's current and past transactions on an annual basis. To account for the influence of the company's size, we divided the accumulated transactions by firm size S of the current year. Firm size was measured by the logarithm of the firm's total assets, adjusted for historical exchange rates. To consider the

frequency of transactions, we have divided the value by the number of years since the CVC unit was founded. Therefore, we set T_x as the year the transaction took place and T_0 as the founding year of the CVC unit.

Dependent variable: Strategic change

Product portfolio change. Product portfolio change (SC_PROD_PORT) is based on product market diversification (Westphal & Fredrickson, 2001). To measure change, we examine the yearly alteration of a firm's product diversification. Product market diversification is operationalized using the entropy measure, which takes into account the number of business segments in which a firm operates and weights each segment according to its contribution to total sales. The index ranges from 0 to 1, with higher values indicating a greater concentration of operations in fewer segments (Palepu, 1985).

Geographic change. To quantify the annual variation of the extent to which a company is geographically diversified, we operationalized geographic change (SC_GEO) using Sullivan's (1994) geographic diversification composite measure. This measure includes three components: (1) the ratio of foreign sales to total sales and (2) foreign assets divided by total assets. According to Sullivan, the number of country subsidiaries of the respective parent firm (3) is calculated as a percentage based on the highest value in the sample (geographic dispersion). Due to a lack of country data, we used the sum of geographic segments, in which a company reports assets in its annual report, as a proxy. Finally, we summed up the three variables to form a composite measure. These three components represent distinct but interrelated aspects of a firm's degree of internationalization (Sanders & Carpenter, 1998; Sullivan, 1994). Combining these attributes provides a holistic view of internationalization while enhancing reliability and reducing measurement errors.

Time is critical regarding corporate reaction (Kunisch et al., 2017). Therefore, to examine the learning and change effects, we followed existing research and chose a reasonable period of one to four years to capture geographic and product portfolio changes (Karaevli &

Zajac, 2013; Tang & Liu, 2016; Wiersema & Bantel, 1992). In the final step, we calculated the annual difference starting from $t_0:t_1$ to $t_3:t_4$ for both change dimensions to measure strategic change.

Moderators

Industry distance. This measure is employed to quantify the degree of industrial similarity between two companies. Building upon previous research (Wadhwa & Basu, 2013), we operationalized industry distance based on the degree of overlap between the SIC (Standard Industrial Classification) codes of the target and parent firm (INDUSTRY_DISTANCE). This ranges from zero (completely identical SIC codes) to one (completely different SIC codes). A complete match results in an SIC distance of zero. A match of the first three digits results in a value of 0.25, the first two digits in a value of 0.5, and the first digit in a value of 0.75. In the absence of a match, the value is one.

Cultural distance. Composite measures, which combine cultural dimensions into a single Euclidean distance index, have been widely used to measure cultural distance (Beugelsdijk et al., 2018). Thus, to measure the cultural distance (CULTURAL_DISTANCE) between the target and parent firm, we applied Kogut and Singh's cultural-distance index (KSI) based on Hofstede's cultural dimensions of the countries in which the companies are headquartered (Hofstede, 2022; Kogut & Singh, 1988). A high KSI value indicates a large cultural distance between the units being compared, while a low value suggests greater cultural proximity.

Control variables

We controlled for firm size, age, prior performance, total transaction height, firm activities, types of interfirm linkages, and year-fixed effects (Appendix 3). To measure *firm size*, we used the total assets of the parent firm (UCP_SIZE) at t_0 . The values have been adjusted to the historical exchange rate in US-dollars. We further applied the natural logarithm to reduce skewness and equalize the results. For robustness reasons, we also tested total revenue as a

proxy for firm size. Both variables correlated with $r = 0.975$. Although we already included firm size in our measure of CVC activity, we added it as a general control variable. Still, a low variance inflation factor ($VIF = 1.70$) indicated no sign of multicollinearity. To control for learning effects caused by the *age* of the CVC unit, we subtracted the year the CVC unit was founded from the year the transaction was announced ($CVC_TRANSACT_AGE$). We further controlled for *prior performance* by calculating the parent firm's return on assets (ROA). ROA is measured as net income divided by average total assets (ROA_UCP). We used data from the year before the announcement (t_{-1} , while t_0 is the year of the announcement). Furthermore, we controlled for the CVC transaction's height by applying the natural logarithm ($TRANSACT_VALUE$).

CVC investments tend to have lower resource inputs than other interfirm linkages. Correspondingly, we controlled for parent firm-specific activities: *IPO (initial public offering)*, *FPO (follow-on public offering)*, *buyback*, *M&A activities*, *downsizing*, *spin-off*, and other *interfirm linkages*, like strategic alliances or joint ventures. Therefore, we coded binary variables for each activity as one if specific parent firm activities occur within a timeframe of two years before the CVC transaction ($t_{-2}:t_0$). We also controlled for a *post-investment merger* to address the investing firm's potential objective of identifying future M&A candidates. Consequently, a binary variable was created, coded as one if the parent firm purchased the target within the five-year study period.

To prevent sample size reduction due to the presence of missing values, we followed previous research (e.g., Abernethy et al., 2021; Wowak et al., 2016) and applied mean imputation for three control variables (Hair et al., 2019): ROA_UCP ($N_{\text{missing}} = 15; 4$), UCP_SIZE ($N_{\text{missing}} = 1; 0$), $TRANSACT_VALUE$ ($N_{\text{missing}} = 344; 293$). The first value in parentheses represents the number of mean imputations regarding product portfolio change, and the second is the equivalent concerning geographic change. Testing the model without mean imputation reduced the sample size to $N = 3833$ for product portfolio change ($H1_{t_0:t_1}$) and $N =$

2250 for geographic change (H3_{t0:t1}). However, the model demonstrated robustness, as evidenced by $\beta = 0.017$; $p < .001$; F-statistic of 3.7; $p < .001$ and $\beta = 0.00$; $p > .1$; F-statistic of 9.161; $p < .001$, respectively.

Data Analysis

To determine the impact of CVC activity on both dimensions of strategic change, we applied an OLS regression. To examine temporary effects, we calculated the regression over four years ($t_0:t_1$ to $t_3:t_4$), where t_0 equals the year the CVC transaction occurred. Due to the impact period of one to four years of strategic change, we only considered CVC units established before 2019.

We developed four estimation models to test the hypotheses. These models examine the effects of CVC activity on two dimensions of strategic change, incorporating industry and cultural distance as moderating variables, along with a comprehensive set of control variables. Each model is specified to be consistent with the respective hypothesis, thus ensuring a robust empirical framework for the analysis.

$$\begin{aligned} \text{H1:} \quad SC_{PORT_{t_{i:i+1}}} &= \beta_{0,i} + \beta_1 CVC_ACTIV \\ &+ \sum_{k=1}^p \beta_k Control_k + \epsilon \quad \text{for } i = 0,1,2,3. \end{aligned}$$

The control variables ($Control_k$) encompass the following: ROA_UCP, UCP_SIZE, TRANSACT_VALUE, CVC_TRANSACT_AGE, M&A, BUYBACK, INTERFIRM_LINK, DOWNSIZING, SPIN-OFF, IPO, FPO, and POST_INVEST_MERGER.

$$\begin{aligned} \text{H2:} \quad SC_{PORT_{t_{i:i+1}}} &= \beta_{0,i} + \beta_1 CVC_ACTIV + \beta_2 INDUSTRY_DISTANCE \\ &+ \beta_3 (CVC_ACTIV \times INDUSTRY_DISTANCE) \\ &+ \sum_{k=1}^p \beta_k Control_k + \epsilon \quad \text{for } i = 0,1,2,3. \end{aligned}$$

$$H3: \quad SC_{GEO_{t:i,i+1}} = \beta_{0,i} + \beta_1 CVC_ACTIV$$

$$+ \sum_{k=1}^p \beta_k Control_k + \epsilon \quad \text{for } i = 0,1,2,3.$$

$$H4: \quad SC_{GEO_{t:i,i+1}} = \beta_{0,i} + \beta_1 CVC_ACTIV + \beta_2 CULTURAL_DISTANCE$$

$$+ \beta_3 (CVC_ACTIV \times CULTURAL_DISTANCE)$$

$$+ \sum_{k=1}^p \beta_k Control_k + \epsilon \quad \text{for } i = 0,1,2,3.$$

In line with our definition, we either frame strategic change as a means of adjusting the existing product portfolio (e.g., by moving into new business segments) or expanding international operations. However, we are aware that CVC transactions can be used for both (Wadhwa & Basu, 2013). Therefore, we only included cross-border transactions to minimize scatter effects when calculating geographic change. For our analysis regarding product portfolio change, we focused on domestic transactions only and, thus, excluded cross-border transactions.

To control for multicollinearity, we calculated the VIF of our variables. The results showed that our variables were below a generally accepted threshold of $VIF < 10$ (Hair et al., 2019). In addition, to control for potential autocorrelation in the residuals of our regression model, we computed the Durbin-Watson statistic (Durbin & Watson, 1951). Our test results were close to the value two, indicating no significant autocorrelation. To assess the normality of the residuals, we also analyzed the residuals using a histogram and a Q-Q plot (Hair et al., 2019). Both visualizations showed no significant deviations from normality, suggesting that the residuals are approximately normally distributed. Furthermore, to test for homoscedasticity, we plotted the residuals against the predicted values (Hair et al., 2019). The scatterplot showed no discernible patterns or funnel-shaped structures, indicating a constant variance of the residuals. Finally, we dealt with outliers by winsorizing at the 1st and 99th percentile levels (e.g.,

Oehmichen et al., 2017). We calculated the regression using the package statsmodels with Python 3.8.11 (Seabold & Perktold, 2010).

RESULTS

Sample Description

Table 2 gives an overview of our variables' descriptive statistics and inter-correlation.

Insert Table 2 here.

We only examined transactions with at least one available strategic change period ($t_0:t_1$ to $t_3:t_4$). Our dataset shows the following characteristics:

- (a) Internationalization: 37.7% of the transactions occur in cross-border activities, while 62.3% are domestic.
- (b) Industry distance: The analysis of the industry distance between buyer and target firms through SIC codes reveals the following investment distribution: 5.17% of firms invest within the same industry, 11.47% invest in firms with the first three digits of the SIC code identical, 5.98% invest in firms sharing the first two digits, and 6.66% invest in firms sharing the first digit. Notably, 70.72% of investments occur in firms from different industries.
- (c) Cultural distance: Cultural distances in cross-border transactions range from very dissimilar cultures (Japan and Netherlands, KSI: 4.67) to very similar cultures (USA and Australia, KSI: 0.02), while the sample median is 1.82.
- (d) Firm size: Our sample shows that large companies are mainly involved in CVC activities. So, the assets of the parent firms at the time of the transaction ranged from 0.5 (e.g., PT Barito Pacific Tbk) to more than a hundred billion USD (e.g., Alphabet,

Microsoft, BP, or General Electric). In comparison, the sample median equals 43.8 billion USD.

(e) Amount of CVC investment: Investments vary from tens of thousands (e.g., Illumina invested in Solarea Bio in 2017) to more than 300 million USD (e.g., Salesforce invested in Automattic in 2019), with a median sample size of 9.0 million USD.

Results of the Regression Analysis

The regression analysis yielded the following results: first, the impact of CVC activity on *product portfolio change* was investigated. H1 posits that higher activity of a CVC unit leads to more product portfolio change within its parent firm, consequently broadening the parent firm's business activities. Our findings indicate a significant positive influence of CVC activity on product portfolio change throughout the observation period ($\beta_{t0:t1} = 0.017$, $p < .001$; $\beta_{t1:t2} = 0.009$, $p < .001$; $\beta_{t2:t3} = 0.015$, $p < .001$; $\beta_{t3:t4} = 0.016$, $p < .001$; Table 3). Therefore, H1 is supported.

H2 posits that the interaction effect of *industry distance* negatively moderates the relationship between CVC activity and product portfolio change. Consequently, the greater the distance between the parent firm and the target, the less the parent firm adjusts its business activities. Our findings indicate a significant negative influence on the relationship throughout the observation period ($\beta_{\text{mod } t0:t1} = -0.016$, $p < .001$; $\beta_{\text{mod } t1:t2} = -0.016$, $p < .001$; $\beta_{\text{mod } t2:t3} = -0.012$, $p < .05$; $\beta_{\text{mod } t3:t4} = -0.019$, $p < .001$; Table 3; Appendix 1). Therefore, H2 is supported.

Insert Table 3 here.

Second, the influence of CVC activity on *geographic change* was tested. H3 states that higher activity of a CVC unit leads to more geographic change of its parent firm. The results demonstrate that CVC activity exerts a significant positive influence, but this is only the case

for the final two periods ($\beta_{t0:t1} = 0.000, p > .1$; $\beta_{t1:t2} = 0.001, p > .1$; $\beta_{t2:t3} = 0.002, p < .05$; $\beta_{t3:t4} = 0.001, p < .1$; Table 4). Therefore, H3 is only partially supported.

H4 posits that the interaction effect of *cultural distance* exerts a negative moderating influence on the relationship between CVC activity and geographic change. Consequently, the more distant the venture, the less the parent firm engages in subsequent international business activities. Our findings indicate a significant negative influence on the relationship for the first three observed periods ($\beta_{\text{mod } t0:t1} = -0.003, p < .001$; $\beta_{\text{mod } t1:t2} = -0.002, p < .001$; $\beta_{\text{mod } t2:t3} = -0.001, p < .05$; $\beta_{\text{mod } t3:t4} = 0.000, p > .1$; Table 4; Appendix 2). Therefore, H4 is only partially supported (Appendix 4 presents the basic models).

Insert Table 4 here.

Supplementary Analysis

Cross-period post-hoc analysis. In addition to considering individual time factors, we conducted a quadratic regression analysis using a structured and standard approach to determine whether the relationship between the variables in our study was linear or curvilinear. To test for curvilinearity, we incorporated polynomial features into the model (Ostertagová, 2012). Specifically, we created a second-degree polynomial term for the independent variable to capture potential quadratic relationships. This involved including linear and quadratic terms along with control variables in the regression model.

To ascertain the nature of the relationship, a significant positive quadratic term indicates the presence of a U-shaped relationship. In contrast, a significant negative term suggests the possibility of an inverted U-shaped relationship. Without a significant quadratic term, it is possible to infer that a linear model might be a more appropriate representation of the data (Haans et al., 2016).

The analysis revealed that for product portfolio change, $\beta = 0.009$, $p < .001$, indicating a significant positive U-shaped relationship. This means that the dependent variable initially decreases and then increases over time (Haans et al., 2016). However, for geographic change, the results of the quadratic regression were $\beta = .0012$, $p > .05$. Thus, with a p-value greater than 0.05, there is no significant quadratic curve. This indicates that a linear model may more accurately describe the data. Consequently, the linear regression model demonstrated a superior fit ($\beta = -.005$, $p < .001$), suggesting a significant negative linear relationship, indicating that the dependent variable decreases over time (Haans et al., 2016). Figures 3 and 4 present the plots of the cross-period analysis.

Insert Figures 3 & 4 here.

Robustness checks to deal with potential endogeneity. We applied several approaches to tackle potential endogeneity issues (Bascle, 2008). First, we time-lagged our dependent variable to avoid simultaneity and reversed causality between our variables. Second, we controlled for year-fixed effects to reduce the chance of omitted variables. Third, we tested our results for robustness with a clustered covariance estimator (Antonakis et al., 2010). This approach led to comparable results. Lastly, we used the Wu-Hausman test to determine if it is necessary to use an instrumental variable method (Sheppard et al., 2020). We chose investment rounds because of their significant correlation with CVC activity in our unreported first-stage results. Investment rounds were measured as the number of transactions in a specific target and depicted the development stage of the target company. However, there was no significant correlation with our strategic change variables (Heckman, 1979). Consequently, using investment rounds as an instrumental variable, the Wu-Hausman test indicated no endogeneity ($p < .05$). Consequently, these approaches served to attenuate endogeneity concerns.

DISCUSSION

Our study examines the effects of CVC activity on two specific dimensions of strategic change: *product portfolio change* and *geographic change*. The study provides interesting insights. First, CVC investments drive product portfolio and geographic change. Second, these effects weaken with increasing industry and cultural distance. In fact, increasing distance leads to diminishing effects because investment uncertainty and risk rise due to the identification of excessively heterogeneous knowledge.

Interpretation of Results and Contribution

Product portfolio change. First, incumbent firms utilize CVC to acquire and incorporate complementary technological knowledge, enhancing their product portfolios or entering new customer markets, thereby driving product portfolio change. Hence, CVC serves as a means of "external R&D" (Kann, 2001, p. 12) to gain a competitive advantage over rivals (Pinkow & Iversen, 2020). Accordingly, our results demonstrate across all post-investment periods that being more active in exploring new technologies and integrating related knowledge leads to stronger subsequent product portfolio change (Table 3). The more pronounced change effects can be attributed to the availability of a higher number of learning and knowledge sources (ventures) when parent firms are more active in CVC investing. Alternatively, being more active in CVC investing involves purchasing larger stakes in one start-up, facilitating closer collaboration and a deeper understanding of novel technologies. As a result, internal R&D evaluates the acquired technological knowledge and learns about its functions and potential added value (Ma, 2020). Ultimately, the investing firms incorporate the knowledge into their processes and products, leading to product portfolio change. This confirms that CVC investments act as an efficient learning and associated change mechanism.

Similarly, higher CVC activity will drive a more significant product portfolio change, as the management of the parent firm may have higher expectations of the investment outcomes.

That is why justifying investments by expanding the product portfolio or strengthening the core business could become a key objective (Ma, 2020). Correspondingly, CVC managers will strive to deliver demonstrable learning successes, for example, in the form of change. Consequently, increased CVC activity facilitates greater technological learning, which in turn leads to the creation of new products (Karim, 2009). Existing literature supports this view, indicating that learning and innovation capabilities positively impact change (Tamayo-Torres et al., 2016).

Regarding time-lagged and related learning effects, product portfolio change becomes even more intense in subsequent years. After acquiring the complementary technological knowledge, the established firms assess the potential value and then "learn" how to integrate it into the existing knowledge bundles (Pinkow & Iversen, 2020). Since we find even stronger positive effects in later periods (Table 3), investing firms require some time to fully comprehend the novel technologies. Afterwards, internal R&D recommends implementing this knowledge and developing the product portfolio. Hence, our time-lagged effects indicate that parent firms build their product portfolio rather gradually (Basu & Wadhwa, 2013). In line with our definition, strategic change could occur through incremental or radical learning (Schildt et al., 2005). While the former involves the gradual adaptation of products and expansion into adjacent customer markets, the radical learning approach refers to entry into entirely new segments (Narayanan et al., 2009). Accordingly, for a more rapid and radical approach to strategic change, the parent firm would have to choose interfirm linkages with higher resource commitments, such as mergers and acquisitions (Bergh & Lawless, 1998).

However, as expected, our results show that investing in industry-distant ventures attenuates the positive change effect because the investing firms face higher levels of (communication) complexity and (transaction) costs as the industry distance to the venture increases (Beugelsdijk et al., 2018; Wu et al., 2007). Thus, firms encounter significant uncertainty and risk upon investing in more distant ventures due to heterogeneous knowledge bases. Consequently, they often decide not to integrate the identified technologies, leading to

fewer changes in their product portfolio (Appendix 1). Internal R&D, lacking familiarity with these technologies, would need to exert considerable effort to understand and incorporate the acquired technological knowledge into existing products or to use it as a basis for new product launches. In addition, in the case of distant investments, market characteristics, processes, and customer needs differ substantially from those of the parent firm (Wadhwa & Basu, 2013), making learning even more challenging.

In contrast, the learning process for internal R&D is simplified if the investing firms select ventures from neighboring industries with complementary technologies. In such cases, R&D employees are likely to possess similar knowledge already, enabling them to quickly identify technological potential and integrate it into the parent firm's processes and products (Hill & Birkinshaw, 2014; March, 1991). This may lead to an expansion of product segments (into adjacent sectors), thereby driving strategic change. Our findings thus support existing research on more efficient collaboration and learning between firms in similar industries (Hill & Birkinshaw, 2014; Sykes, 1986). Ultimately, moving into similar markets is promising for investing firms, as they can better assess their chances of success and predict potential returns more accurately.

It should be emphasized, however, that investing in start-ups from distant industries can also add great value and enable interorganizational learning. Such investments offer parent firms opportunities to explore real options, monitor technological developments, and strengthen their core segments (Anokhin et al., 2016; Baldi et al., 2015; Pinkow & Iversen, 2020). Tong and Li (2011) found that firms resort to CVC (relative to other interfirm linkages), especially when they face high technological uncertainty. CVC helps them stay abreast of innovative developments and diversify their technology-related knowledge sets (Lee & Kang, 2015), allowing them to respond more quickly to market threats while limiting the resources they need to invest (Keil, Autio, & George, 2008). Our descriptive data indicates that this practice is quite common, with over two-thirds (70%) of all investments made in unfamiliar industries. This

aligns with the literature, which highlights the fact that one of the main objectives of CVC is to provide a window into new technologies (Haslanger et al., 2022). This motive enables parent firms to implement strategies that protect and strengthen their core business - which subsequently results in less product portfolio change.

Geographic change. Second, CVC investments in foreign ventures are used to learn about and evaluate unknown markets to initiate internationalization steps with a comparatively low resource commitment (Belderbos et al., 2018; Dushnitsky, 2008). Accordingly, subsequent geographic change is positively affected by CVC activity (Table 4): the more active a CVC unit is in investing abroad, the higher the incumbent's change in international business activities in the post-investment phase. Therefore, we characterize CVC as a "precursor" to the investing firm's later internationalization practices. In preparation for entering the foreign market, relationships are established with local partner firms in subsequent periods. By interacting with the selected ventures, incumbents get a comprehensive picture of the target region and its relevant institutions, values, and work habits (Zahra & Hayton, 2008). The positive change effect in the post-investment phase indicates that parent firms continuously interact with foreign ventures to analyze the region under investigation, develop internationalization capabilities, and expand their foreign market activities (Bruneel et al., 2010; Du et al., 2020). Thus, by gathering information through the venture, the investing firms better understand how to design further business activities in the target country (Magni et al., 2022). Correspondingly, our results support Zahra and Hayton (2008), who state that internationalization processes and venturing require some time. Our findings imply that this is also true for the interorganizational learning process induced by CVC.

However, CVC is not the only strategic means of entering the foreign market for established firms. Still, incumbents use several internationalization practices, such as increasing export activities, establishing joint ventures, or acquiring other promising foreign firms (Claver et al., 2007). In particular, prior studies have shown that acquisitions are strongly associated

with CVC, as many incumbent firms use CVC to identify and study potential targets (Asel et al., 2015; Benson & Ziedonis, 2009). Consistent with our results, the parent firms might acquire the (foreign) ventures in subsequent periods when the incumbents can better assess the start-ups' prospects. Table 2 illustrates how 12% of all funded ventures are fully acquired by the CVC investor in subsequent periods. Consequently, as more efforts and resources are put into foreign markets, parent firms expand their international activities.

Nonetheless, the learning processes stimulated by CVC investments do not inevitably lead to increased internationalization in subsequent periods. We argue that learning can take place even when the cultural distance between incumbent firms and ventures becomes substantial. However, investing firms realize that operating successfully in a culturally distant target country will require excessive efforts in the future to cope with the cultural disparities. Since the CVC units accumulate and analyze knowledge about the target region after the investment has been made, they can gain a better understanding of environmental influences, institutions, or work practices in the foreign market (Belderbos et al., 2018; Magni et al., 2022). Therefore, for culturally distant countries, the investing firms find that the disparities identified pose substantial challenges, leading them to avoid further internationalization activities after the initial CVC investment. Indeed, our results reveal that the strategic change effect becomes weaker with increasing cultural distance (Appendix 2). Thus, we show that despite the incumbent firm's willingness to become more engaged in a distant market, the liability of foreignness is too great to expand foreign business activities in subsequent periods (Moalla & Mayrhofer, 2020; Zaheer, 1995). Distance-related phenomena, such as increased complexity, higher uncertainty, and (transaction) costs, lead investing firms to refrain from further intensifying their international business activities (Beugelsdijk et al., 2018). These observations on the negative influence of cultural distance align with studies on interfirm linkages as a foreign market entry mode. For international joint ventures, up to 50% of all projects are discontinued within the first five years because of persistent location-specific uncertainties

(Meschi & Riccio, 2008). Likewise, interorganizational learning in alliances and acquisitions is negatively affected by cultural distance (Barkema & Vermeulen, 1998; Pesch & Bouncken, 2017).

Managerial Implications

Our findings offer valuable insights for practitioners. First, CVC serves as a valuable strategic instrument when parent firms seek to adapt their product portfolio. In this vein, managers can utilize CVC to learn about novel technologies and customer markets, thereby enhancing and expanding the incumbent's existing product portfolio. By investing in start-ups, established firms acquire complementary knowledge to develop current products further or introduce new ones. However, managers seeking to adjust their product portfolio should focus on ventures operating in similar yet complementary industries. In such cases, the knowledge inflow will be efficiently processed due to the more homogeneous knowledge bases of the parties involved, reducing uncertainty. While our results indicate that investments in ventures from unfamiliar industries lead to less change, they still hold value for parent firms. It is advisable for managers to select ventures with high industry distance to monitor technological trends and to be able to respond quickly to market threats, thereby protecting the core segment and gaining a competitive advantage (Pinkow & Iversen, 2020). In contrast, if managers want to expand their portfolios into distant industries, they should consider interfirm linkages with higher resource commitment, such as mergers and acquisitions (Bergh & Lawless, 1998).

Second, managers can choose CVC to study unknown foreign markets and take their first steps toward internationalization with a comparatively low-cost investment. Indeed, our results show that after initial CVC investments, foreign activities have increased in subsequent periods. From this, we infer that incumbent firms have acquired market-specific knowledge by communicating with foreign ventures and they thus intensify their international business activities. Moreover, CVC investments are made to test and assess potential foreign M&A

targets: our findings suggest that parent firms initially choose a market entry mode with little resource commitment and, after analyzing the start-up's prospects, may acquire the entire venture (Table 2), increasing internationalization. Furthermore, the results indicate that learning even takes place when the cultural distance becomes too substantial, as investing firms then tend to refrain from further international expansion. Overall, CVC can help an investing firm understand regional peculiarities or build a foreign network to support its geographic expansion strategy efficiently. Otherwise, CVC serves as a cost-effective strategic instrument for recognizing that regional differences could significantly impede successful further internationalization. In such cases, CVC is valuable for parent firms as the CVC-related learning prevents them from bringing additional financial or human resources to the target region.

Nonetheless, as we have shown in our reasoning, CVC is closely connected to other forms of interfirm relationships and must, therefore, be coordinated with them to jeopardize the intended (change) objectives (Dushnitsky & Lavie, 2010).

Limitations and Future Research

Our study is not without limitations: first, although the literature emphasizes the strategic objectives of CVC investments, some incumbents could also pursue purely financial objectives (Siegel et al., 1988; Wang et al., 2019). Strategic change is closely linked to learning effects and, thus, the strategic motive of CVC investments. However, we could not exclude parent firms that are only seeking financial gains through CVC investments. This lack of exclusion may have reduced the expressive power of our analysis. To mitigate potential biases, we excluded financial sector parent firms based on their SIC code, as banks or private equity firms are likely to have financial objectives. Therefore, future studies could refer to samples that include only CVC units with strategic goals. For instance, these could be identified through surveys.

Second, we applied a somewhat isolated view of CVC investments. However, CVC is part of an incumbent firm's strategic learning toolbox, which also includes alliances, joint ventures, exporting, or acquisitions (Lee & Kang, 2015). In line with this, our data show that parent firms also used alternative interfirm linkages prior to 71% of CVC transactions (Table 2). Future studies could consider the variety of interfirm linkages, as interdependencies and synergies exist between the different strategic instruments (Belderbos et al., 2018; Zahra & Hayton, 2008). These would allow a more detailed understanding of the interactions between other interfirm relationships. For example, a comprehensive view is desirable because investing companies may allocate a certain annual investment sum to all interfirm collaboration activities. We also encourage researchers to examine the interactions between different forms of interfirm linkages and their cumulative effects on strategic change, as we categorize CVC as a precursor and screening mechanism for subsequent (foreign) M&A activity.

Similarly, CVC investments and their associated learning effects depend on the incumbent's other search activities, as redundant knowledge could be acquired through different channels (Belderbos et al., 2018; Haslanger et al., 2022). Thus, some firms may have less CVC activity only because knowledge is transferred through other interfirm relationships. In the same vein, researchers could examine the synergistic effects of different interfirm linkages, focusing on the temporal aspect. For example, Table 3 shows that parent firms involved in M&A activity in the two years before the CVC investment reduced their product portfolios during our first two observation periods, possibly due to consolidation efforts. These analyses would also be of practical value by providing recommendations on which forms of interfirm linkages could be pursued simultaneously to achieve specific goals.

Third, we acknowledge other potential moderator variables worth exploring in the future. As we focused on individual CVC transactions, we cannot make any statements on a portfolio's diversity effects. Although we provide evidence on the distance between the incumbent and the start-up, it would also be interesting to measure the diversity of the parent

firm's portfolio: an aggregate view of the portfolio's complexity would make it possible to examine what level of diversification is needed to promote change. As such, future studies could explore the effects of the portfolio's geographic and industry diversity (Belderbos et al., 2018; Matusik & Fitza, 2012).

CONCLUSION

The study contributes to the literature on CVC, its associated interorganizational learning effects, and, in particular, its impact on two specific dimensions of strategic change. Drawing on learning theory, we have found strong evidence that CVC investments lead to changes in the investing firm's product portfolio and internationalization practices in subsequent periods. Indeed, technology-related CVC investments are associated with adjustments to the existing product portfolio or introducing new products in the post-investment phase. Furthermore, the investing companies increase their involvement in international markets after assessing the conditions and institutions in the target region. Thus, our study classifies CVC as an effective catalyst for strategic change. However, the results for our moderators indicate that the more substantial the distance - both industry and cultural - between the investing firm and the start-up, the more the change effects diminish due to increased uncertainty and heterogeneous knowledge bases. This reduces the effectiveness of interorganizational learning and impedes strategic change.

REFERENCES

- Abernethy, M. A., Dekker, H. C., & Grafton, J. (2021). The influence of performance measurement on the processual dynamics of strategic change. *Management Science*, *67*(1), 640–659.
- Ahn, S., Cho, C. K., & Cho, T. S. (2021). Performance feedback and organizational learning: The role of regulatory focus. *Management Decision*, *59*(3), 616–637.
- Ahuja, G. (2000). The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal*, *21*(3), 317–343.
- Anokhin, S., Peck, S., & Wincent, J. (2016). Corporate venture capital: The role of governance factors. *Journal of Business Research*, *69*(11), 4744–4749.
- Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2010). On making causal claims: A review and recommendations. *The Leadership Quarterly*, *21*(6), 1086–1120.
- Asel, P., Park, H. D., & Velamuri, S. R. (2015). Creating values through corporate venture capital programs: The choice between internal and external fund structures. *The Journal of Private Equity*, *19*(1), 63–72.
- Baldi, F., Baglieri, D., & Corea, F. (2015). Balancing risk and learning opportunities in corporate venture capital investments: Evidence from the biopharmaceutical industry. *Entrepreneurship Research Journal*, *5*(3), 221–250.
- Barkema, H. G., & Vermeulen, F. (1998). International expansion through start-up or acquisition: A learning perspective. *Academy of Management Journal*, *41*(1), 7–26.
- Barker, V. L., & Duhaime, I. M. (1997). Strategic change in the turnaround process: Theory and empirical evidence. *Strategic Management Journal*, *18*(1), 13–38.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

- Bascle, G. (2008). Controlling for endogeneity with instrumental variables in strategic management research. *Strategic Organization*, 6(3), 285–327.
- Basu, S., Phelps, C., & Kotha, S. (2011). Towards understanding who makes corporate venture capital investments and why. *Journal of Business Venturing*, 26(2), 153–171.
- Basu, S., & Wadhwa, A. (2013). External venturing and discontinuous strategic renewal: An options perspective. *Journal of Product Innovation Management*, 30(5), 956–975.
- Belderbos, R., Jacob, J., & Lokshin, B. (2018). Corporate venture capital (CVC) investments and technological performance: Geographic diversity and the interplay with technology alliances. *Journal of Business Venturing*, 33(1), 20–34.
- Benson, D., & Ziedonis, R. H. (2009). Corporate venture capital as a window on new technologies: Implications for the performance of corporate investors when acquiring startups. *Organization Science*, 20(2), 329–351.
- Bergh, D. D., & Lawless, M. W. (1998). Portfolio restructuring and limits to hierarchical governance: The effects of environmental uncertainty and diversification strategy. *Organization Science*, 9(1), 87–102.
- Beugelsdijk, S., Kostova, T., Kunst, V. E., Spadafora, E., & van Essen, M. (2018). Cultural distance and firm internationalization: A meta-analytical review and theoretical implications. *Journal of Management*, 44(1), 89–130.
- Bourgeois, L. J. (1980). Strategy and environment: A conceptual integration. *Academy of Management Review*, 5(1), 25–39.
- Brouthers, K. D., & Brouthers, L. E. (2001). Explaining the national cultural distance paradox. *Journal of International Business Studies*, 32(1), 177–189.
- Bruneel, J., Yli-Renko, H., & Clarysse, B. (2010). Learning from experience and learning from others: How congenital and interorganizational learning substitute for experiential learning in young firm internationalization. *Strategic Entrepreneurship Journal*, 4(2), 164–182.

- Carpenter, M. A. (2000). The price of change: The role of CEO compensation in strategic variation and deviation from industry strategy norms. *Journal of Management*, 26(6), 1179–1198.
- Chesbrough, H. W. (2002). Making sense of corporate venture capital. *Harvard Business Review*, 80(3), 90–99.
- Claver, E., Rienda, L., & Quer, D. (2007). The internationalisation process in family firms: Choice of market entry strategies. *Journal of General Management*, 33(1), 1–14.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Crossan, M. M., Lane, H. W., & White, R. E. (1999). An organizational learning framework: From intuition to institution. *Academy of Management Review*, 24(3), 522–537.
- Das, T. K., & Teng, B.-S. (2000). A resource-based theory of strategic alliances. *Journal of Management*, 26(1), 31–61.
- Datta, D. K., & Puia, G. (1995). Cross-border acquisitions: An examination of the influence of relatedness and cultural fit on shareholder value creation in U.S. acquiring firms. *MIR: Management International Review*, 35(4), 337–359.
- Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. *Journal of Management*, 43(6), 1820–1853.
- Du, J., Zheng, Q., & Chang, X. (2020). Dynamic process: International diversification and innovation performance from emerging economies. *Asian Journal of Technology Innovation*, 28(2), 234–250.
- Durbin, J., & Watson, G. S. (1951). Testing for serial correlation in least squares regression. II. *Biometrika*, 38(1/2), 159–178.

- Dushnitsky, G. (2008). *Corporate venture capital: Past evidence and future directions*.
- Dushnitsky, G., & Lavie, D. (2010). How alliance formation shapes corporate venture capital investment in the software industry: A resource-based perspective. *Strategic Entrepreneurship Journal*, 4(1), 22–48.
- Dushnitsky, G., & Shaver, J. M. (2009). Limitations to interorganizational knowledge acquisition: The paradox of corporate venture capital. *Strategic Management Journal*, 30(10), 1045–1064.
- Finkelstein, S., & Hambrick, D. C. (1990). Top-management-team tenure and organizational outcomes: The moderating role of managerial discretion. *Administrative Science Quarterly*, 35(3), 484–503.
- Floyd, S. W., & Lane, P. J. (2000). Strategizing throughout the organization: Managing role conflict in strategic renewal. *Academy of Management Review*, 25(1), 154–177.
- Folta, T. B. (1998). Governance and uncertainty: The trade-off between administrative control and commitment. *Strategic Management Journal*, 19(11), 1007–1028.
- Ginsberg, A. (1988). Measuring and modelling changes in strategy: Theoretical foundations and empirical directions. *Strategic Management Journal*, 9(6), 559–575.
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(2), 109–122.
- Greiner, L. E., & Bhambri, A. (1989). New CEO intervention and dynamics of deliberate strategic change. *Strategic Management Journal*, 10(1), 67–86.
- Haans, R. F. J., Pieters, C., & He, Z.-L. (2016). Thinking about U: Theorizing and testing U- and inverted U-shaped relationships in strategy research. *Strategic Management Journal*, 37(7), 1177–1195.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (Eighth edition). Cengage.

- Haslanger, P., Lehmann, E. E., & Seitz, N. (2022). The performance effects of corporate venture capital: A meta-analysis. *The Journal of Technology Transfer*, 48(6), 1–29.
- Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153–161.
- Henley, G. L. (2007). Extending innovation boundaries: Corporate venture capital gives large firms a strategic option. *Journal of Business Strategy*, 28(5), 36–43.
- Hill, S. A., & Birkinshaw, J. (2008). Strategy–organization configurations in corporate venture units: Impact on performance and survival. *Journal of Business Venturing*, 23(4), 423–444.
- Hill, S. A., & Birkinshaw, J. (2014). Ambidexterity and survival in corporate venture units. *Journal of Management*, 40(7), 1899–1931.
- Hofstede, G. (2022, May 11). *The dimension scores in the Hofstede model of national culture*. <https://geerthofstede.com/research-and-vsm/dimension-data-matrix/>
- Holmqvist, M. (2003). A dynamic model of intra-and interorganizational learning. *Organization Studies*, 24(1), 95–123.
- Hong, J. F., Snell, R. S., & Easterby-Smith, M. (2006). Cross-cultural influences on organizational learning in MNCS: The case of Japanese companies in China. *Journal of International Management*, 12(4), 408–429.
- Hoskisson, R. E., & Hitt, M. A. (1988). Strategic control systems and relative r&d investment in large multiproduct firms. *Strategic Management Journal*, 9(6), 605–621.
- Huang, P., & Madhavan, R. (2021). Dumb money or smart money? Meta-analytically unpacking corporate venture capital. *Strategic Entrepreneurship Journal*, 15(3), 403–429.
- Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organization Science*, 2(1), 88–115.
- Huff, J. O., Huff, A. S., & Thomas, H. (1992). Strategic renewal and the interaction of cumulative stress and inertia. *Strategic Management Journal*, 13(1), 55–75.

- Hutzschenreuter, T., Kleindienst, I., & Lange, S. (2016). The concept of distance in international business research: A review and research agenda. *International Journal of Management Reviews*, 18(2), 160–179.
- Inkpen, A. C. (2000). Learning through joint ventures: A framework of knowledge acquisition. *Journal of Management Studies*, 37(7), 1019–1044.
- Jacquemin, A. P., & Berry, C. H. (1979). Entropy measure of diversification and corporate growth. *The Journal of Industrial Economics*, 27(4), 359–369.
- Kann, A. (2001). *Strategic venture capital investing by corporations: A framework for structuring and valuing corporate venture capital programs*. Stanford University ProQuest Dissertations Publishing.
- Karaevli, A., & Zajac, E. J. (2013). When do outsider CEOs generate strategic change? The enabling role of corporate stability. *Journal of Management Studies*, 50(7), 1267–1294.
- Karim, S. (2009). Business unit reorganization and innovation in new product markets. *Management Science*, 55(7), 1237–1254.
- Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal*, 45(6), 1183–1194.
- Keil, T., Autio, E., & George, G. (2008). Corporate venture capital, disembodied experimentation and capability development. *Journal of Management Studies*, 45(8), 1475–1505.
- Keil, T., Maula, M., Schildt, H., & Zahra, S. A. (2008). The effect of governance modes and relatedness of external business development activities on innovative performance. *Strategic Management Journal*, 29(8), 895–907.
- Keil, T., Zahra, S. A., & Maula, M. (2018). Explorative and exploitative learning from corporate venture capital: A model of program-level determinants. In S. A. Zahra, D. O.

- Neubaum, & J. C. Hayton (Eds.), *Handbook of research on corporate entrepreneurship* (pp. 259–289). Edward Elgar Publishing.
- Kim, J. Y., & Park, H. D. (2017). Two faces of early corporate venture capital funding: Promoting innovation and inhibiting IPOs. *Strategy Science*, 2(3), 161–175.
- Klammer, A., Gueldenberg, S., Kraus, S., & O'Dwyer, M. (2017). To change or not to change—antecedents and outcomes of strategic renewal in SMEs. *International Entrepreneurship and Management Journal*, 13(3), 739–756.
- Kogut, B. (1988). Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal*, 9(4), 319–332.
- Kogut, B., & Singh, H. (1988). The effect of national culture on the choice of entry mode. *Journal of International Business Studies*, 19(3), 411–432.
- Kraus, S., Ambos, T. C., Eggers, F., & Cesinger, B. (2015). Distance and perceptions of risk in internationalization decisions. *Journal of Business Research*, 68(7), 1501–1505.
- Kunisch, S., Bartunek, J. M., Mueller, J., & Huy, Q. N. (2017). Time in strategic change research. *Academy of Management Annals*, 11(2), 1005–1064.
- Lai, H.-C., Chiu, Y.-C., & Liaw, Y.-C. (2010). Can external corporate venturing broaden firm's technological scope? The role of complementary assets. *Journal of Engineering and Technology Management*, 27(3-4), 183–196.
- Lamb, P. W., & Liesch, P. W. (2002). The internationalization process of the smaller firm: Reframing the relationships between market commitment, knowledge and involvement. *Management International Review*, 42(1), 7–26.
- Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19(5), 461–477.
- Lee, S. M., Kim, T., & Jang, S. H. (2015). Inter-organizational knowledge transfer through corporate venture capital investment. *Management Decision*, 53(7), 1601–1618.

- Lee, S. U., & Kang, J. (2015). Technological diversification through corporate venture capital investments: Creating various options to strengthen dynamic capabilities. *Industry and Innovation*, 22(5), 349–374.
- Lennerts, S., Schulze, A., & Tomczak, T. (2020). The asymmetric effects of exploitation and exploration on radical and incremental innovation performance: An uneven affair. *European Management Journal*, 38(1), 121–134.
- Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology*, 14(1), 319–338.
- Ma, S. (2020). The life cycle of corporate venture capital. *The Review of Financial Studies*, 33(1), 358–394.
- Magni, D., Chierici, R., Fait, M., & Lefebvre, K. (2022). A network model approach to enhance knowledge sharing for internationalization readiness of SMEs. *International Marketing Review*, 39(3), 626–652.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Matusik, S. F., & Fitza, M. A. (2012). Diversification in the venture capital industry: Leveraging knowledge under uncertainty. *Strategic Management Journal*, 33(4), 407–426.
- Maula, M., Autio, E., & Murray, G. (2005). Corporate venture capitalists and independent venture capitalists: What do they know, who do they know and should entrepreneurs care? *Venture Capital*, 7(1), 3–21.
- Maula, M., Keil, T., & Zahra, S. A. (2013). Top management's attention to discontinuous technological change: Corporate venture capital as an alert mechanism. *Organization Science*, 24(3), 926–947.

- Meschi, P.-X., & Riccio, E. L. (2008). Country risk, national cultural differences between partners and survival of international joint ventures in Brazil. *International Business Review*, 17(3), 250–266.
- Milagres, R., & Burcharth, A. (2019). Knowledge transfer in interorganizational partnerships: What do we know? *Business Process Management Journal*, 25(1), 27–68.
- Moalla, E., & Mayrhofer, U. (2020). How does distance affect market entry mode choice? Evidence from French companies. *European Management Journal*, 38(1), 135–145.
- Mohammad, H. I. (2019). Mediating effect of organizational learning and moderating role of environmental dynamism on the relationship between strategic change and firm performance. *Journal of Strategy and Management*, 12(2), 275–297.
- Müller, J., & Kunisch, S. (2018). Central perspectives and debates in strategic change research. *International Journal of Management Reviews*, 20(2), 457–482.
- Narayanan, V. K., Yang, Y., & Zahra, S. A. (2009). Corporate venturing and value creation: A review and proposed framework. *Research Policy*, 38(1), 58–76.
- Nicholls-Nixon, C. L., Cooper, A. C., & Woo, C. Y. (2000). Strategic experimentation. *Journal of Business Venturing*, 15(5-6), 493–521.
- Oehmichen, J., Schrapp, S., & Wolff, M. (2017). Who needs experts most? Board industry expertise and strategic change - a contingency perspective. *Strategic Management Journal*, 38(3), 645–656.
- Oh, Y., & Yoo, N. (2022). Effective cooperation modes based on cultural and market similarities in interfirm relationships. *Journal of International Management*, 28(1), 100891.
- Olander Roese, M., & Olsson, A. (2012). Challenging the strategy paradigm within the paper packaging industry. *International Journal of Business Science & Applied Management*, 7(2), 1–12.

- Olander Roese, M., & Sikström, S. (2014). Strategic change: A journey towards new meaning? Semantic analysis of corporate communication. *International Journal of Business Science & Applied Management*, 9(2), 51–64.
- Ostertagová, E. (2012). Modelling using polynomial regression. *Procedia Engineering*, 48, 500–506.
- Pak, Y. S., Ra, W., & Park, Y.-R. (2009). Understanding IJV performance in a learning and conflict mediated context. *International Business Review*, 18(5), 470–480.
- Palepu, K. (1985). Diversification strategy, profit performance and the entropy measure. *Strategic Management Journal*, 6(3), 239–255.
- Pathak, S., Hoskisson, R. E., & Johnson, R. A. (2014). Settling up in CEO compensation: The impact of divestiture intensity and contextual factors in refocusing firms. *Strategic Management Journal*, 35(8), 1124–1143.
- Pesch, R., & Bouncken, R. B. (2017). The double-edged sword of cultural distance in international alliances. *Cross Cultural & Strategic Management*, 24(1), 33–54.
- Pinkow, F., & Iversen, J. (2020). Strategic objectives of corporate venture capital as a tool for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 157–178.
- Pla-Barber, J., Sanchez-Peinado, E., & Madhok, A. (2010). Investment and control decisions in foreign markets: Evidence from service industries. *British Journal of Management*, 21(3), 736–753.
- Rajagopalan, N., & Spreitzer, G. M. (1997). Toward a theory of strategic change: A multi-lens perspective and integrative framework. *Academy of Management Review*, 22(1), 48–79.
- Roy, A., Sekhar, C., & Vyas, V. (2016). Barriers to internationalization: A study of small and medium enterprises in India. *Journal of International Entrepreneurship*, 14(4), 513–538.

- Sanders, W. G., & Carpenter, M. A. (1998). Internationalization and firm governance: The roles of CEO compensation, top team composition, and board structure. *Academy of Management Journal*, 41(2), 158–178.
- Schildt, H. A., Maula, M. V., & Keil, T. (2005). Explorative and exploitative learning from external corporate ventures. *Entrepreneurship Theory and Practice*, 29(4), 493–515.
- Schmitt, A., Raisch, S., & Volberda, H. W. (2018). Strategic renewal: Past research, theoretical tensions and future challenges. *International Journal of Management Reviews*, 20(1), 81–98.
- Seabold, S., & Perktold, J. (2010). Statsmodels: Econometric and statistical modeling with Python. *Proceedings of the 9th Python in Science Conference*, 92–96.
- Sharma, P., & Chrisman, J. J. (1999). Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. *Entrepreneurship Theory and Practice*, 23(3), 11–28.
- Sheppard, K., Rene-Corail, X., Guangyi, & Lewis, B. (2020). *bashtage/linearmodels: Release 4.17* [Computer software]. Zenodo.
- Siegel, R., Siegel, E., & MacMillan, I. C. (1988). Corporate venture capitalists: Autonomy, obstacles, and performance. *Journal of Business Venturing*, 3(3), 233–247.
- Slangen, A. H. (2006). National cultural distance and initial foreign acquisition performance: The moderating effect of integration. *Journal of World Business*, 41(2), 161–170.
- Snow, C. C., & Hambrick, D. C. (1980). Measuring organizational strategies: Some theoretical and methodological problems. *Academy of Management Review*, 5(4), 527–538.
- Sullivan, D. (1994). Measuring the degree of internationalization of a firm. *Journal of International Business Studies*, 25(2), 325–342.
- Sykes, H. B. (1986). The anatomy of a corporate venturing program: Factors influencing success. *Journal of Business Venturing*, 1(3), 275–293.

- Tamayo-Torres, I., Gutiérrez-Gutiérrez, L. J., Llorens-Montes, F. J., & Martínez-López, F. J. (2016). Organizational learning and innovation as sources of strategic fit. *Industrial Management & Data Systems*, 116(8), 1445–1467.
- Tang, Y., & Liu, Y. (2016). A multi-level analytical framework of firm strategic change. *Frontiers of Business Research in China*, 10(1), 76–90.
- Tihanyi, L., Griffith, D. A., & Russell, C. J. (2005). The effect of cultural distance on entry mode choice, international diversification, and MNE performance: A meta-analysis. *Journal of International Business Studies*, 36(3), 270–283.
- Titus, V., House, J. M., & Covin, J. G. (2017). The influence of exploration on external corporate venturing activity. *Journal of Management*, 43(5), 1609–1630.
- Tong, T. W., & Li, Y. (2011). Real options and investment mode: Evidence from corporate venture capital and acquisition. *Organization Science*, 22(3), 659–674.
- van Iwaarden, J., & van der Wiele, T. (2012). The effects of increasing product variety and shortening product life cycles on the use of quality management systems. *International Journal of Quality & Reliability Management*, 29(5), 470–500.
- Wadhwa, A., & Basu, S. (2013). Exploration and resource commitments in unequal partnerships: An examination of corporate venture capital investments. *Journal of Product Innovation Management*, 30(5), 916–936.
- Wadhwa, A., Phelps, C., & Kotha, S. (2009). Creating exploratory innovations by learning from entrepreneurial ventures. In *New Frontiers in Entrepreneurship* (pp. 147–173). Springer, New York, NY.
- Wang, L., Zhou, F., An, Y., & Yang, J. (2019). Corporate venture capital: Technological innovation or value creation? A comparative study of CVC- and IVC-invested Chinese listed companies. *Asian Journal of Technology Innovation*, 27(3), 257–279.

- Weber, B., & Weber, C. (2007). Corporate venture capital as a means of radical innovation: Relational fit, social capital, and knowledge transfer. *Journal of Engineering and Technology Management*, 24(1-2), 11–35.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180.
- Westphal, J. D., & Fredrickson, J. W. (2001). Who directs strategic change? Director experience, the selection of new CEOs, and change in corporate strategy. *Strategic Management Journal*, 22(12), 1113–1137.
- Wiersema, M. F., & Bantel, K. (1992). Top management team demography and corporate strategic change. *Academy of Management Journal*, 35(1), 91–121.
- Winters, T. E., & Murfin, D. L. (1988). Venture capital investing for corporate development objectives. *Journal of Business Venturing*, 3(3), 207–222.
- Wowak, A. J., Mannor, M. J., Arrfelt, M., & McNamara, G. (2016). Earthquake or glacier? How CEO charisma manifests in firm strategy over time. *Strategic Management Journal*, 37(3), 586–603.
- Wu, F., Sinkovics, R. R., Cavusgil, S. T., & Roath, A. S. (2007). Overcoming export manufacturers' dilemma in international expansion. *Journal of International Business Studies*, 38(2), 283–302.
- Yang, Y. (2012). Bilateral inter-organizational learning in corporate venture capital activity. *Management Research Review*, 35(5), 352–378.
- Zaheer, S. (1995). Overcoming the liability of foreignness. *Academy of Management Journal*, 38(2), 341–363.
- Zahra, S. A., & Hayton, J. C. (2008). The effect of international venturing on firm performance: The moderating influence of absorptive capacity. *Journal of Business Venturing*, 23(2), 195–220.

FIGURES AND TABLES

FIGURE 1

Relationship between corporate venture capital and strategic change

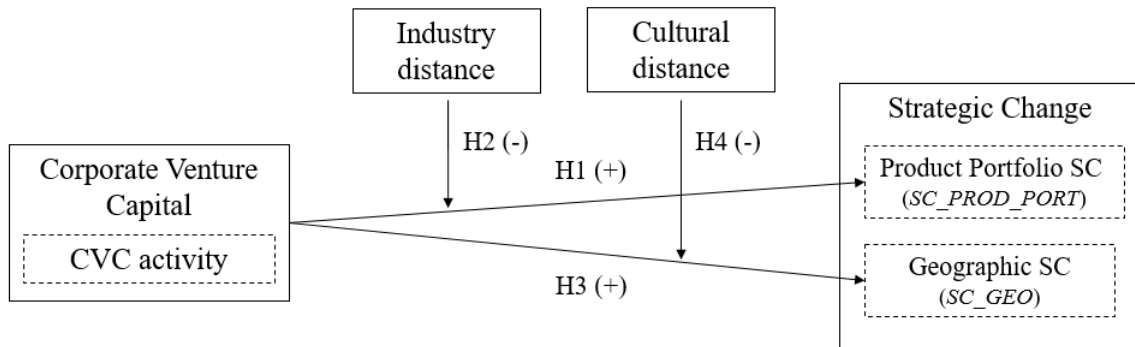
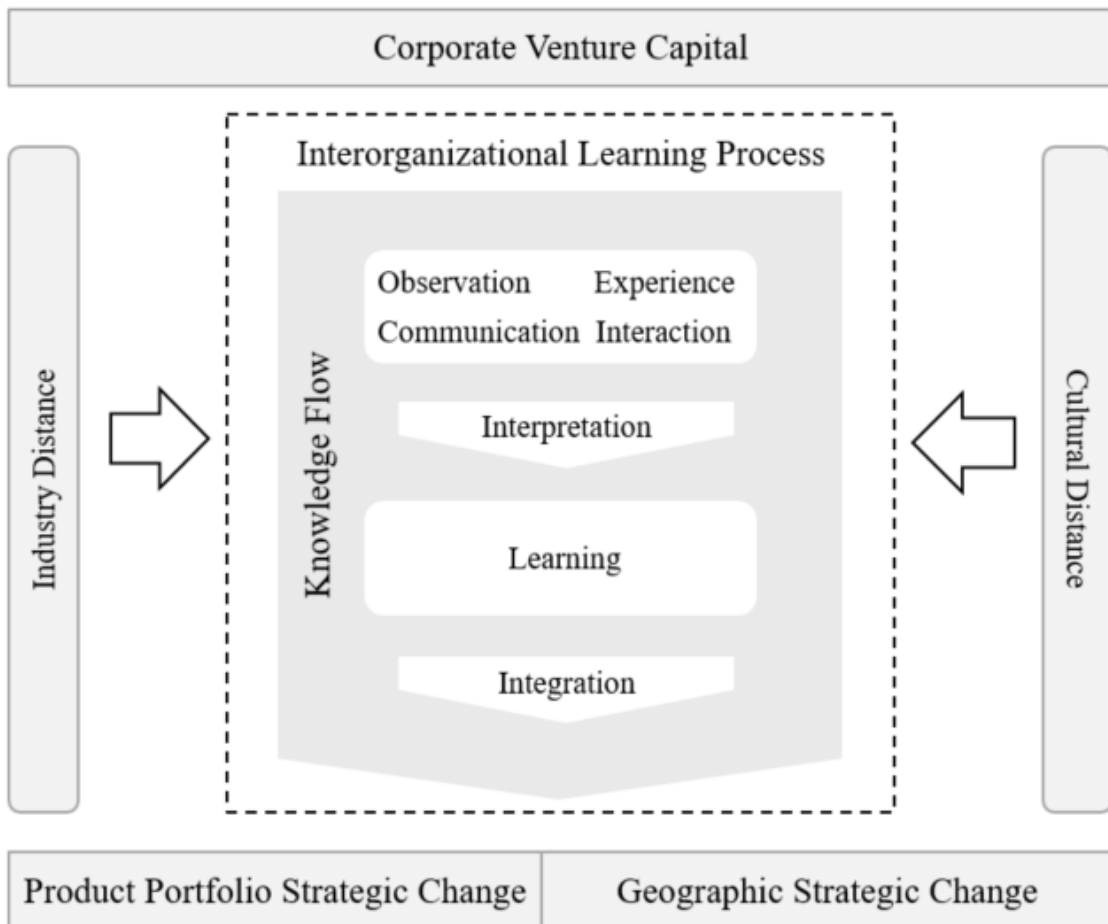


FIGURE 2

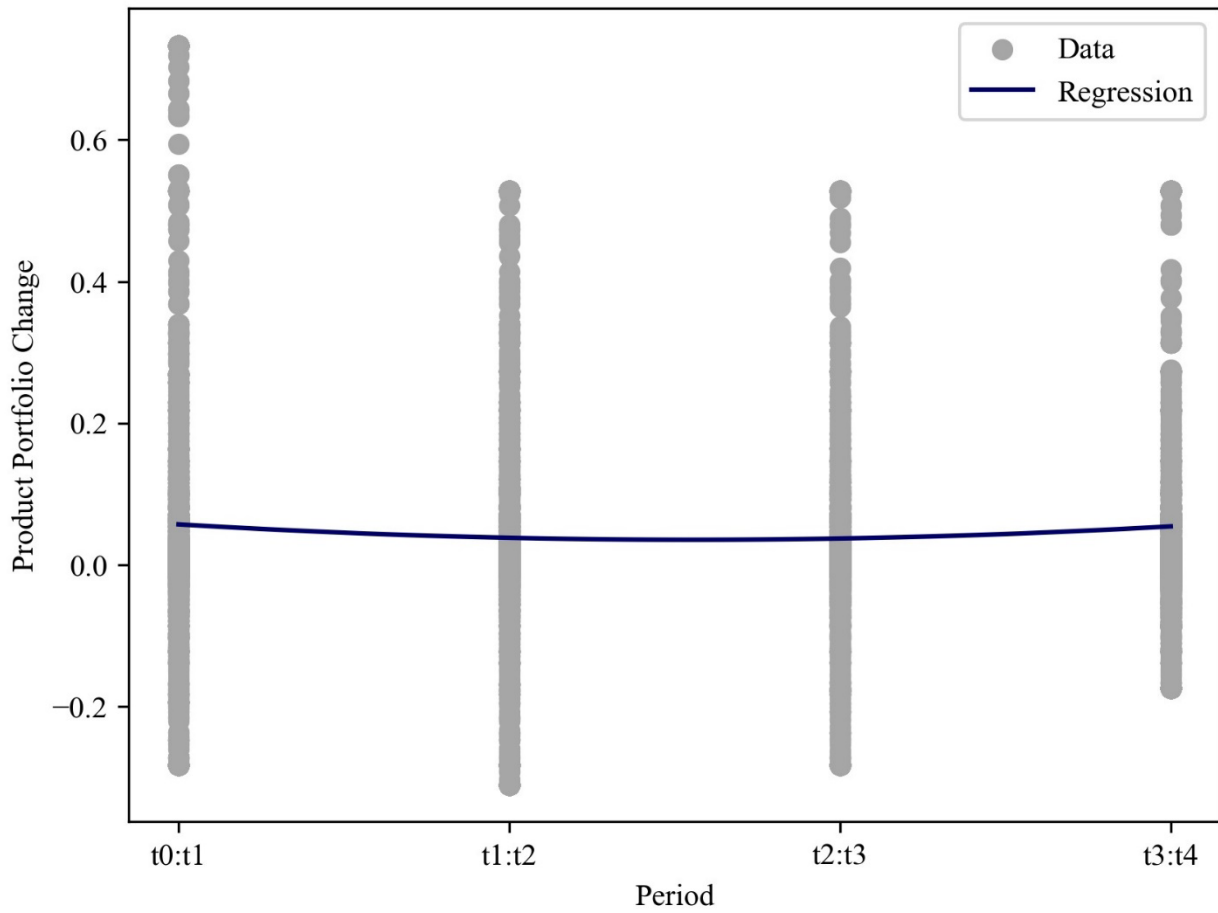
CVC-related interorganizational learning framework



Source: The authors' own illustration, derived from the principles of learning theory.

FIGURE 3

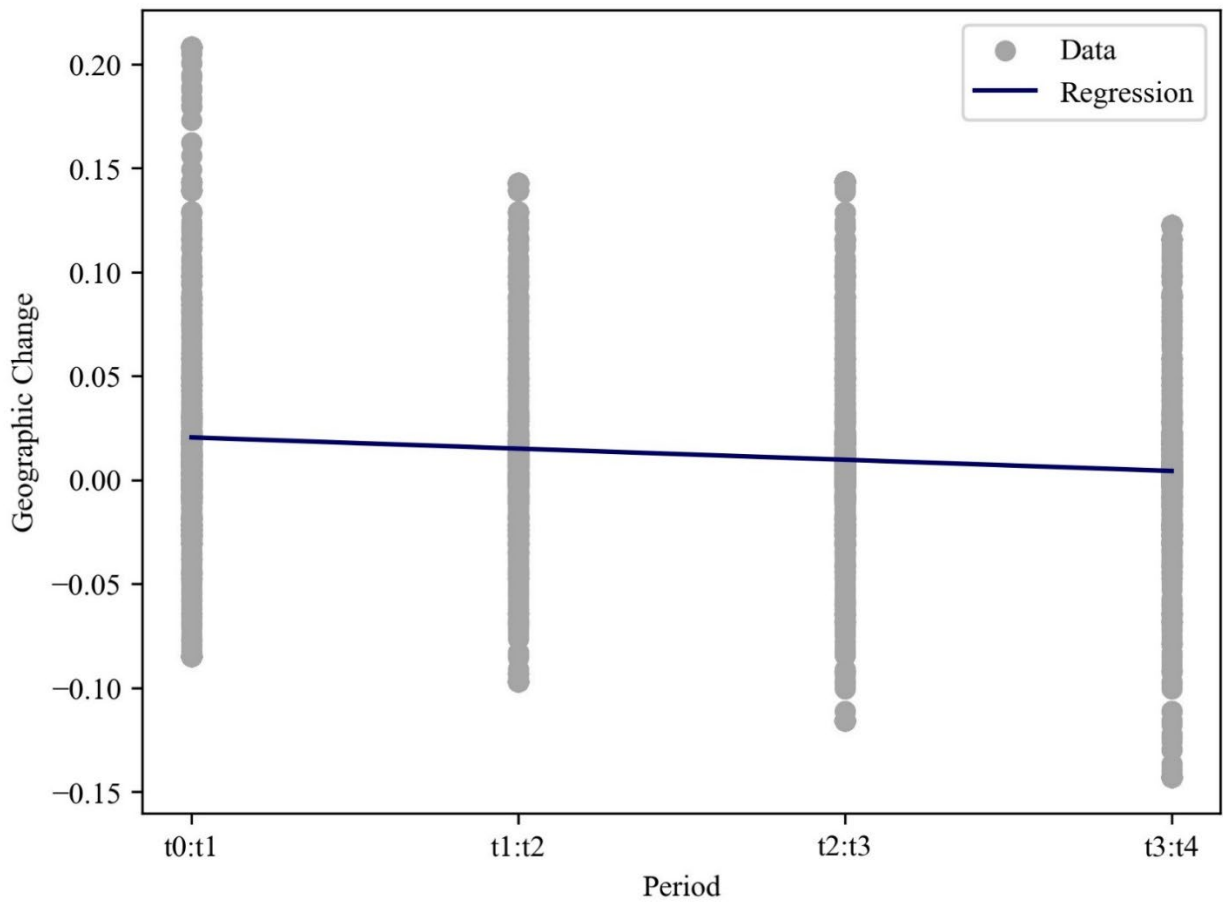
Result of cross-period analysis for product portfolio change



Notes. N = 3,231. Quadratic positive relationship across the periods t₀:t₁ to t₃:t₄.

FIGURE 4

Result of cross-period analysis for geographic change



Notes. N = 1,921. Linear negative relationship across the periods t0:t1 to t3:t4.

TABLE 1**Dimensions of strategic change**

Dimensions	Product portfolio change	Geographic change
Conceptual foundation	Product market change (Wiersema & Bantel, 1992)	International commitment (Sullivan, 1994)
Measure	Yearly change in product diversification (Entropy) (Jacquemin & Berry, 1979; Palepu, 1985)	Yearly change in geographic diversification (Sanders & Carpenter, 1998)

TABLE 2

Descriptive statistics and correlations

Variables	mean	std	min	max	1	2	3	4	5	6	7	8	9
1. SC_GEOt0:t1	0.07	0.07	-0.16	0.43	1								
2. SC_GEOt1:t2	0.01	0.09	-0.24	0.3	0.10	1							
3. SC_GEOt2:t3	0.02	0.13	-0.29	0.3	0.00	-0.02	1						
4. SC_GEOt3:t4	0.01	0.13	-0.29	0.25	0.01	0.15	0.03	1					
5. SC_PROD_PORTt0:t1	0.31	1.83	-0.5	14.31	-0.02	-0.05	-0.02	-0.01	1				
6. SC_PROD_PORTt1:t2	0.12	0.93	-0.43	6.75	-0.02	0.01	0.10	-0.02	0.01	1			
7. SC_PROD_PORTt2:t3	0.14	0.91	-0.49	6.75	0.00	0.00	0.00	0.03	-0.10	-0.03	1		
8. SC_PROD_PORTt3:t4	0.18	0.98	-0.53	6.75	-0.03	-0.03	0.00	0.00	0.02	-0.08	0.03	1	
9. CVC_ACTIV	2.41	1.77	0.00	4.73	-0.04	-0.01	-0.03	0.00	0.10	0.07	0.09	0.13	1
10. CULTURAL_DISTANCE	0.93	1.29	0	4.67	0.13	-0.05	-0.02	-0.06	-0.10	-0.06	-0.05	-0.10	-0.12
11. INDUSTRY_DISTANCE	0.82	0.31	0	1	0.03	0.01	-0.01	0.01	-0.13	-0.02	-0.09	-0.18	-0.03
12. ROA_UCP	0.1	0.08	-0.09	0.23	-0.03	0.02	0.09	0.16	0.07	-0.01	0.02	0.07	0.31
13. UCP_SIZE	10.9	0.97	1.47	12.78	0.01	0.02	-0.10	-0.04	0.12	0.01	0.11	0.12	0.24
14. TRANSACT_VALUE	2.38	1.25	-1.97	5.3	-0.05	0.00	-0.04	-0.01	0.02	0.07	0.06	0.02	0.30
15. CVC_TRANSACT_AGE	11.48	8.09	0	38	0.02	-0.01	-0.03	-0.04	-0.11	-0.09	-0.10	-0.14	0.24
16. M&A	0.1	0.29	0	1	-0.02	-0.01	0.06	-0.02	-0.05	-0.02	-0.04	-0.06	0.04
17. BUYBACK	0.2	0.4	0	1	0.15	-0.01	-0.04	-0.04	0.03	0.18	0.19	-0.07	-0.15
18. INTERFIRM_LINK	0.71	0.45	0	1	-0.12	-0.12	-0.13	-0.10	0.09	0.03	0.05	0.09	0.17
19. DOWNSIZING	0.7	0.46	0	1	-0.11	-0.05	-0.01	-0.05	0.01	0.02	0.05	0.10	0.18
20. SPIN-OFF	0.04	0.18	0	1	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.04	-0.08
21. IPO	0.05	0.21	0	1	-0.02	-0.03	-0.02	-0.03	0.48	-0.01	-0.06	-0.02	-0.05
22. FPO	0.52	0.5	0	1	0.06	0.01	-0.12	-0.08	0.04	0.07	0.07	0.10	0.10
23. POST_INVEST_MERGER	0.12	0.13	0	1	-0.01	-0.01	-0.01	-0.01	0.04	0.06	-0.02	0.05	0.00

Notes. Pearson's correlation matrix. The number of effect sizes varies according to the underlying strategic change dimension due to the distinction between domestic and cross-border transactions. Regarding the dependent variables: $N_{SC_PROD_PORT\ t0:t2} = 4,204$, $N_{SC_GEO\ t0:t1} = 2,547$. However, we calculated the correlation on the basis of the entire database, ignoring the distinction between change activities, domestic and cross-border activities: $N_{Full} = 2,920$; Mean = mean effect size; SD = standard deviation; Min = Minimal value; Max = maximum value; Correlations with an absolute value greater than 0.05 are considered significant; two-tailed test.

Variables	10	11	12	13	14	15	16	17	18	19	20	21	22
10. CULTURAL_DISTANCE	1												
11. SIC_DISTANCE	0.09	1											
12. ROA_UCP	-0.20	-0.15	1										
13. UCP_SIZE	0.02	0.00	-0.03	1									
14. TRANSACT_VALUE	-0.02	-0.06	0.02	0.14	1								
15. CVC_TRANSACT_AGE	-0.04	0.01	0.21	0.19	0.07	1							
16. M&A	0.05	0.09	-0.03	0.08	-0.02	0.11	1						
17. BUYBACK	-0.07	-0.19	0.08	0.19	0.02	-0.06	-0.08	1					
18. INTERFIRM_LINK	0.01	-0.06	-0.10	0.37	0.05	0.11	0.09	0.14	1				
19. DOWNSIZING	-0.16	-0.09	0.09	0.25	0.00	0.20	0.10	0.11	0.56	1			
20. SPIN-OFF	-0.04	-0.03	0.00	-0.15	-0.03	-0.11	0.11	0.11	0.03	0.04	1		
21. IPO	0.01	0.00	-0.08	0.09	0.01	-0.09	-0.04	-0.02	-0.01	-0.08	0.01	1	
22. FPO	-0.01	-0.01	-0.08	0.14	0.03	0.12	-0.06	-0.04	0.14	0.09	0.02	0.13	1
23. POST_INVEST_MERGER	-0.06	-0.04	0.01	0.05	0.06	-0.02	0.01	0.02	0.04	0.01	0.02	0.02	0.07

TABLE 3

Results of OLS regression analysis for product portfolio change

	Product Portfolio Change							
	H1 t _{0:t1}	H1 t _{1:t2}	H1 t _{2:t3}	H1 t _{3:t4}	H2 t _{0:t1}	H2 t _{1:t2}	H2 t _{2:t3}	H2 t _{3:t4}
CVC_ACTIV:	0.017 (0.001) [0.000]	0.009 (0.001) [0.000]	0.015 (0.001) [0.000]	0.016 (0.001) [0.000]	0.027 (0.004) [0.000]	0.022 (0.004) [0.000]	0.025 (0.004) [0.000]	0.034 (0.004) [0.000]
INDUSTRY_DISTANCE:					0.030 (0.012) [0.012]	0.012 (0.013) [0.349]	0.012 (0.014) [0.420]	0.030 (0.014) [0.036]
MOD: INDUSTRY_DISTANCE:					-0.016 (0.004) [0.000]	-0.016 (0.005) [0.001]	-0.012 (0.005) [0.012]	-0.019 (0.005) [0.000]
Intercept:	0.096 (0.015) [0.000]	-0.037 (0.015) [0.015]	-0.201 (0.018) [0.000]	0.248 (0.018) [0.000]	0.097 (0.020) [0.000]	-0.065 (0.021) [0.002]	-0.194 (0.023) [0.000]	0.277 (0.022) [0.000]
Control:								
ROA_UCP:	-0.041 (0.021) [0.043]	0.013 (0.022) [0.544]	0.128 (0.024) [0.000]	0.124 (0.023) [0.000]	-0.082 (0.024) [0.001]	0.009 (0.026) [0.720]	0.068 (0.026) [0.010]	0.082 (0.024) [0.001]
UCP_SIZE:	0.003 (0.001) [0.031]	0.002 (0.001) [0.127]	0.003 (0.002) [0.077]	0.000 (0.002) [0.976]	0.000 (0.002) [0.799]	0.006 (0.002) [0.002]	0.002 (0.002) [0.303]	-0.004 (0.002) [0.042]
TRANSACT_VALUE:	-0.005 (0.001) [0.000]	0.003 (0.001) [0.027]	-0.003 (0.002) [0.037]	-0.001 (0.002) [0.597]	-0.002 (0.002) [0.168]	0.004 (0.002) [0.054]	-0.004 (0.002) [0.049]	-0.004 (0.002) [0.024]
CVC_TRANSACT_AGE:	-0.001 (0.000) [0.000]	-0.001 (0.000) [0.000]	-0.001 (0.000) [0.000]	-0.002 (0.000) [0.000]	0.000 (0.000) [0.267]	-0.001 (0.000) [0.000]	-0.001 (0.000) [0.000]	-0.001 (0.000) [0.000]
M&A:	-0.021 (0.007) [0.002]	-0.024 (0.007) [0.001]	-0.011 (0.010) [0.271]	-0.006 (0.010) [0.539]	-0.030 (0.008) [0.000]	-0.016 (0.010) [0.113]	-0.043 (0.011) [0.000]	-0.013 (0.011) [0.259]
BUYBACK:	0.025 (0.005) [0.000]	0.007 (0.005) [0.206]	0.001 (0.006) [0.878]	0.004 (0.006) [0.474]	0.023 (0.006) [0.000]	-0.006 (0.007) [0.410]	0.006 (0.007) [0.381]	0.015 (0.006) [0.018]
INTERFIRM_LINK:	-0.009 (0.005) [0.057]	-0.020 (0.005) [0.000]	-0.008 (0.006) [0.158]	-0.023 (0.006) [0.000]	0.007 (0.006) [0.251]	-0.028 (0.007) [0.000]	-0.007 (0.007) [0.348]	-0.024 (0.007) [0.001]
DOWNSIZING:	-0.019 (0.005) [0.000]	0.011 (0.005) [0.040]	-0.001 (0.006) [0.931]	0.017 (0.006) [0.006]	-0.031 (0.006) [0.000]	-0.001 (0.007) [0.889]	-0.004 (0.007) [0.556]	0.016 (0.007) [0.018]
SPIN-OFF:	-0.016 (0.007) [0.029]	-0.014 (0.009) [0.116]	-0.017 (0.009) [0.067]	-0.024 (0.009) [0.011]	-0.010 (0.009) [0.266]	-0.027 (0.011) [0.011]	-0.011 (0.011) [0.331]	-0.017 (0.010) [0.098]
IPO:	0.053 (0.008) [0.000]	0.077 (0.007) [0.000]	0.065 (0.009) [0.000]	0.032 (0.008) [0.000]	0.042 (0.010) [0.000]	0.055 (0.010) [0.000]	0.067 (0.011) [0.000]	0.046 (0.009) [0.000]
FPO:	-0.025 (0.004) [0.000]	-0.029 (0.004) [0.000]	-0.028 (0.005) [0.000]	-0.008 (0.005) [0.144]	-0.016 (0.005) [0.002]	-0.033 (0.006) [0.000]	-0.023 (0.006) [0.000]	-0.003 (0.006) [0.567]
POST_INVEST_MERGER:	0.008 (0.012) [0.516]	-0.007 (0.014) [0.597]	0.016 (0.015) [0.289]	0.008 (0.015) [0.614]	0.004 (0.014) [0.756]	-0.021 (0.017) [0.240]	0.027 (0.017) [0.126]	-0.008 (0.017) [0.629]
Model information:								
N:	4,204	3,926	3,570	3,231	2,774	2,582	2,410	2,241
R ² -adjusted:	0.202	0.259	0.287	0.269	0.224	0.236	0.313	0.311
R ² :	0.209	0.265	0.294	0.276	0.234	0.247	0.323	0.321
F-statistic:	32.321 [0.000]	42.553 [0.000]	45.971 [0.000]	39.299 [0.000]	23.239 [0.000]	23.803 [0.000]	33.298 [0.000]	31.593 [0.000]

Notes. Multivariate regression analysis. Standard errors are in parentheses and p-values in brackets. Year-fixed effects are included but not reported.

TABLE 4

Results of OLS regression analysis for geographic change

	Geographic Change							
	H3 t _{0:t1}	H3 t _{1:t2}	H3 t _{2:t3}	H3 t _{3:t4}	H4 t _{0:t1}	H4 t _{1:t2}	H4 t _{2:t3}	H4 t _{3:t4}
CVC_ACTIV:	0.000 (0.001) [0.772]	0.001 (0.001) [0.119]	0.002 (0.001) [0.023]	0.001 (0.001) [0.089]	0.005 (0.001) [0.000]	0.006 (0.001) [0.000]	0.005 (0.002) [0.002]	0.002 (0.002) [0.139]
CULTURAL_DISTANCE:					0.008 (0.001) [0.000]	0.004 (0.001) [0.014]	0.002 (0.002) [0.247]	0.001 (0.002) [0.523]
MOD:CULTURAL_DISTANCE:					-0.003 (0.001) [0.000]	-0.002 (0.001) [0.000]	-0.001 (0.001) [0.037]	0.000 (0.001) [0.444]
Intercept:	-0.006 (0.014) [0.694]	-0.017 (0.015) [0.246]	-0.047 (0.015) [0.002]	0.020 (0.016) [0.198]	-0.018 (0.014) [0.217]	-0.025 (0.015) [0.091]	-0.050 (0.015) [0.001]	0.018 (0.017) [0.282]
Control:								
ROA_UCP:	-0.074 (0.013) [0.000]	0.016 (0.013) [0.240]	0.050 (0.014) [0.000]	0.037 (0.017) [0.033]	-0.076 (0.013) [0.000]	0.011 (0.013) [0.410]	0.047 (0.014) [0.001]	0.039 (0.018) [0.029]
UCP_SIZE:	0.004 (0.001) [0.000]	0.000 (0.001) [0.821]	0.003 (0.001) [0.008]	0.001 (0.001) [0.271]	0.004 (0.001) [0.000]	0.000 (0.001) [0.839]	0.003 (0.001) [0.011]	0.001 (0.001) [0.315]
TRANSACT_VALUE:	-0.002 (0.001) [0.049]	-0.002 (0.001) [0.052]	-0.001 (0.001) [0.163]	0.000 (0.001) [0.988]	-0.002 (0.001) [0.017]	-0.002 (0.001) [0.045]	-0.001 (0.001) [0.133]	0.000 (0.001) [0.757]
CVC_TRANSACT_AGE:	0.000 (0.000) [0.050]	0.000 (0.000) [0.308]	0.000 (0.000) [0.387]	0.000 (0.000) [0.767]	0.000 (0.000) [0.049]	0.000 (0.000) [0.311]	0.000 (0.000) [0.400]	0.000 (0.000) [0.975]
M&A:	0.005 (0.004) [0.201]	-0.009 (0.004) [0.026]	-0.003 (0.004) [0.519]	-0.003 (0.004) [0.505]	0.007 (0.004) [0.062]	-0.007 (0.004) [0.091]	-0.001 (0.004) [0.804]	-0.003 (0.005) [0.570]
BUYBACK:	0.007 (0.003) [0.010]	0.018 (0.003) [0.000]	-0.004 (0.003) [0.215]	0.002 (0.003) [0.483]	0.007 (0.003) [0.015]	0.017 (0.003) [0.000]	-0.004 (0.003) [0.210]	0.002 (0.003) [0.412]
INTERFIRM_LINK:	-0.011 (0.003) [0.000]	-0.008 (0.003) [0.011]	-0.006 (0.003) [0.073]	0.001 (0.003) [0.802]	-0.011 (0.003) [0.000]	-0.008 (0.003) [0.005]	-0.006 (0.003) [0.054]	0.000 (0.003) [0.999]
DOWNSIZING:	-0.006 (0.002) [0.020]	-0.012 (0.003) [0.000]	-0.009 (0.003) [0.003]	-0.006 (0.003) [0.043]	-0.003 (0.003) [0.186]	-0.012 (0.003) [0.000]	-0.009 (0.003) [0.003]	-0.005 (0.003) [0.129]
SPIN-OFF:	-0.004 (0.005) [0.411]	-0.001 (0.006) [0.852]	-0.009 (0.008) [0.253]	0.012 (0.008) [0.146]	-0.004 (0.005) [0.403]	-0.003 (0.006) [0.665]	-0.010 (0.008) [0.185]	0.011 (0.008) [0.176]
IPO:	-0.020 (0.005) [0.000]	-0.012 (0.006) [0.031]	-0.009 (0.006) [0.170]	-0.023 (0.006) [0.000]	-0.023 (0.005) [0.000]	-0.013 (0.006) [0.029]	-0.009 (0.006) [0.153]	-0.023 (0.006) [0.000]
FPO:	-0.005 (0.002) [0.041]	-0.003 (0.002) [0.157]	-0.002 (0.003) [0.389]	0.002 (0.003) [0.478]	-0.005 (0.002) [0.025]	-0.004 (0.002) [0.125]	-0.002 (0.003) [0.468]	0.003 (0.003) [0.279]
POST_INVEST_MERGER:	0.006 (0.007) [0.420]	-0.002 (0.007) [0.802]	0.008 (0.008) [0.363]	0.004 (0.009) [0.649]	0.005 (0.007) [0.458]	-0.002 (0.007) [0.771]	0.007 (0.008) [0.401]	0.006 (0.009) [0.530]
Model information:								
N:	2,547	2,363	2,141	1,921	2,523	2,344	2,126	1,887
R ² -adjusted:	0.101	0.130	0.109	0.136	0.112	0.136	0.110	0.133
R ² :	0.113	0.142	0.122	0.150	0.124	0.149	0.124	0.148
F-statistic:	9.380 [0.000]	11.671 [0.000]	9.179 [0.000]	10.720 [0.000]	9.803 [0.000]	11.519 [0.000]	8.718 [0.000]	9.783 [0.000]

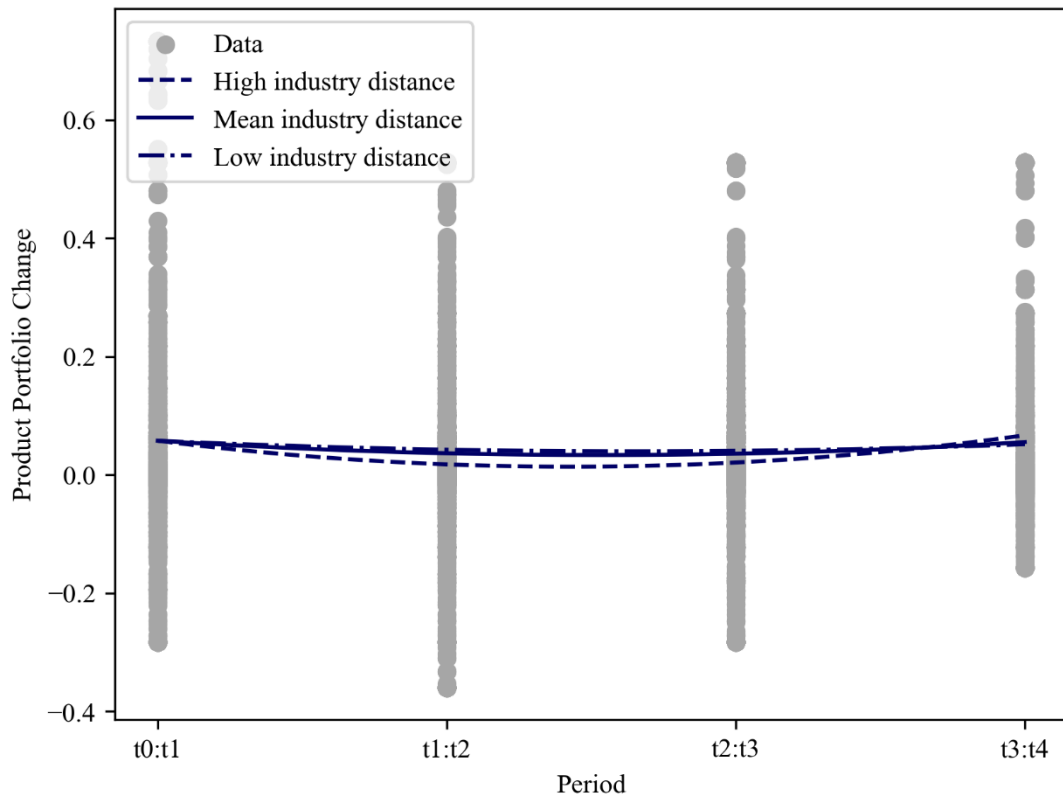
Notes. Multivariate regression analysis. Standard errors are in parentheses and p-values in brackets. Year-fixed effects are included but not reported.

APPENDICES

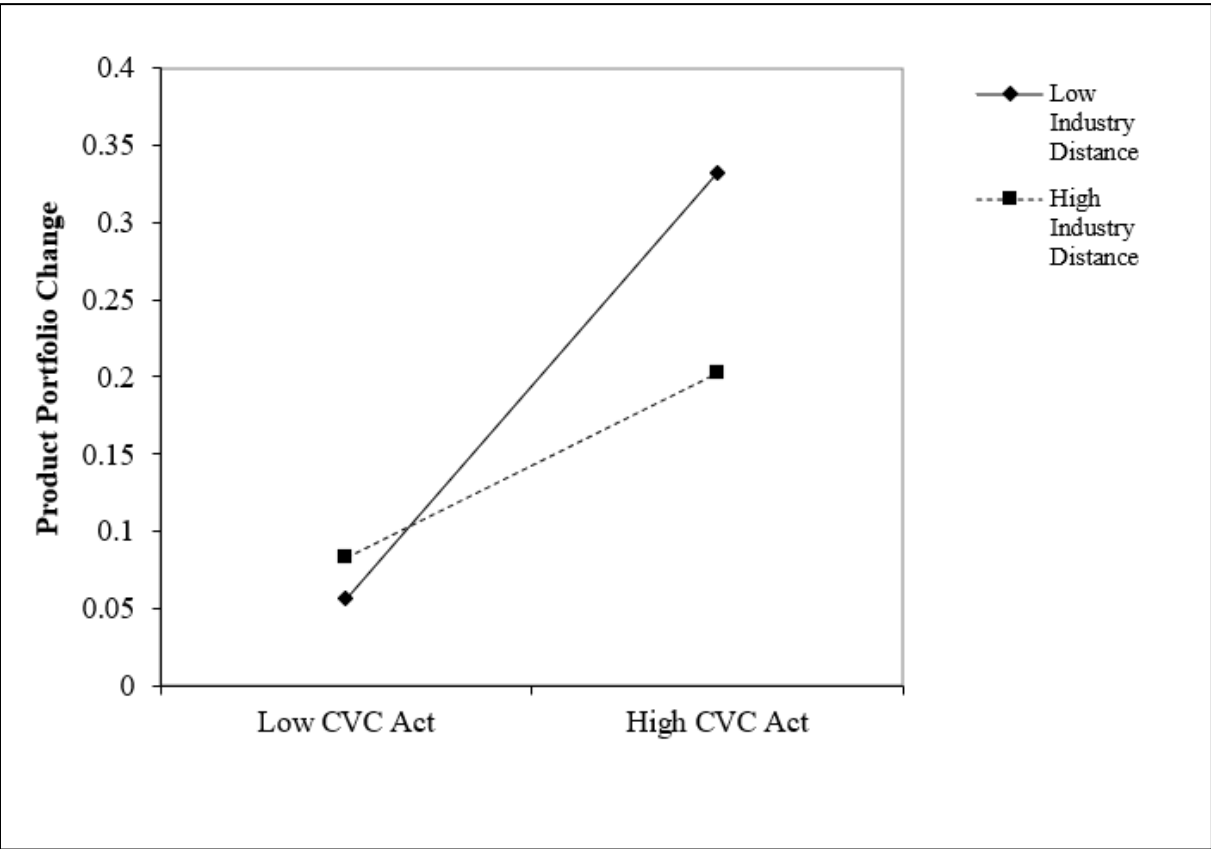
APPENDIX 1

Moderation effect of industry distance

The following chart demonstrates the moderating effect of industry distance on the relationship between CVC activity and product portfolio change over the period $t_0:t_1$ to $t_3:t_4$.



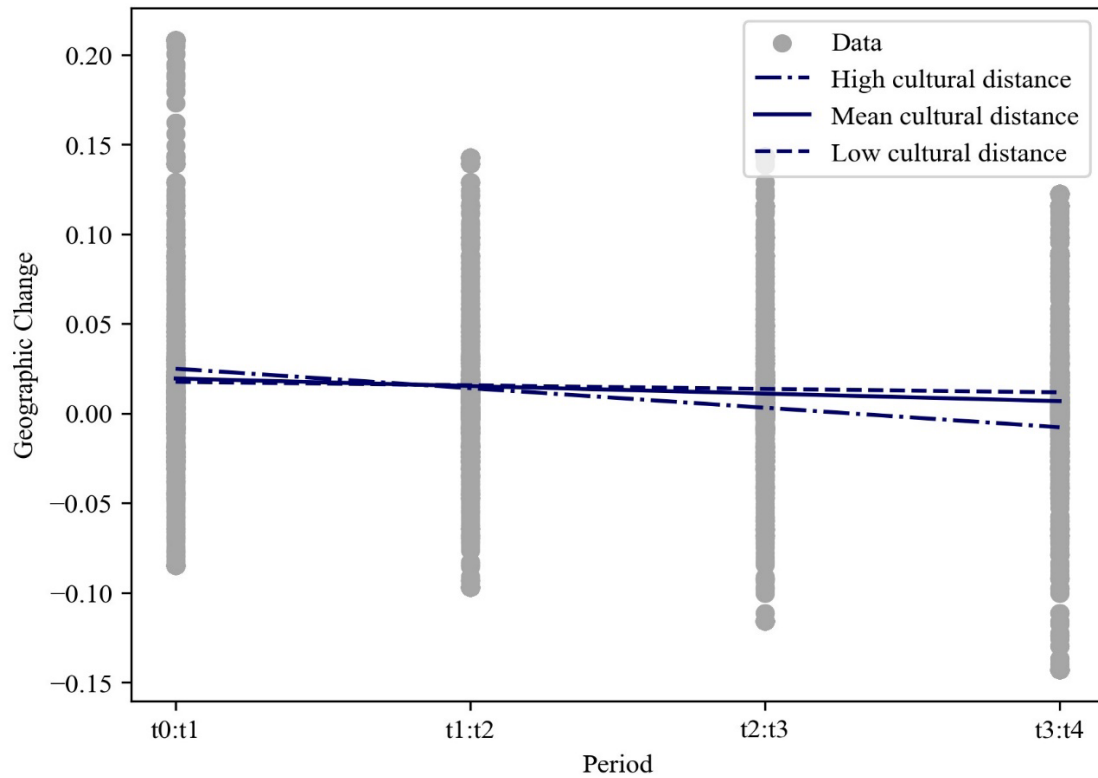
The following chart, which illustrates period $t_0:t_4$, shows the interactive effects of CVC activity and industry distance on product portfolio change. Industry distance negatively moderates the relationship between CVC activity and product portfolio change.



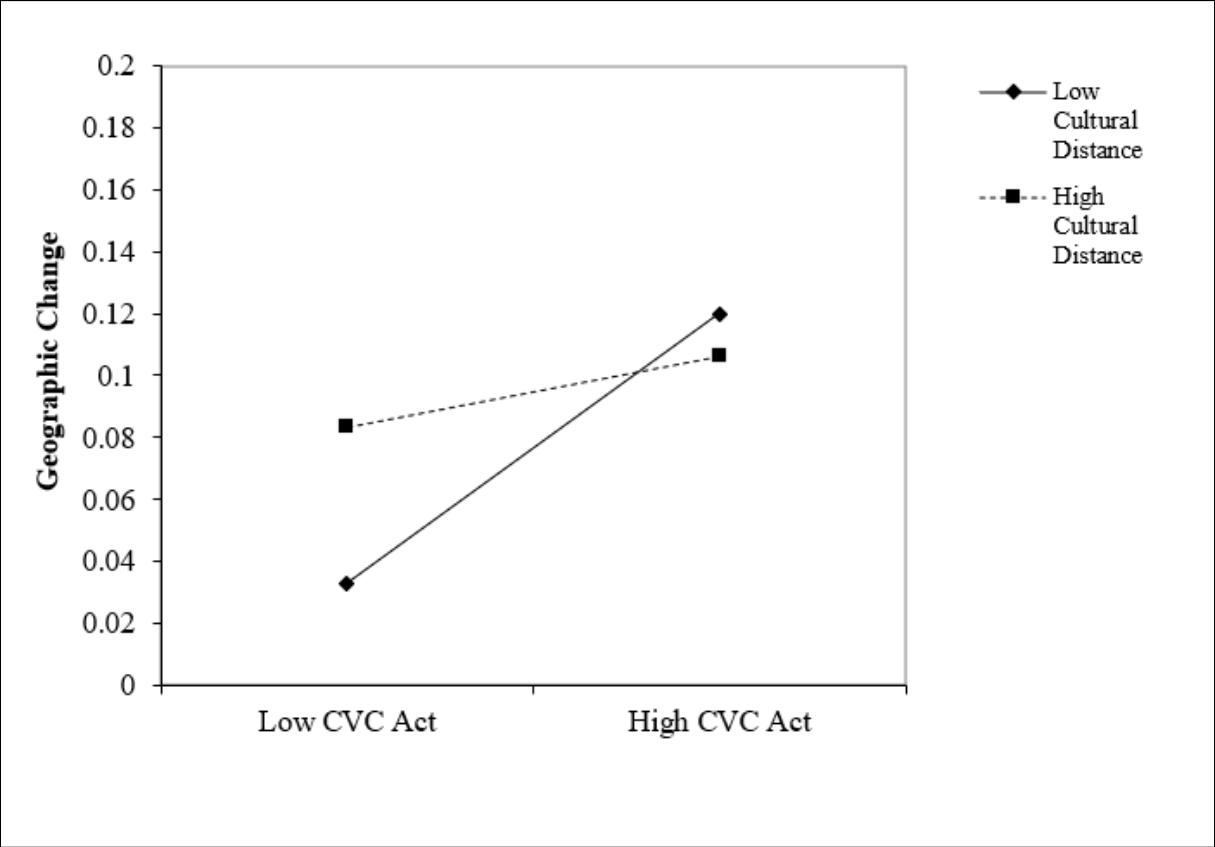
APPENDIX 2

Moderation effect of cultural distance

The following chart demonstrates the moderating effect of cultural distance on the relationship between CVC activity and geographic change over the period $t_0:t_1$ to $t_3:t_4$.



The following chart, which illustrates period $t_0:t_4$, shows the interactive effects of CVC activity and cultural distance on geographic change. Cultural distance negatively moderates the relationship between CVC activity and geographic change.



APPENDIX 3

Overview of variable measurements

The table presents the measurements of the variables used in the analysis.

Variable	Measurement
CVC Activity (CVC_ACTIV)	<p>Logarithmized accumulated value of individual transactions of CVC units on a yearly basis.</p> $CVC\ activity = \frac{\frac{\sum H_{Tx}}{S_{Tx}}}{Year_{Tx-t_0}}$ <p>H: logarithmized cumulative value of a CVC unit's current and past transactions on an annual basis. S: firm size measured by the logarithm of the parent firm's total assets, adjusted for historical exchange rates Year: transaction year minus founding year of CVC unit</p>
Geographic Change (SC_GEO)	Annual difference from $t_0:t_1$ to $t_3:t_4$ of Sullivan's geographic diversification composite measure (Sullivan, 1994): sum of (1) the ratio of foreign sales to total sales, (2) foreign assets divided by total assets, and (3) the number of country subsidiaries of the respective UCP, a percentage based on the highest value in the sample.
Product portfolio change (SC_PROD_PORT)	Annual difference from $t_0:t_1$ to $t_3:t_4$ of product market diversification (Westphal & Fredrickson, 2001). Product market diversification is operationalized using the entropy measure, which takes into account the number of segments respectively industries in which a firm operates and weighs each segment according to its contribution to total sales. The index ranges from 0 to 1 (Palepu, 1985).
Industry distance (INDUSTRY_DISTANCE)	SIC code overlap between UCP and target firm with values between zero (completely identical SIC codes) to one (completely different SIC codes) (Wadhwa & Basu, 2013).
Cultural distance (CULTURAL_DISTANCE)	Cultural distances between UCP and the target firm are based on Kogut and Singh's cultural-distance index along Hofstede's cultural dimensions of the country where their headquarters are located (Kogut & Singh, 1988).
Firm size (UCP_SIZE)	Natural logarithm of total assets of the UCP at t_0 adjusted to the historical exchange rate in US dollar, while t is the year of the announcement.
Age (CVC_TRANSACT_AGE)	The year the transaction was announced minus the founding year of the CVC unit.
Prior performance (ROA_UCP)	Net income divided by average total assets at t_1 , while t is the year of the announcement.
CVC transaction's magnitude (TRANSACT_VALUE)	Natural logarithm of the value of the transaction (in Mio. USD) given by the database.
IPO, FPO, buyback, M&A activities, downsizing, spin-off, and other interfirm linkages, like strategic alliances or joint ventures	Binary variable, coded as one if specific parent firm activities occur within a timeframe of two years before the CVC transaction ($t_2:t_0$).
Post-investment merger	Binary variable, coded as one if the UCP or the associated CVC unit purchased the target within five years ($t_0:t_4$) after the investment.

APPENDIX 4

Results of OLS regression analysis without CVC activity

	Product Portfolio Change				Geographic Change			
	H1 t _{0:t1}	H1 t _{1:t2}	H1 t _{2:t3}	H1 t _{3:t4}	H3 t _{0:t1}	H3 t _{1:t2}	H3 t _{2:t3}	H3 t _{3:t4}
Intercept:	0.084 (0.015) [0.000]	-0.045 (0.015) [0.003]	-0.211 (0.018) [0.000]	0.243 (0.018) [0.000]	-0.006 (0.014) [0.688]	-0.017 (0.015) [0.250]	-0.045 (0.015) [0.002]	0.022 (0.016) [0.159]
Control:								
ROA_UCP:	0.015 (0.021) [0.479]	0.044 (0.022) [0.040]	0.173 (0.024) [0.000]	0.180 (0.023) [0.000]	-0.074 (0.013) [0.000]	0.018 (0.013) [0.180]	0.054 (0.014) [0.000]	0.041 (0.017) [0.018]
UCP_SIZE:	0.006 (0.001) [0.000]	0.004 (0.001) [0.004]	0.005 (0.002) [0.000]	0.002 (0.002) [0.158]	0.004 (0.001) [0.000]	0.000 (0.001) [0.668]	0.004 (0.001) [0.005]	0.002 (0.001) [0.244]
TRANSACT_VALUE:	0.000 (0.001) [0.707]	0.006 (0.001) [0.000]	0.002 (0.001) [0.295]	0.004 (0.002) [0.012]	-0.002 (0.001) [0.042]	-0.001 (0.001) [0.081]	-0.001 (0.001) [0.250]	0.000 (0.001) [0.899]
CVC_TRANSACT_AGE:	-0.001 (0.000) [0.008]	-0.001 (0.000) [0.000]	-0.001 (0.000) [0.000]	-0.002 (0.000) [0.000]	0.000 (0.000) [0.052]	0.000 (0.000) [0.171]	0.000 (0.000) [0.140]	0.000 (0.000) [0.427]
M&A:	-0.016 (0.007) [0.023]	-0.023 (0.007) [0.003]	-0.015 (0.010) [0.126]	-0.013 (0.010) [0.212]	0.005 (0.004) [0.190]	-0.009 (0.004) [0.015]	-0.004 (0.004) [0.385]	-0.004 (0.004) [0.417]
BUYBACK:	0.017 (0.005) [0.000]	0.002 (0.005) [0.714]	-0.006 (0.006) [0.348]	-0.003 (0.006) [0.663]	0.007 (0.003) [0.010]	0.017 (0.003) [0.000]	-0.004 (0.003) [0.180]	0.002 (0.003) [0.550]
INTERFIRM_LINK:	0.004 (0.005) [0.432]	-0.013 (0.005) [0.011]	0.005 (0.006) [0.349]	-0.008 (0.006) [0.164]	-0.011 (0.003) [0.000]	-0.008 (0.003) [0.011]	-0.006 (0.003) [0.065]	0.001 (0.003) [0.840]
DOWNSIZING:	-0.019 (0.005) [0.000]	0.012 (0.005) [0.028]	0.001 (0.006) [0.921]	0.021 (0.006) [0.001]	-0.006 (0.002) [0.018]	-0.012 (0.003) [0.000]	-0.008 (0.003) [0.005]	-0.005 (0.003) [0.060]
SPIN-OFF:	-0.025 (0.008) [0.001]	-0.019 (0.009) [0.029]	-0.027 (0.010) [0.005]	-0.033 (0.009) [0.001]	-0.004 (0.005) [0.398]	0.000 (0.006) [0.948]	-0.008 (0.008) [0.265]	0.013 (0.008) [0.133]
IPO:	0.046 (0.008) [0.000]	0.077 (0.007) [0.000]	0.066 (0.009) [0.000]	0.033 (0.008) [0.000]	-0.020 (0.005) [0.000]	-0.013 (0.006) [0.027]	-0.009 (0.006) [0.156]	-0.023 (0.006) [0.000]
FPO:	-0.023 (0.004) [0.000]	-0.029 (0.004) [0.000]	-0.029 (0.005) [0.000]	-0.008 (0.005) [0.112]	-0.005 (0.002) [0.036]	-0.003 (0.002) [0.206]	-0.002 (0.003) [0.487]	0.002 (0.002) [0.372]
POST_INVEST_MERGER:	0.009 (0.012) [0.468]	-0.010 (0.014) [0.463]	0.012 (0.016) [0.430]	0.004 (0.015) [0.793]	0.006 (0.007) [0.418]	-0.002 (0.007) [0.786]	0.007 (0.008) [0.389]	0.004 (0.009) [0.675]
Model information:								
N:	4204	3926	3570	3231	2547	2363	2141	1921
R ² -adjusted:	0.163	0.249	0.267	0.243	0.101	0.129	0.107	0.135
R ² :	0.170	0.255	0.273	0.250	0.113	0.141	0.120	0.148
F-statistic:	25.824 [0.000]	41.745 [0.000]	42.874 [0.000]	35.557 [0.000]	9.665 [0.000]	11.953 [0.000]	9.288 [0.000]	10.970 [0.000]

Notes. Multivariate regression analysis. Standard errors are in parentheses and p-values in brackets. Year-fixed effects are included but not reported.

STUDY 3:
EXPLORING THE PERSONAL VALUES OF ENTREPRENEURIAL FINANCE
INVESTORS: A TWITTER ANALYSIS

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ABSTRACT

This study analyzes the social media activity of entrepreneurial finance investors to gain a deeper understanding of their personal values. Drawing on Schwartz's (1992) framework of personal values, we identify considerable value differences between business angels and venture capitalists. We compare 500 business angels with 478 venture capitalists by employing a computerized language-based assessment tool that examines their Twitter messages. Our findings indicate that both investor groups exhibit comparable scores in five value dimensions, underscoring a substantial degree of commonality between them. However, we also observe significant value variations between both investor types that are mostly in line with our expectations and the existing literature on entrepreneurial finance. Venture capitalists place emphasis on the overarching dimension of self-enhancement, as they score higher on the values of power and achievement orientation than business angels. Moreover, the study provides some unexpected results when it comes to the second overarching dimension, openness to change vs. conservation. While venture capitalists' focus on the security value is closely related to their investment objectives, we did not expect venture capitalists to score higher than business angels on the opposite value of stimulation.

Keywords: Entrepreneurial finance, business angels, venture capitalist, personal values, social media analysis, psychology

INTRODUCTION

Business angels (BAs) and venture capitalists (VCs) play vital roles in the field of entrepreneurial finance (Drover et al., 2017). Consequently, research on both groups of investors has increased significantly in recent years. By now, papers have explored the personal characteristics, objectives, behavior, or investment practices of both investor types and note that BAs and VCs differ in various aspects (Boulton et al., 2019; Mitteness et al., 2012; Morrissette, 2007; Zinecker et al., 2022). However, there is remarkably little research analyzing the psychology of these investor groups (Block et al., 2019; Duxbury et al., 1996).

This lack of research is all the more surprising considering the crucial impact that psychological traits, and personal values in particular, have on investment decisions (Matusik et al., 2008; Quas et al., 2021; Sreedevi & Chitra, 2012). Our focus lies on the personal values held by investors, which are an integral part of individual psychology (Hueso et al., 2021; Sagiv et al., 2017). A value can be defined as "a belief pertaining to desirable end states or modes of conduct, that transcends specific situations, guides selection or evaluation of behavior, people, and events, and is ordered by importance relative to other values to form a system of value priorities" (Schwartz, 1994, p. 20). According to Schwartz's theory (1992), there are ten basic personal values, organized along two overarching dimensions (self-enhancement vs. self-transcendence; conservation vs. openness to change). These personal values shape decisions under uncertain circumstances and can serve as indicators of human behavior (Matusik et al., 2008; Rohan, 2000). Indeed, in entrepreneurial finance, the decision-making process is also notably marked by high uncertainty (Wiltbank et al., 2009), which makes it particularly interesting to explore the psychology of both BAs and VCs. Against this backdrop, progress has recently been made in understanding the importance of investor psychology in entrepreneurial finance research. For instance, investor psychology exerts a strong influence on investment behavior and motives, portfolio diversification strategies, or deal size (Altmeier & Fisch, 2024; Falcão et al., 2023; Lien et al., 2022).

The relevance of personal values has already been underscored in a variety of economic studies. Egri and Ralston (2004) compare the values of Chinese managers with those of American executives and find substantial value differences. Similarly, Lyons et al. (2007) identify value disparities between generational cohorts: Generation X individuals demonstrate notably greater openness to change and less adherence to conservative values compared to the older baby boomers. In turn, Doran (2009) focuses on consumers who support fair trade and investigates the impact of their value systems on purchasing behavior. Additionally, existing research states that personal values serve as a determinant of both entrepreneurial behavior and intention (Liñán et al., 2016; Yang et al., 2015). More specifically, Bolzani and Foo (2018) highlight that five of ten personal values influence a founder's intention to engage in internationalization. Sharmila and Swamy (2023) highlight that one specific value, hedonism, positively affects real estate investment decisions. Similar to entrepreneurial finance, these investments involve high risk, which can generate both pleasure and excitement. As the only study in the field of entrepreneurial finance, Matusik et al. (2008) apply the personal values framework to examine how VCs' level of security and self-direction influence their initial assessment of entrepreneurs. Accordingly, the underlying paper marks the initial attempt to explore the value differences of the two primary investor types in entrepreneurial finance, BAs and VCs. Since investors' objectives are not yet fully understood (Falcão et al., 2023), our study seeks to examine personal values as an additional explanatory factor for the differing investment motives and behavior of BAs and VCs. Thus, this study fills the research gap by delving into the value profiles of both BAs and VCs. Correspondingly, our exploratory research question is: *What personal values do VCs and BAs hold, and how do they differ?*

While BAs and VCs diverge notably in their investment goals and behavior, they also share similarities in their expertise for evaluating, financing, and nurturing start-up ventures. Likewise, there is an ongoing debate whether BAs and VCs should be seen as complements (friends) or substitutes (foes) (Chahine et al., 2007; Hellmann & Thiele, 2015). For this reason,

we aim to enhance our comprehension of the shared personal values between the two groups and identify the dimensions in which they diverge. Analyzing the tweets of 500 BAs and 488 VCs, this study provides interesting findings. Both investor groups exhibit comparable scores in five value dimensions, underscoring a substantial degree of commonality between them. However, we also observe notable value variations between BAs and VCs. These are largely consistent with the literature on entrepreneurial finance, as VCs show higher levels of power, security, and achievement-orientation. Furthermore, the study provides some unexpected results, suggesting that BAs have lower levels of stimulation than VCs.

Our exploratory study contributes in several ways to the growing literature on entrepreneurial finance and, in particular, on investor psychology. First, we examine the personal values of key players in entrepreneurial finance. We gain insights into the mindset of start-up investors, a group that has been little studied in business and economics research, largely due to the challenges of obtaining relevant data (Croce et al., 2021). This paper adds another interesting dimension to prior research about similarities and differences between VCs and BAs. The identification of differing personal values between the two investor types is highly relevant, as these values help explain variations in investment behavior, underlying motives, and the extent of involvement with the funded startup. Hence, our study contributes to a more accurate delineation of the two primary investor types in entrepreneurial finance and brings a new perspective to the "friends vs. foes" debate, as we show that both types of investors substitute and complement each other in certain value dimensions. Specifically, we employ both univariate and multivariate analyses to empirically evaluate distinctions between BAs and VCs (our dependent binary variable).

Second, despite the relevance of psychology for investment-related decisions, we are among the pioneering researchers to scrutinize (investor) psychology in the context of entrepreneurial finance. We are raising awareness of a research area that has received little attention so far (Altmeier & Fisch, 2024). While Matusik et al. (2008) have analyzed the impact

of self-direction and security values on VC's decision-making, no researcher has yet comprehensively investigated the value systems of BAs or VCs. This lack of research is particularly surprising given that scholars emphasize personal values as a major factor in one's decision-making under uncertainty (Gorgievski et al., 2011; Hueso et al., 2021), a common feature in the entrepreneurial finance context. Therefore, our paper serves as a starting point for future research to delve more deeply into various dimensions of investor psychology (such as personality traits, attitudes, or emotions). Similarly, there is a need to better understand the effects of certain psychological traits on investment-related outcome variables (such as performance effects or co-investor selection). In this context, our paper sheds light on which investor values are particularly relevant for a more thorough analysis by highlighting the dimensions with the most substantial value deviations and offering potential explanations.

Third, we present a novel approach to evaluate personal value disparities in the context of entrepreneurial finance research. This involves the utilization of a computerized language-based assessment tool designed to explore digital footprints. Language serves as a fundamental component of human communication, and analyzing it helps to better understand human behavior and psychology. In fact, examining social media posts has recently proven to be a valid and accurate method to uncover psychological characteristics such as values, emotions, or personality traits of a respective target group (Kakar et al., 2021; Kaur et al., 2021; Obschonka et al., 2017). In particular, analyzing social media data has the distinct advantage of being considerably more objective compared to other methods of identifying psychological traits, such as surveys (Ponizovskiy et al., 2020).

CONCEPTUAL BACKGROUND

Business Angels and Venture Capitalists

BAs (also known as informal investors) and VCs represent the most important sources of start-up financing (Drover et al., 2017; Lindsay, 2004; White & Dumay, 2017). BAs are

described as middle-aged, wealthy men (less than 1/10th of all BAs are women) with extensive entrepreneurial background and networks (Mittennes et al., 2012; Tenca et al., 2019). They invest their own money and prefer start-ups at an early stage that are geographically close to them (Freear et al., 1994; Morrissette, 2007). Usually, BAs become active when the financial needs to develop the venture exceed the financial means of founders, family, and friends (3F) (Aram, 1989; Ramadani, 2009). BAs therefore often fill the funding gap between 3F and banks, institutional funds, or VCs that consider the start-up too risky to finance (White & Dumay, 2017). In terms of their post-investment engagement, BAs are heavily involved in the day-to-day operations of the venture and act as mentors (van Osnabrugge, 2000).

VCs differ from BAs in several aspects: VCs obtain money from a group of limited partners, such as universities or pension funds (Benjamin & Margulis, 2000). Accordingly, they have different goals than BAs when investing in new ventures (Boulton et al., 2019). VCs' primary objective is to achieve successful exits and generate substantial returns for the limited partners by strategically investing in a portfolio of young ventures with high potential (Drover et al., 2017; Gompers & Lerner, 2000). Therefore, VCs closely monitor the funded start-ups, often obtaining board seats or providing value-added services to expedite the ventures' growth and increase their value (Fried & Hisrich, 1995; Gorman & Sahlman, 1989). Due to their high level of education (they often have a master's degree or a PhD), VCs represent specialists in finance and valuation (Bonnet et al., 2014). Besides, VCs are rather seen as generalists (unlike BAs who often possess expertise in a particular industry) as they manage a diverse portfolio of start-ups to mitigate risk (Bonnet & Wirtz, 2012).

In terms of investment phases, BAs often provide funding to new ventures at early stages, when risk is the highest (Morrissette, 2007). In contrast, VCs rather invest at later stages when uncertainty has decreased and the venture's potential can be assessed more thoroughly (Gregson et al., 2013; Sapienza et al., 1996). While the total annual investment amounts from VCs and BAs are comparable (OECD, 2011), there is a notable distinction in the distribution.

BAs engage in numerous deals, often with lower average values, while VCs frequently target (technological) start-ups deemed to have the highest potential (Hsu, 2001). The average size of a venture capital investment is \$4 million, while BAs provide tens and sometimes hundreds of thousands of dollars (Morrissette, 2007). In light of these similarities and differences, scholars continue to debate whether BAs and VCs complement or substitute each other (Chahine et al., 2007). On the one hand, the literature suggests that VCs become more influential (and displace BAs) in later stages of investment aimed at a profitable exit (van Osnabrugge, 2000). On the other hand, there are many examples where BAs and VCs cooperate efficiently and even form syndicates (Harrison & Mason, 2000). Since this "friends or foes" question remains unresolved (Hellmann & Thiele, 2015), our study is all the more relevant because the two types of investors may complement each other in terms of their psychological profiles.

Likewise, we identify characteristics closely related to investor psychology and values. Since BAs have a long-term investment horizon and no predefined exit strategy, they are more patient and build closer relationships with the founders (Croce et al., 2018). Correspondingly, BAs find satisfaction in their work due to intrinsic motivation and show higher levels of both entrepreneurial passion and orientation (Bonnet et al., 2014; Duxbury et al., 1996; Mitteness et al., 2012). This is also why BAs take more risks and rely on their instincts (Lindsay, 2004; Morrissette, 2007; Ramadani, 2009). As BAs strive to become part of and support an interesting entrepreneurial project, they spend less effort on due diligence and may even invest opportunistically against rational considerations (Mitteness et al., 2012; Robinson & van Osnabrugge, 2000). Thus, personal values play a crucial role in the investment decision-making process of BAs, as they do not have to justify their start-up choices to an employer and can base their decisions on their own interests (Altmeier & Fisch, 2024). Conversely, VCs, constrained by the need to maximize return on investment for their limited partners, are more analytical and conduct intensive due diligences (Morrissette, 2007). However, although entrepreneurial

finance investors play a crucial role in nurturing promising companies, no study has yet examined the personal values of both BAs and VCs.

Theory of Personal Values

Human psychology, defined as "the mental characteristics (...) of a person or group" (Oxford English Dictionary, 2023), encompasses various dimensions such as personality, thoughts, feelings, attitudes, thinking styles - and personal values (Boyd, 2017; Hueso et al., 2021; Mitchell, 2009; Omorede et al., 2015; Sagiv et al., 2017). Values are not visible, intrinsic, and enduring perspectives on the importance of overarching goals that individuals hold (Rokeach, 1973). Accordingly, personal values act as guiding principles in people's lives (Schwartz, 1992). Value dimensions are ranked in a certain hierarchy as the degree of each value dimension varies from person to person (Schwartz, 2012). However, this value hierarchy typically remains consistent and stable over time (Schwartz et al., 2010). In this paper, we focus on personal values as an integral part of psychology, as individuals make behavioral choices that align with their value systems (Rohan, 2000). The theory of basic human values comprises a total of ten broad value dimensions, which are universally recognized across cultures (Schwartz, 1992). These values can be depicted within a circular arrangement that considers their motivational congruence and interrelationships (see Figure 1).

Insert Figure 1 here.

Values close to each other in the structure share similar motivations and are more likely to be pursued together, for instance tradition and conformity are compatible values. Correspondingly, values with conflicting motivations, positioned opposite each other, contradict one another, such as benevolence and power. Thus, the crucial factor influencing the relationship between the values is the compatibility of their motivational goals. The

motivational conflicts between opposing value types can be understood by conceptualizing values as arranged along two bipolar dimensions. While conservation values (security, conformity, and tradition) embody the desire for control and protection, openness to change values (self-direction, stimulation, and hedonism) signify the pursuit of exploration and novelty. In a similar vein, self-transcendence values (universalism and benevolence), which focus on equality and the influence of one's actions on others, contrast with the self-enhancement values (achievement and power), which highlight personal outcomes and success. Each value dimension is defined as follows:

(1) *Openness to Change*

- Self-Direction: valuing autonomy, individual freedom, and self-determination.
- Stimulation: the desire for new opportunities, excitement, and encounters in life.
- Hedonism: appreciating pleasure and the pursuit of enjoyable moments.

(2) *Conservation*

- Security: valuing stability, safety, and predictability in life.
- Conformity: recognizing social norms to gain acceptance in society.
- Tradition: preserving traditions, cultural customs, and values.

(3) *Self-Transcendence*

- Universalism: emphasizing tolerance and the equality of all people.
- Benevolence: valuing empathy and promoting the welfare of others.

(4) *Self-Enhancement*

- Achievement: striving for personal success and attaining ambitious goals.
- Power: striving for influence and control over others and asserting dominance.

Indeed, prior studies demonstrate the high relevance of personal values in diverse economic contexts: Egri and Ralston (2004) conduct a comparison of managers from various generations in both China and the United States, revealing substantial value disparities. For

instance, Chinese managers who have been active since the establishment of Communist China exhibited a significantly higher inclination toward self-enhancement, while being comparatively less conservative than the generation from the Republican Era. Conversely, Doran (2009) examines consumers who support fair trade and explores how their value systems influence their purchasing behavior. Unsurprisingly, she finds that universalism is the most important value for loyal fair trade consumers, while benevolence and security values play a significant role for those who abstain from purchasing fair trade products altogether. Furthermore, existing research suggests that personal values function as a key determinant of entrepreneurial behavior and intentions (Liñán et al., 2016; Yang et al., 2015). Being the sole study in the field of entrepreneurial finance, Matusik et al. (2008) utilize Schwartz's framework to investigate the impact of security and self-direction values on VC's initial assessment of entrepreneurs. While VCs, for whom self-direction holds critical value, consider the start-up experience of founders a pertinent decision factor, VCs who focus on the security dimension rather place positive emphasis on the founder's education.

METHODOLOGY

Psycholinguistic Text Analysis

We employ a novel computer-based method to examine large volumes of text, harnessing the power of language analysis to gain valuable insights into the personal values of individuals. Language serves as a fundamental component of human communication, and analyzing it helps to better understand human behavior and psychological traits. Accordingly, the way people use language can provide critical information about an individual's values, emotions, and attitudes (Boyd & Schwartz, 2020). Consequently, researchers have devised various assessment tools centered on language to enhance our understanding of human psychology. Language-based tools allow to draw conclusions about psychological traits, as language use remains consistent over time, has internal coherence and varies significantly

between individuals (Bardi et al., 2008; Chung & Pennebaker, 2021). Thus, these tools are gaining increasing popularity due to their efficiency and accuracy in evaluating an individual's psychology (Boyd & Pennebaker, 2017; Tausczik & Pennebaker, 2010). In particular, a major benefit of analyzing text data, as opposed to relying on participant self-reports or surveys, is that it helps mitigate issues like low response rates and small sample sizes, participant fatigue, and response bias (Paulhus & Vazire, 2007).

One such instrument is the *Linguistic Inquiry and Word Count* (LIWC) software, a text analysis program that scrutinizes individual's choice of words and language patterns. LIWC originated in the late 1990s through the collaborative efforts of psychologists James Pennebaker, Roger Booth, and Martha Francis, emerging as a prominent language analysis tool within the area of psychology. LIWC examines language by detecting the presence and frequency of specific words and phrases within a given text. The software calculates value scores (with 0 as the minimum boundary) by systematically analyzing textual data using a predefined dictionary that classifies words into linguistic, emotional, and psychological categories. LIWC processes each word in the input text, matching it to relevant categories, and then computes category scores based on the percentage of words that fall into each category relative to the total word count. Ultimately, the software is able to categorize these linguistic elements along a number of dimensions, including personality traits, values, or emotions (Boyd et al., 2015; Chung & Pennebaker, 2021; Jordan et al., 2019; McHaney et al., 2018).

We provide LIWC with a reputable and validated dictionary (Personal Values Dictionary), which we found in Ponizovskiy et al. (2020), to determine the presence of different value dimensions within a given text. The researchers developed and validated this dictionary by investigating a variety of single-authored texts, contributed by over 180,000 individuals, totaling more than 525 million words. As a first step, experts compiled a list of potential terms for each value dimension. The scholars identified these candidate words using established value questionnaires, synonym lists, and online research, resulting in 2,570 words. Methods such as

exploratory factor analysis were then applied to obtain the final dictionary of 1,068 value-laden terms. The Personal Values Dictionary is applicable to a wide range of textual contributions and has a high degree of internal consistency. According to the Personal Values Dictionary, the following sentence, for instance, indicates a high score on the achievement dimension (signal terms for achievement values in *italics*): "*Proud of the growth and results we've achieved together. Success is built on hard work and continuous improvement.*"

We performed both univariate and multivariate analysis on the LIWC output to investigate personal value variations between BAs and VCs. The univariate analysis examines one value dimension at a time, while the regression analyzes the model as a whole. In particular, we conduct multivariate analysis using logistic regression to examine whether the effects observed in the univariate analysis persist when demographic control variables are included. Thus, combining both uni- and multivariate analyses allows for a comprehensive understanding of how values are expressed in tweets.

Data

We draw on two platforms to find a sufficient number of both BAs and VCs: LinkedIn (www.linkedin.com) and Crunchbase (www.crunchbase.com). While LinkedIn is a social network platform for maintaining existing business contacts and making new ones, Crunchbase represents a commercial database providing information about firms, entrepreneurs, M&A activities, or (start-up) investors.

In July 2023, we performed a broad keyword search on LinkedIn using the following search terms: "business angel", "angel invest*", "angel financ*", "BA", "informal investor", "venture capital*", "VC financ*", and "VC". For Crunchbase, we either used the same keywords when searching for "Job Title" or we directly selected "Individual/Angel" or "Venture Capital" as the investor type. By this means, we were able to extract 1,701 BAs as well as 900 VCs.

We excluded investors in accordance with the following criteria. First, we employed a Python code to link the names of the investors to their Twitter (since renamed: X) profiles. More specifically, we matched the identified investor names to a Twitter user if the respective investor name and at least one of the following keywords were included in the user's biography: "angel investor", "venture capitalist", "vc", "business angel", "ba", "startup investor", "seed investor", "early-stage investor", "tech investor", "investor", "investment", "private equity", "growth capital", "investment portfolio", "funding", "investment management", "scaleup", "disruptor", "investment advisor", "fintech investor", "business builder", "serial entrepreneur", "lead investor", "startup mentor", "ecosystem builder", "accelerator", "wealth manager", "strategic investor", "venture builder", "financier", "impact investor", "portfolio manager", "risk capital", and "growth investor". Second, we excluded so-called "superstar" investors, such as Nico Rosberg (former formula 1 world champion) or Keisuke Honda (former Japanese national soccer player), with more than 500,000 followers to reduce potential bias from individuals who may not be primarily investors or whose accounts are professionally managed (Block et al., 2019). Third, we collected relevant demographic information (age, education, experience etc.) to code them as corresponding control variables (see below) and manually checked each investor to see if the classification as VC/BA was correct. Thus, we excluded those individuals who identified themselves as both BA and VC. We then introduced a binary variable. This dependent variable is assigned a value of 0 for BAs and 1 for VCs in order to distinguish between these two groups of investors. Ultimately, we find 500 BAs and 478 VCs with an average of 7,774 words per individual. The range of words extends from 253 to over 84,555 terms per investor. In the final analysis, we were able to examine a total of 146,211 tweets, whereby we did not impose any time restrictions.

Variables

Personal values. We refer to the Personal Values Dictionary by Ponizovskiy et al. (2020) to assess the personal values of the two investor types according to Schwartz's (1992)

theory (see Table 1). The dictionary contains approximately 100 words and phrases for each value dimension, resulting in a total of 1068 terms. The lexicon demonstrates a high level of reliability and internal consistency. Furthermore, it has been validated by using single-authored Facebook or blog posts, essays, or book chapters, encompassing 525 million words written by more than 180,000 individuals from 1990 to 2017.

Insert Table 1 here.

Control variables. To examine if any variations in the personal values of BAs and VCs are influenced by other factors, we take into account several control variables that are likely to correlate with the investor's value system. We gather biographical data for each investor by conducting manual online searches. Following similar studies (Obschonka et al., 2017; Qiu et al., 2012), we control for individual and sociodemographic characteristics such as *age*, *gender*, *education*, *place of residence*, and *professional experience* (both general and as an investor). In cases where the investor's birth year is unspecified, we approximate it by taking the initial year of education or occupation and subtracting 20 years. Additionally, we include Twitter-related variables to eliminate potential effects stemming from variations in Twitter usage. Therefore, we control for both the *number of followers* and *number of tweets*.

RESULTS

Descriptive Statistics

In our dataset, we find demographic differences between BAs and VCs that are mostly in line with the existing literature. The majority of entrepreneurial finance investors are still men, with more than 80% in both groups. In terms of age, our sample resembles previous studies which found most investors aged 45-50 (Freear et al., 1994; Hill & Power, 2002). BAs are a bit

younger than the VCs, which could indicate that many found a venture first and then act as a BA after its sale. In contrast, the age distribution turns in favor of VCs from the age of 50, suggesting that reputation is an important indicator in the venture capital industry. The clearest differences we see are in education: while most BAs hold a Bachelor's degree, the majority of VCs have a master's, MBA or even PhD. Other researchers have also observed this distinction (Ramadani, 2009; World Bank Group, 2018). In the context of investor experience, it is noteworthy that BAs boast a considerably longer history as investors (64% started before 2000 compared to only 25% of VCs), while the majority of VCs commenced their investment careers after 2011 (51% compared to 4% of BAs). In terms of origin, the majority of investors in our sample come from the U.S., with more than 50% for each investor group, but we have found many investors from Europe and Asia as well. Regarding the number of tweets and the quantity of followers, BAs and VCs are on a comparable level.

Univariate and Multivariate Analysis

Overall, while BAs and VCs have similar scores in five dimensions, we observe highly noteworthy differences between these two groups in the other five out of ten variables. Table 2 presents a univariate analysis where we utilize a two-sided t-test to assess the disparities in mean personal values between BAs and VCs.

Insert Table 2 here.

VCs exhibit a higher inclination towards achievement compared to BAs. Their mean score of 0.32 surpasses that of BAs (0.29). Furthermore, VCs value security more (0.1) than BAs (0.08). When it comes to power, VCs (1.88) show a higher value than BAs (1.81). The same applies to the stimulation dimension, where VCs (0.16) are higher than BAs (0.13).

To determine the persistence of the effects while considering crucial demographic factors, we employ a multivariate analysis (logistic regression) to predict the probability of being a BA versus a VC (as displayed in Table 3). The results of the multivariate analysis support our findings of the univariate analysis. Stimulation ($p < 0.1$), achievement ($p < 0.1$), power ($p < 0.1$) and security ($p < 0.1$) have positive effects on the likelihood of being a VC. In turn, universalism ($p < 0.05$) has a negative effect on the likelihood of being a VC. Additionally, the Pearson correlations between the variables are presented in Table 4.

Insert Tables 3 & 4 here.

Supplementary Analysis

In our model, we performed extensive robustness checks to ensure the stability and reliability of our estimates. First, we assessed the sensitivity of the results to different covariates by running alternative model specifications and gradually adding variables to the model. We then addressed potential heteroscedasticity by calculating robust standard errors to provide more reliable significance tests (White, 1980). This adjustment resulted in minimal changes in significance levels, confirming the stability of our main results. Second, we conducted a multicollinearity analysis to ensure that no variables exhibited excessive linear correlation, which could otherwise bias the interpretation of the model (Kutner et al., 2005). The calculated variance inflation factor (VIF) was low ($VIF < 10$), indicating that multicollinearity did not significantly affect the estimates (James et al., 2023). Finally, we tested the model on different subgroups of the dataset to assess robustness to structural variation within the sample, and conducted bootstrap resampling to confirm the precision of our estimates in randomly drawn samples (Angrist & Pischke, 2009; Wooldridge, 2010). These robustness checks validate the consistency and reliability of our main results.

DISCUSSION

Interpretation of Value Disparities

Our results show that BAs and VCs have comparable scores for half of the value dimensions analyzed. This is hardly surprising given that they operate in the same industry and are therefore influenced by similar environmental conditions. For example, Mason and Stark (2004) find that, in contrast to bankers, VCs and BAs use a similar approach in the funding decision process. Bonnet and Wirtz (2012) take a different perspective, showing that the cognitive distance between founders and VCs is the greatest, while BAs exhibit similarities with both groups. In line with the concept of cognitive distance between BAs and VCs, as well as prior research on entrepreneurial finance, we observe notable distinctions on certain value dimensions.

As expected, both investor types have by far the highest scores in the **power** dimension. This result reflects the specific context of the entrepreneurial finance industry. Since investors provide resources to high-risk ventures, they strive to exert influence and actively participate in the processes of the start-ups in order to successfully drive their development. However, divergent investment motives contribute to variations in the power dimension between BAs and VCs. Given their imperative to meet pre-defined return targets, it is not surprising that VCs score higher on the power dimension than BAs. That is why VCs try to influence entrepreneurs to attain their financial objectives. For example, VCs may exert pressure on the start-up team to rapidly accelerate the value of the venture and to take growth-maximizing measures, as they are aiming for a lucrative exit rather than sustainable business development (Kang, 2020). In practice, their power is demonstrated by replacing the venture's founding team members or the CEO (Hellmann & Puri, 2002). Filling these positions with people they know gives them another mechanism to control the venture (Schmidt, 2003). The representation of VCs on the board, the refusal of follow-on funding if start-ups miss milestones, or the use of incentive

contracts are further forms of monitoring and exercising power over the founding team (Bergemann & Hege, 1998; Bonnet & Wirtz, 2012).

Existing literature also provides evidence to explain why power holds slightly less importance to BAs. Since BAs are former founders, they understand the problems and challenges during the entrepreneurial process very well. Thus, as the cognitive distance between BAs and entrepreneurs is smaller than with VCs, BAs are more cooperative, because they can better identify with the entrepreneurs and their needs, fears, and wishes. Correspondingly, rather than putting pressure on founders to meet growth targets, BAs are proactively involved in advising ventures and sharing their experience as former entrepreneurs (Bonini et al., 2019; Falcão et al., 2023; Preston, 2007). By coaching the start-up team, BAs try to build a stable, trusting working relationship (Croce et al., 2021; Politis, 2008). In this context, BAs may even become co-founders (Morrissette, 2007). Consequently, BAs interact frequently with the founding team, fostering strong interpersonal relationships and reducing power differentials (Granz et al., 2020). Therefore, fewer conflicts arise between BAs and entrepreneurs (Croce et al., 2020), which implies that BAs perceive less necessity to assert their power claims. Since BAs have objectives beyond purely financial ones (Wetzel, 1983), they opt for simple contracts with the founders (Mason & Stark, 2004), indicating that they (can) exercise less power. Accordingly, BAs are less focused on predefined exit strategies and dates (Bonnet & Wirtz, 2012). Moreover, BAs operate more on an equal footing with the founders since they invest considerably smaller sums on average (7.6% of common share equity) than VCs (43%) (Goldfarb et al., 2014). Given that VCs expend substantial amounts of money, this presumably entails a certain claim to power and influence.

Achievement-orientation appears to be relevant for both investor types as financial success is a fundamental incentive for entrepreneurial finance investors. Indeed, both investor groups exhibit high scores on this dimension. Nonetheless, though Duxbury et al. (1996) state

that BAs strive for achievement and control, VCs score even higher in this dimension for a number of reasons. VCs present themselves as more achievement-oriented, striving to increase the value of the start-up in a short time, to exit the venture successfully, and to generate the promised returns for their limited partners (Drover et al., 2017; van Osnabrugge, 2000). This finding is consistent with Granz et al. (2020) who characterize VCs as outcome-oriented, whereas BAs tend to be behavior-oriented, focusing more on the start-up team. Since VCs invest on behalf of other people, there is a certain pressure to succeed. Thus, they only pursue financial investment goals (Bonnet & Wirtz, 2012). Therefore, they set challenging, contractual milestones for their portfolio firms, which they have to reach in order to receive follow-on funding (Hsu et al., 2014).

Due to their financial objectives, VCs also pay more attention to criteria such as market and business model analyses or the venture's technology potential in their decision-making, while BAs focus strongly on the behavior and characteristics of the founding team (Sudek, 2006; Wiltbank, 2005). This attitude, known as entrepreneurial orientation (Lindsay, 2004), may lead BAs to prioritize ventures in challenging environments or with intriguing products over start-ups that promise secure returns (Falcão et al., 2023). Indeed, existing studies show that VCs do achieve higher rates of return (van Osnabrugge, 2000). Certainly, BAs strive for financial success, but have additional altruistic motivations for investing, such as having fun, socializing with new people, or being part of an entrepreneurial venture (Croce et al., 2020; Falcão et al., 2023; Ramadani, 2009). For example, BAs derive satisfaction not only when founders heed their advice but their own entrepreneurial experience also makes them willing to support underperforming ventures for a longer period of time (Hsu et al., 2014; Mason & Harrison, 2002). In line with this, Croce et al. (2020) found that BAs demonstrate more patience than VCs in developing the chosen venture and occasionally share (non-financial) objectives with the start-up team.

Due to both their primary objectives and professional background, VCs value **security** more than BAs. Predictability is less relevant for BAs than for VCs, as BAs are more adept at (and may even enjoy) dealing with challenging situations or unexpected events (Falcão et al., 2023; Ramadani, 2009). The vast majority of BAs are former entrepreneurs who have experience with the "feeling of uncertainty" and may find fulfillment in working under such conditions. Uncertainty and the risk of failure are particularly high for BAs because they usually invest in early-stage companies that are not yet profitable (Wetzel, 1983). Accordingly, their selection of deals is mainly driven by the BAs' gut feeling, intuition and instinct (Altmeier & Fisch, 2024; Huang, 2018; Robinson & van Osnabrugge, 2000). In a similar vein, they place less emphasis on the contractual arrangements (incomplete contracts approach) and rely more on soft monitoring mechanisms such as their ability to intervene in the post-investment phase if necessary (Bonnet & Wirtz, 2012; van Osnabrugge, 2000). Hence, as BAs' focus is on building a trusting relationship with the entrepreneur, they do not draft detailed contracts (Bonini et al., 2019; Croce et al., 2021). However, it is also part of the truth that BAs are usually high net worth individuals. This allows BAs to act more independently than VCs (Altmeier & Fisch, 2024), who must adhere to the guidelines set by their employer (Zinecker et al., 2022).

Contrariwise, VCs feel pressure to meet the return targets, which is why they choose measures to minimize the risk of failure. VCs conduct intensive due diligence, use more complex contractual terms, and consider various exit options (Morrissette, 2007; van Osnabrugge, 2000). Through the frequent utilization of complex covenants, clauses, and securities, VCs aim to reduce the risks of potential agency conflicts (Bonnet & Wirtz, 2012). Consequently, most contracts between start-ups and VCs incorporate specific elements, such as staged financing, the use of convertible preferred stock, or the provision of seats on the venture's board (Benjamin & Margulis, 2000; Wallmeroth et al., 2018). Staging is of considerable importance for VCs, because if ventures fail to meet the contractually agreed milestones, the VCs are able to refuse follow-on funding (Bergemann & Hege, 1998; Granz et

al., 2020). Additionally, VCs have moved away from investing in early-stage start-ups towards more secure and established ones (Sapienza et al., 1996). Similarly, Chen et al. (2009) have found that the preparedness of the founding team plays a fundamental role for VCs in their funding decision, even more important than the founder's level of entrepreneurial passion. Given that preparedness is associated with in-depth analyses and a high-quality business plan, this again indicates the VC's inclination for predictability.

The higher security scores observed among VCs could also be attributed to their educational background. As highlighted above, a significant majority of VCs hold at least a master's degree, and many have even attained a PhD, in contrast to BAs who predominantly possess a bachelor's degree. Having likely acquired the skill of conducting thorough financial analyses to mitigate risks during their education, they are prone to applying this approach in their role as professional investors. Lastly, VCs may also take these actions (and share them on Twitter) to publicly demonstrate their commitment to delivering returns and their sense of responsibility to their investors. They might portray themselves as reliable investors, aiming to persuade limited partners to trust them with their investments. Ultimately, their goal is to convey trustworthiness, strengthen existing relationships with institutional investors, and potentially attract new limited partners for the future (Bonnet & Wirtz, 2012).

The previous explanations are consistent with our results from the multivariate analysis regarding the **universalism** dimension. The adverse impact on the probability of being a VC implies that the higher one's appreciation for tolerance or equality among individuals, the less likely one will be a VC. When VCs exert influence over the funded venture (with the help of contracts or board positions) this creates power structures. The formation of hierarchies, in turn, leads to a loss of equality among the people involved (Magee & Galinsky, 2008). In turn, individuals who place less value on equality and tolerance tend to score lower on the universalism dimension - as do VCs. Therefore, the negative impact of universalism on the

likelihood of being a VC can be attributed to the elevated power aspirations of VCs. Besides, VCs may have a lower tolerance for (start-up) failures than BAs, as VCs see the ventures as a means to achieve their financial goals. Again, BAs are more tolerant when faced with problems or serious challenges in the entrepreneurial process, drawing from their own experiences as founders. Accordingly, Freear et al. (1994) stress that more than 50% of their BA sample continue to support the funded venture even though lower returns are expected. Since BAs invest in new ventures for regional development and social reasons (Falcão et al., 2023; Preston, 2007), this might offer an additional rationale for the positive impact of universalism on the likelihood of becoming a BA.

In terms of our last significant value dimension, the analysis reveals an unexpected but remarkable result. VCs exhibit a higher **stimulation** score compared to BAs, indicating a greater inclination to actively seek new opportunities or experiences in life. From our point of view, this result is surprising, as one of the main motivations for BAs to invest in start-ups is the opportunity to participate in something "new and uncertain". Ramadani (2009) even compares BAs' investment approach to gambling. Likewise, Lindsay (2004) explains that a high level of proactiveness is essential for BAs to both compete successfully with more visible investor types and to add value to the start-up through post-investment involvement. As it is in the nature of entrepreneurial finance investors, we have expected VCs to also be curious about new (investment) opportunities or to get to know potential partners. However, we did not anticipate them surpassing the level of BAs, given that VCs typically rely on standardized routines and syndicate with known investors (Jääskeläinen, 2012; Wallmeroth et al., 2018). We posit that the VCs' higher stimulation score could be the result of utilizing Twitter as a tool for self-promotion or impression management (Saffer et al., 2013). By presenting themselves as particularly bold and open to new, innovative projects, they may be seeking to enhance their reputation or increase their attractiveness to prospective limited partners. Indeed, Fischer and

Reuber (2014) have identified that managers, sharing more similarities with VCs than BAs, employ social media as a communication tool to market their products or services. Contrariwise, BAs are less likely to see Twitter as a marketing tool, as they do not need money from investors and therefore write tweets without the explicit intention of signaling their professionalism or attracting new partners. In a similar vein, Obschonka et al. (2017) discover that entrepreneurs (who frequently become BAs) exhibit a lower concern for impression management.

Overall, in terms of the overarching value dimensions, it is striking to see that both categories of **self-enhancement** (achievement and power) are highly valued by VCs. Consistent with this, individuals who score low on the opposite category of **self-transcendence** are more likely to be VCs. This is particularly noteworthy in the case of the universalism dimension (being part of the self-transcendence category), as our results suggest that individuals show a higher probability of being BAs when they value tolerance and equality among people. These findings, especially VC's achievement-orientation, reflect the primary investment objective of VCs, which is to meet pre-defined return targets (Bonnet & Wirtz, 2012). Regarding the second dimension of self-enhancement (power), VCs frequently implement standardized processes in the funded ventures to attain rapid growth, a task that necessitates a certain degree of power. Conversely, BAs have investment objectives beyond financial gains. These include a willingness to share their start-up experience, provide mentoring, or contribute to regional development and job creation (Preston, 2007). Hence, it is not surprising that individuals with high scores in the universalism dimension tend to be BAs. However, regarding the second overarching category, **openness to change** versus **conservation**, our findings are less straightforward than those for the first category mentioned above. In this bipolar category, VCs score significantly high on both the conservation (security) and the contrasting openness to change dimension (stimulation). While we anticipated that VCs pursue conservation values due

to their preference for control and predictability (of their investments), the results regarding stimulation are more unexpected, as mentioned above. In principle, the attributes associated with the stimulation value, such as the pursuit of exciting experiences, new challenges, and variety, contrast sharply with those of the security value, which emphasizes stability and structure in life. We argue that VCs (and possibly their assistants) are very conscious of using Twitter as a means of communication and are therefore careful about their choice of words. Venture capital firms may aim to avoid portraying themselves in a one-dimensional manner on Twitter, such as by solely highlighting investment successes or the intensive due diligence process (which could account for the elevated scores in the security dimension). Accordingly, to explain the VCs' high score in the stimulation dimension, they might choose to employ language characterized by exciting and varied words and phrases, presenting themselves as courageous and multifaceted individuals.

Limitations

Inevitably, the present study is not without limitations. First, since we identified value differences between BAs and VCs based on their Twitter texts, we only considered investors who are active on the social media platform Twitter. Therefore, there might be a potential selection bias as investors who use other social media platforms (and aim to reach a different audience) or do not blog online at all could exhibit different scores in other value dimensions (Block et al., 2019). Furthermore, even though our sample is broadly consistent with previous literature on the demographic characteristics of entrepreneurial finance investors, social media users are typically younger (Perrin, 2015). This could potentially lead to an over-representation of younger investors. For these reasons, it may be useful to conduct similar analyses on different social media platforms and to complement our study by employing other methods to uncover psychological differences, such as surveys.

Second, our study sought to explore variations in personal values between the two predominant types of start-up investors and the reasons behind them. However, as individual investors differ from one another in terms of demographic characteristics, investment objectives or skills, for example, we are aware that both BAs and VCs do not represent homogeneous groups (Croce et al., 2021; Tenca et al., 2019). That is why it can be dangerous to make generalizations about their psychological profiles (Lindsay, 2004). Nevertheless, we see this study as a useful starting point for further analysis of each dimension in the future, as well as for identifying in-group-differences. Thus, future studies could investigate whether value differences can also be found within an investor group when demographic factors are taken into greater account. Indeed, our results indicate that older BAs (aged 65+) engage with Twitter differently than younger investors under 35. On average, the older group has a word count of 2,640 words, while the younger BAs are more active and post 4,853 words. We similarly observe interesting variations when comparing investors with high levels of specific personal values to those with average scores. For instance, our analysis reveals that VCs with the highest universalism scores (top 10%) are substantially older, with an average age of 52 years, compared to the overall mean age of the VC group (47 years).

Third, although psychology and values in particular are assumed to be relatively stable over time (Haan et al., 1986; Rokeach, 1973), we see the possibility that the length of time individuals have been active investors may change their value systems over the years. Indeed, it would be intriguing to examine how certain events, developments, or crises impact the investors' values (and respective Twitter utilization). For example, with regard to entrepreneurial finance, one could explore whether investment failures or intensive collaboration with co-investors significantly alter the value systems of investors. We therefore call for future studies that delve into the temporal component and the longitudinal evolution of psychological traits, similar to the approach taken by Weismayer et al. (2021) in measuring how emotions change over time by analyzing Instagram posts. Similarly, there is a need to better

understand the context in which social media posts are written. Therefore, future studies could focus on investigating text in a specific time frame, such as during the Covid-19 pandemic.

Fourth, as highlighted earlier in the discussion, it is plausible that investors may not spontaneously express their sentiments on Twitter but instead take (considerable) time to deliberate on the content they wish to convey and the manner in which they articulate it. Thus, similar to managers valuing Twitter as a strategic communication platform (Fischer & Reuber, 2014), VCs could utilize Twitter as a marketing or retention tool for their limited partners (Saffer et al., 2013). As they depend on the money flow from the limited partners, VCs will pay more attention to their choice of words and may not give free rein to their emotions. In such cases, VCs are inclined to present themselves as positive, affable, and professional investors. In fact, VCs try to convince fund providers of the quality of their investments by emphasizing a number of different actions (van Osnabrugge, 2000). They communicate their remarkable qualifications, their industry expertise, or the clearly defined procedures used in the selection of targets. Furthermore, there is the risk that it is not the investors themselves who author the Twitter posts, but that assistants manage the account. To mitigate this bias, all "superstar" accounts with more than 500,000 followers were excluded from the sample (Block et al., 2019).

Implications

Our findings offer interesting insights for both scholars and practitioners. First, our paper provides a starting point for future scientific contributions dealing with the psychology of entrepreneurial finance investors. While values constitute a fundamental aspect of an individual's psychology, there is a necessity to explore other psychological characteristics of investors, such as personality traits, attitudes, moral foundations, or emotions. Accordingly, researchers may focus on the interdependencies between different frameworks and study which psychological dimensions go hand in hand (Ponizovskiy et al., 2020). In fact, current research provides evidence to jointly examine various psychological traits: Feldman's meta-analysis

(2021) indicates that personal values are associated with moral foundations. For instance, the dimensions of conservation vs. openness to change show strong links to the binding foundations. Therefore, a multidimensional examination of investor psychology will help create more nuanced investor profiles. By this means, researchers could supplement Sullivan and Miller's (1996) seminal paper and their categorization of investors by providing a detailed list of relevant psychological characteristics. Furthermore, there is a need to better understand the impact of values (and other psychological traits) on investment-related outcome variables. Future studies could analyze the effects of psychological characteristics on specific variables, such as investment performance, syndicate partner selection, or exit choices. In this context, our paper sheds light on which investor values are particularly relevant for an in-depth analysis.

Second, our paper introduces a new dimension to the ongoing "friends versus foes" discourse. Our results show that BAs, as co-investors, can indeed fulfill a complementary and important role for VCs. Since BAs navigate between both "worlds" (of founders and institutional investors) and demonstrate entrepreneurial orientation (Lindsay, 2004), they have a reduced cognitive distance to both groups (Bonnet & Wirtz, 2012). This allows them to act as effective translators and mitigate potential conflicts (Wallmeroth et al., 2018). Thus, BAs and VCs differ (and complement each other) not only in their financial resources and skills, but also in their value characteristics. This implies that future studies could explore whether both groups of investors take their value systems into account when choosing co-investors. For example, it could be examined whether investors reflect on their values and consider selecting individuals with differing values.

Third, our study has substantial practical relevance. With regard to founders, understanding the dominant values of investors is beneficial to persuade them of the business idea and ultimately obtain funding. For this reason, founders are advised to tailor the presentation of their venture and to emphasize certain aspects depending on the value system of the investor (Mason & Stark, 2004). For instance, since most of the BAs themselves have

founding experience, they may place greater value (than VCs) on a detailed presentation of the start-up team, their skills, and the founding story, including challenges and milestones. Correspondingly, assessing the investor's value system can also aid in identifying potential challenges stemming from divergent or shared values, thus improving the alignment between entrepreneurs and investors (Murnieks et al., 2011). However, it should be noted that we only provide mean value disparities, which is why a "case-by-case" analysis of each investor's value system should be made before pitching the venture. Similarly, understanding the prevailing values can also be essential when searching for potential syndicate partners (Duxbury et al., 1996). Indeed, the decision to invest alone or to form a syndicate will be influenced by the psychology and values of the potential co-investor (Block et al., 2019). For example, a lead investor might recognize that high levels of stimulation or power of the potential co-investor (which the lead lacks) could add value to the development of the venture. In this way, the parties mentioned can find mutually compatible partners by studying the cognitive profile of the investor.

CONCLUSION

Based on Schwartz's (1992) framework of personal values, this study is among the first to analyze the psychology of start-up investors. By applying a novel, objective language-based assessment tool to examine social media posts, we compare the value systems of BAs and VCs. Our results show comparable scores across five value dimensions between the two investor groups, indicating a substantial degree of commonality. However, we observe significant value variations between BAs and VCs. In particular, VCs place emphasis on the overarching dimension of self-enhancement. This study also provides some unexpected findings, as VCs score higher than BAs in the stimulation dimension. Thus, our paper contributes to a better understanding of investor psychology, which is closely related to investment behavior, decision-making, and strategic goals. Identifying key value disparities, this study serves as a

starting point for future research on the psychological profiles of entrepreneurial finance investors.

REFERENCES

- Altmeier, A., & Fisch, C. (2024). The relationship between business angels' psychological attributes and investments in successful portfolio ventures: An empirical investigation using Twitter data. *British Journal of Management*, *35*(2), 629–643.
- Angrist, J. D., & Pischke, J.-S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.
- Aram, J. D. (1989). Attitudes and behaviors of informal investors toward early-stage investments, technology-based ventures, and coinvestors. *Journal of Business Venturing*, *4*(5), 333–347.
- Bardi, A., Calogero, R. M., & Mullen, B. (2008). A new archival approach to the study of values and value-behavior relations: Validation of the value lexicon. *The Journal of Applied Psychology*, *93*(3), 483–497.
- Benjamin, G. A., & Margulis, J. (2000). *Angel financing: How to find and invest in private equity*. The Wiley investment series. Wiley.
- Bergemann, D., & Hege, U. (1998). Venture capital financing, moral hazard, and learning. *Journal of Banking & Finance*, *22*(6-8), 703–735.
- Block, J. H., Fisch, C., Obschonka, M., & Sandner, P. G. (2019). A personality perspective on business angel syndication. *Journal of Banking & Finance*, *100*, 306–327.
- Bolzani, D., & Foo, M. D. (2018). The “why” of international entrepreneurship: Uncovering entrepreneurs' personal values. *Small Business Economics*, *51*(3), 639–666.
- Bonini, S., Capizzi, V., & Zocchi, P. (2019). The performance of angel-backed companies. *Journal of Banking & Finance*, *100*, 328–345.
- Bonnet, C., & Wirtz, P. (2012). Raising capital for rapid growth in young technology ventures: When business angels and venture capitalists coinvest. *Venture Capital*, *14*(2-3), 91–110.

- Bonnet, C., Wirtz, P., & Haon, C. (2014). Liftoff: When strong growth is predicted by angels and fuelled by professional venture funds. *Review of Entrepreneurship*, 12(4), 59–78.
- Boulton, T. J., Shohfi, T. D., & Zhu, P. (2019). Angels or sharks? The role of personal characteristics in angel investment decisions. *Journal of Small Business Management*, 57(4), 1280–1303.
- Boyd, R. (2017). Psychological text analysis in the digital humanities. In *Data analytics in digital humanities* (pp. 161–189). Springer, Cham.
- Boyd, R., & Pennebaker, J. (2017). Language-based personality: A new approach to personality in a digital world. *Current Opinion in Behavioral Sciences*, 18, 63–68.
- Boyd, R., & Schwartz, A. (2020). Natural language analysis and the psychology of verbal behavior: The past, present, and future states of the field. *Journal of Language and Social Psychology*, 40(1), 21–41.
- Boyd, R., Wilson, S., Pennebaker, J., Kosinski, M., Stillwell, D., & Mihalcea, R. (2015). Values in words: Using language to evaluate and understand personal values. *Proceedings of the International AAAI Conference on Web and Social Media*, 9(1), 31–40.
- Chahine, S., Filatotchev, I., & Wright, M. (2007). Venture capitalists, business angels, and performance of entrepreneurial IPOs in the UK and France. *Journal of Business Finance & Accounting*, 34(3-4), 505–528.
- Chen, X.-P., Yao, X., & Kotha, S. (2009). Entrepreneur passion and preparedness in business plan presentations: A persuasion analysis of venture capitalists' funding decisions. *Academy of Management Journal*, 52(1), 199–214.
- Chung, C. K., & Pennebaker, J. (2021). *What do we know when we LIWC a person? Text analysis as an assessment tool for traits, personal concerns and life stories: The SAGE Handbook of Personality and Individual Differences*. SAGE.

- Croce, A., Guerini, M., & Ughetto, E. (2018). Angel financing and the performance of high-tech start-ups. *Journal of Small Business Management*, *56*(2), 208–228.
- Croce, A., Ughetto, E., Bonini, S., & Capizzi, V. (2021). Gazelles, ponies, and the impact of business angels' characteristics on firm growth. *Journal of Small Business Management*, *59*(2), 223–248.
- Croce, A., Ughetto, E., & Cowling, M. (2020). Investment motivations and UK business angels' appetite for risk taking: The moderating role of experience. *British Journal of Management*, *31*(4), 728–751.
- Doran, C. J. (2009). The role of personal values in fair trade consumption. *Journal of Business Ethics*, *84*(4), 549–563.
- Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. *Journal of Management*, *43*(6), 1820–1853.
- Duxbury, L., Haines, G. H., & Riding, A. (1996). A personality profile of Canadian informal investors. *Journal of Small Business Management*, *34*(2), 44–55.
- Egri, C. P., & Ralston, D. A. (2004). Generation cohorts and personal values: A comparison of China and the United States. *Organization Science*, *15*(2), 210–220.
- Falcão, R., Carneiro, M. J., & Moreira, A. C. (2023). Why do business angels invest? Uncovering angels' goals. *Cogent Business & Management*, *10*(2), 1–28.
- Feldman, G. (2021). Personal values and moral foundations: Examining relations and joint prediction of moral variables. *Social Psychological and Personality Science*, *12*(5), 676–686.

- Fischer, E., & Reuber, R. A. (2014). Online entrepreneurial communication: Mitigating uncertainty and increasing differentiation via Twitter. *Journal of Business Venturing*, 29(4), 565–583.
- Freear, J., Sohl, J. E., & Wetzel, W. E. (1994). Angels and non-angels: Are there differences? *Journal of Business Venturing*, 9(2), 109–123.
- Fried, V. H., & Hisrich, R. D. (1995). The venture capitalist: A relationship investor. *California Management Review*, 37(2), 101–113.
- Goldfarb, B. D., Hoberg, G., Kirsch, D., & Triantis, A. (2009). *Does angel participation matter? An analysis of early venture financing*. CrossRef.
- Gompers, P., & Lerner, J. (2000). Money chasing deals? The impact of fund inflows on private equity valuations. *Journal of Financial Economics*, 55(2), 281–325.
- Gorgievski, M. J., Ascalon, M. E., & Stephan, U. (2011). Small business owners' success criteria, a values approach to personal differences. *Journal of Small Business Management*, 49(2), 207–232.
- Gorman, M., & Sahlman, W. A. (1989). What do venture capitalists do? *Journal of Business Venturing*, 4(4), 231–248.
- Granz, C., Henn, M., & Lutz, E. (2020). Research on venture capitalists' and business angels' investment criteria: A systematic literature review. *Contemporary Developments in Entrepreneurial Finance*, 105–136.
- Gregson, G., Mann, S., & Harrison, R. T. (2013). Business angel syndication and the evolution of risk capital in a small market economy: Evidence from Scotland. *Managerial and Decision Economics*, 34(2), 95–107.
- Haan, N., Millsap, R., & Hartka, E. (1986). As time goes by: Change and stability in personality over fifty years. *Psychology and Aging*, 1(3), 220–232.

- Harrison, R. T., & Mason, C. (2000). Venture capital market complementarities: The links between business angels and venture capital funds in the United Kingdom. *Venture Capital*, 2(3), 223–242.
- Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: Empirical evidence. *The Journal of Finance*, 57(1), 169–197.
- Hellmann, T., & Thiele, V. (2015). Friends or foes? The interrelationship between angel and venture capital markets. *Journal of Financial Economics*, 115(3), 639–653.
- Hill, B. E., & Power, D. (2002). *Attracting capital from angels: How their money - and their experience - can help you build a successful company*. Wiley.
- Hsu, D. K., Haynie, J. M., Simmons, S. A., & McKelvie, A. (2014). What matters, matters differently: A conjoint analysis of the decision policies of angel and venture capital investors. *Venture Capital*, 16(1), 1–25.
- Hsu, D. H. (2001). *The role of venture capitalists in financing and developing high-technology start-ups*. Massachusetts Institute of Technology.
- Huang, L. (2018). The role of investor gut feel in managing complexity and extreme risk. *Academy of Management Journal*, 61(5), 1821–1847.
- Hueso, J. A., Jaén, I., & Liñán, F. (2021). From personal values to entrepreneurial intention: A systematic literature review. *International Journal of Entrepreneurial Behavior & Research*, 27(1), 205–230.
- Jääskeläinen, M. (2012). Venture capital syndication: Synthesis and future directions. *International Journal of Management Reviews*, 14(4), 444–463.
- James, G., Witten, D., Hastie, T., Tibshirani, R., & Taylor, J. (2023). *An introduction to statistical learning*. Springer International Publishing.
- Jordan, K. N., Sterling, J., Pennebaker, J., & Boyd, R. (2019). Examining long-term trends in politics and culture through language of political leaders and cultural institutions.

- Proceedings of the National Academy of Sciences of the United States of America*, 116(9), 3476–3481.
- Kakar, S., Dhaka, D., & Mehrotra, M. (2021). Value-based behavioral analysis of users using Twitter. *Inventive Communication and Computational Technologies*, 145, 283–294.
- Kang, M. Y. (2020). Sustainable profit versus unsustainable growth: Are venture capital investments and governmental support medicines or poisons? *Sustainability*, 12(18), 7773–7785.
- Kaur, M., Verma, R., & Otoo, F. N. K. (2021). Emotions in leader's crisis communication: Twitter sentiment analysis during COVID-19 outbreak. *Journal of Human Behavior in the Social Environment*, 31(1-4), 362–372.
- Kutner, M. H., Nachtsheim, C. J., Neter, J., & Li, W. (2005). *Applied linear statistical models*. McGraw-Hill.
- Lien, W.-C., Chen, J., & Sohl, J. (2022). Do I have a big ego? Angel investors' narcissism and investment behaviors. *Journal of Business Venturing*, 37(5), 106–123.
- Liñán, F., Moriano, J. A., & Jaén, I. (2016). Individualism and entrepreneurship: Does the pattern depend on the social context? *International Small Business Journal: Researching Entrepreneurship*, 34(6), 760–776.
- Lindsay, N. J. (2004). Do business angels have an entrepreneurial orientation? *Venture Capital*, 6(2-3), 197–210.
- Lyons, S. T., Duxbury, L., & Higgins, C. (2007). An empirical assessment of generational differences in basic human values. *Psychological Reports*, 101(2), 339–352.
- Magee, J. C., & Galinsky, A. D. (2008). 8 social hierarchy: The self-reinforcing nature of power and status. *The Academy of Management Annals*, 2(1), 351–398.
- Mason, C., & Harrison, R. T. (2002). Is it worth it? The rates of return from informal venture capital investments. *Journal of Business Venturing*, 17(3), 211–236.

- Mason, C., & Stark, M. (2004). What do investors look for in a business plan? *International Small Business Journal*, 22(3), 227–248.
- Matusik, S., George, J. M., & Heeley, M. B. (2008). Values and judgment under uncertainty: Evidence from venture capitalist assessments of founders. *Strategic Entrepreneurship Journal*, 2(2), 95–115.
- McHaney, R., Tako, A., & Robinson, S. (2018). Using LIWC to choose simulation approaches: A feasibility study. *Decision Support Systems*, 111(3), 1–12.
- Mitchell, J. P. (2009). Social psychology as a natural kind. *Trends in Cognitive Sciences*, 13(6), 246–251.
- Mittiness, C., Sudek, R., & Cardon, M. S. (2012). Angel investor characteristics that determine whether perceived passion leads to higher evaluations of funding potential. *Journal of Business Venturing*, 27(5), 592–606.
- Morrisette, S. G. (2007). A profile of angel investors. *The Journal of Private Equity*, 10(3), 52–66.
- Murnieks, C. Y., Haynie, J. M., Wiltbank, R. E., & Harting, T. (2011). ‘I like how you think’: Similarity as an interaction bias in the investor-entrepreneur dyad. *Journal of Management Studies*, 48(7), 1533–1561.
- Obschonka, M., Fisch, C., & Boyd, R. (2017). Using digital footprints in entrepreneurship research: A Twitter-based personality analysis of superstar entrepreneurs and managers. *Journal of Business Venturing Insights*, 8, 13–23.
- OECD. (2011). *Financing high-growth firms: The role of angel investors*. OECD Publishing.
- Omoredede, A., Thorgren, S., & Wincent, J. (2015). Entrepreneurship psychology: A review. *International Entrepreneurship and Management Journal*, 11(4), 743–768.
- Oxford English Dictionary. (2023). <https://www.oed.com/>

- Paulhus, D. L., & Vazire, S. (2007). The self-report method. In *Handbook of research methods in personality psychology* (pp. 224–239).
- Perrin, A. (2015). *Social media usage: 2005-2015: 65% of adults now use social networking sites - a nearly tenfold jump in the past decade*. Pew Research Center. <http://www.pewinternet.org/2015/10/08/2015/Social-Networking-Usage-2005-2015/>
- Politis, D. (2008). Business angels and value added: What do we know and where do we go? *Venture Capital*, 10(2), 127–147.
- Ponizovskiy, V., Ardag, M., Grigoryan, L., Boyd, R., Dobewall, H., & Holtz, P. (2020). Development and validation of the personal values dictionary: A theory-driven tool for investigating references to basic human values in text. *European Journal of Personality*, 34(5), 885–902.
- Preston, S. L. (2007). *Angel financing for entrepreneurs: Early stage funding for long-term success*. Jossey-Bass.
- Qiu, L., Lin, H., Ramsay, J., & Yang, F. (2012). You are what you tweet: Personality expression and perception on Twitter. *Journal of Research in Personality*, 46(6), 710–718.
- Quas, A., Alperovych, Y., & Le Pendeven, B. (2021). Call for papers for the special issue on the role of personality traits in entrepreneurial finance - venture capital: An international journal of entrepreneurial finance. *Venture Capital*.
- Ramadani, V. (2009). Business angels: Who they really are. *Strategic Change*, 18(7-8), 249–258.
- Robinson, R. J., & van Osnabrugge, M. (2000). *Angel investing: Matching start-up funds with start-up companies - The guide for entrepreneurs, individual investors, and venture capitalists*. Business book summary. Jossey-Bass.
- Rohan, M. J. (2000). A rose by any name? The values construct. *Personality and Social Psychology Review*, 4(3), 255–277.

- Rokeach, M. (1973). *The nature of human values*. Free Press.
- Saffer, A. J., Sommerfeldt, E. J., & Taylor, M. (2013). The effects of organizational Twitter interactivity on organization–public relationships. *Public Relations Review*, 39(3), 213–215.
- Sagiv, L., Roccas, S., Cieciuch, J., & Schwartz, S. (2017). Personal values in human life. *Nature Human Behaviour*, 1(9), 630–639.
- Sapienza, H. J., Manigart, S., & Vermeir, W. (1996). Venture capitalist governance and value added in four countries. *Journal of Business Venturing*, 11(6), 439–469.
- Schmidt, K. M. (2003). Convertible securities and venture capital finance. *The Journal of Finance*, 58(3), 1139–1166.
- Schwartz, S. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In *Advances in experimental social psychology* (pp. 1–65). Elsevier.
- Schwartz, S. (1994). Are there universal aspects in the structure and contents of human values? *Journal of Social Issues*, 50(4), 19–45.
- Schwartz, S. (2012). An overview of the Schwartz theory of basic values. *Online Readings in Psychology and Culture*, 2(1).
- Schwartz, S., Caprara, G. V., & Vecchione, M. (2010). Basic personal values, core political values, and voting: A longitudinal analysis. *Political Psychology*, 31(3), 421–452.
- Sharmila, D., & Swamy, P. (2023). Does hedonism influence real estate investment decisions? The moderating role of financial self-efficacy. *Cogent Economics & Finance*, 11(1), 1–18.
- Sreedevi, V. R., & Chitra, K. (2012). Does personality traits influence the choice of investment? *IUP Journal of Behavioral Finance*, 8(2), 47–57.
- Sudek, R. (2006). Angel investment criteria. *Journal of Small Business Strategy*, 17(2), 89–104.

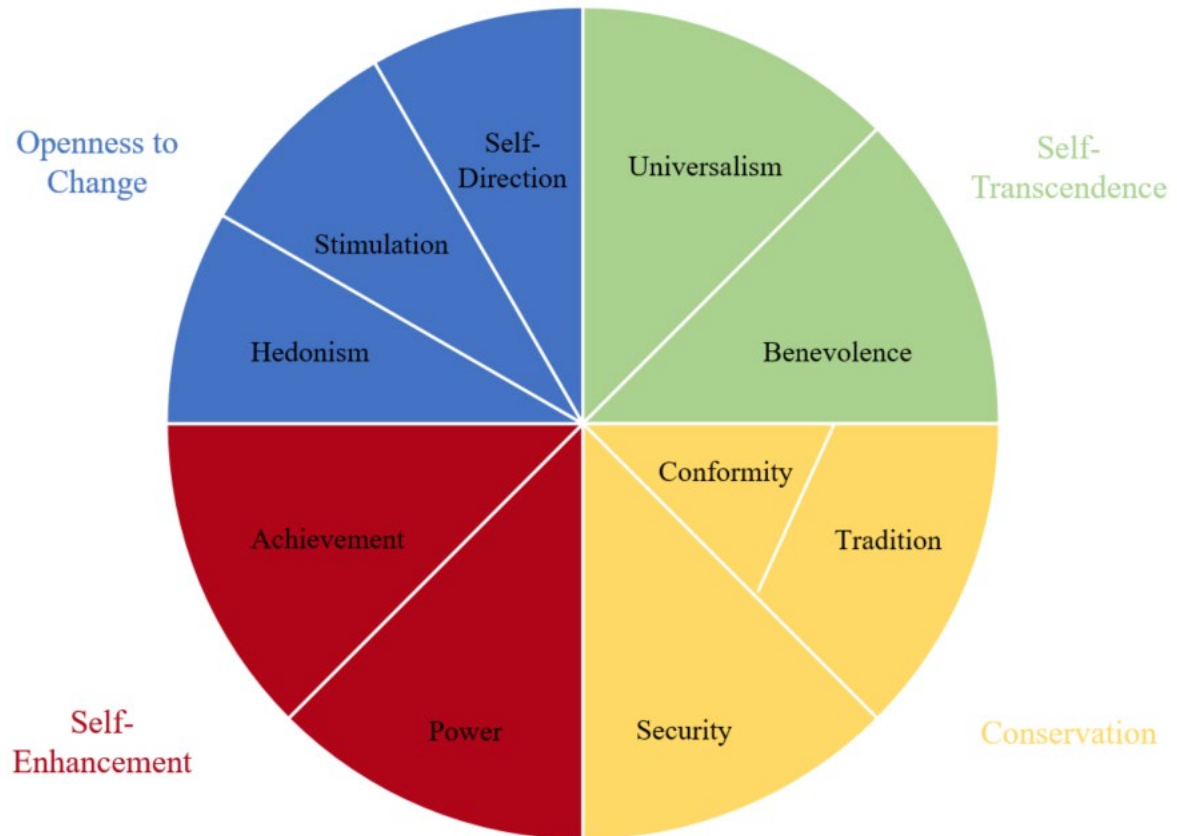
- Sullivan, M. K., & Miller, A. (1996). Segmenting the informal venture capital market: Economic, hedonistic, and altruistic investors. *Journal of Business Research*, 36(1), 25–35.
- Tausczik, Y. R., & Pennebaker, J. (2010). The psychological meaning of words: Liwc and computerized text analysis methods. *Journal of Language and Social Psychology*, 29(1), 24–54.
- Tenca, F., Croce, A., & Ughetto, E. (2019). Business angels research in entrepreneurial finance: A literature review and a research agenda. In *Contemporary topics in finance* (pp. 183–214). Wiley.
- van Osnabrugge, M. (2000). A comparison of business angel and venture capitalist investment procedures: An agency theory-based analysis. *Venture Capital*, 2(2), 91–109.
- Wallmeroth, J., Wirtz, P., & Groh, A. P. (2018). Venture capital, angel financing, and crowdfunding of entrepreneurial ventures: A literature review. *FNT in Entrepreneurship (Foundations and Trends in Entrepreneurship)*, 14(1), 1–129.
- Weismayer, C., Gunter, U., & Önder, I. (2021). Temporal variability of emotions in social media posts. *Technological Forecasting and Social Change*, 167, 120699.
- Wetzel, W. E. (1983). Angels and informal risk capital. *Sloan Management Review*, 24(4), 23–34.
- White, B. A., & Dumay, J. (2017). Business angels: A research review and new agenda. *Venture Capital*, 19(3), 183–216.
- White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817–838.
- Wiltbank, R. E. (2005). Investment practices and outcomes of informal venture investors. *Venture Capital*, 7(4), 343–357.
- Wiltbank, R. E., Read, S., Dew, N., & Sarasvathy, S. D. (2009). Prediction and control under uncertainty: Outcomes in angel investing. *Journal of Business Venturing*, 24(2), 116–133.

- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data, second edition*. MIT Press.
- World Bank Group. (2018). *Stimulating business angels in the Czech Republic*. World Bank, Washington, DC.
- Yang, K.-P., Hsiung, H.-H., & Chiu, Y.-J. (2015). The comfort zone of the value circumplex for entrepreneurship: A structural analysis. *Career Development International*, 20(6), 663–683.
- Zinecker, M., Skalicka, M., Balcerzak, A. P., & Pietrzak, M. B. (2022). Business angels in the Czech Republic: Characteristics and a classification with policy implications. *Economic Research-Ekonomska Istraživanja*, 35(1), 273–298.

FIGURES AND TABLES

FIGURE 1

Schwartz's (1992) framework of personal values.



Source: The authors' own illustration, based on Schwartz (1992).

TABLE 1**Description of variables according to Schwartz's (1992) framework of personal values.**

Variables	Description	Mean	SD	Median	Max
Personal Values					
Self-direction	Valuing autonomy, individual freedom, and self-determination.	0.29	0.23	0.25	2.65
Stimulation	The desire for new opportunities and encounters in life.	0.15	0.14	0.12	1.28
Hedonism	Appreciating pleasure and the pursuit of enjoyable moments.	0.09	0.09	0.07	0.67
Achievement	Striving for personal success and attaining ambitious goals.	0.31	0.22	0.26	2.62
Power	Striving for influence and control over others and asserting dominance.	1.84	0.35	1.81	3.99
Security	Valuing stability, safety, and predictability in life.	0.09	0.16	0.06	2.83
Conformity	Recognizing social norms and expectations to gain acceptance in society.	0.10	0.11	0.08	1.06
Tradition	Preserving traditions, cultural customs, and values.	0.06	0.13	0.03	1.86
Benevolence	Valuing empathy and promoting the welfare of others.	0.21	0.16	0.18	1.41
Universalism	Emphasizing tolerance and the equality of all people.	0.21	0.20	0.17	2.21

TABLE 2

Group differences between business angels and venture capitalists.

	(0) Business Angel (N = 500)		(1) Venture Capitalist (N =478)		t-test (1-0)	Cohen's d
	Mean	SD	Mean	SD		
Personal Values						
Self-direction	0.30	0.23	0.28	0.23	-0.02	-0.09
Stimulation	0.13	0.14	0.16	0.14	0.03 ***	0.21
Hedonism	0.09	0.09	0.09	0.08	0.00	0.00
Achievement	0.29	0.22	0.32	0.23	0.03 ***	0.13
Power	1.81	0.32	1.88	0.39	0.07 ***	0.20
Security	0.08	0.14	0.10	0.19	0.02 ***	0.12
Conformity	0.11	0.12	0.10	0.10	-0.01	-0.09
Tradition	0.06	0.16	0.05	0.09	-0.01	-0.08
Benevolence	0.22	0.16	0.20	0.16	-0.02	-0.13
Universalism	0.22	0.21	0.21	0.18	-0.01	-0.05

Notes. *p<0.10. **p<0.05. ***p<0.01. N=978

TABLE 3

Logistic regression (dependent variable: Venture Capitalist 0/1).

Variable	Model 1 Logit (SE)	Model 2 Logit (SE)
Age	0.009 (0.01)	-0.058 (0.02) **
Country	0.027 (0.02)	0.036 (0.02) *
Gender (male)	1.150 (0.64)	1.038 (0.80) **
Education	0.523 (0.31)	0.618 (0.35) **
Educationstart	0.012 (0.02)	0.003 (0.02) *
Investorstart	-0.123 (0.03) ***	-0.122 (0.02)
Careerstart	-0.036 (0.02)	-0.004 (0.03) *
Follower	0.001 (0.00)	0.001 (0.00) ***
Tweets	0.001 (0.00)	0.001 (0.00) *
Personal Values		
Self-direction		1.530 (0.90)
Stimulation		3.618 (1.96) *
Hedonism		-2.829 (3.25)
Achievement		1.705 (1.24) *
Power		1.218 (0.71) *
Security		4.501 (2.63) *
Conformity		1.146 (2.54)
Tradition		-0.839 (1.52)
Benevolence		-1.045 (1.55)
Universalism		-1.914 (1.44) **
Pseudo R ² (Log likelihood)	0.25	0.34

Notes. *p<0.10. **p<0.05. ***p<0.01. N=978

TABLE 4

Correlations.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
(1) Age	1																			
(2) Country	-0.15	1																		
(3) Gender	-0.05	-0.02	1																	
(4) Education	0.10	0.12	0.02	1																
(5) Educationstart	0.07	0.06	-0.04	-0.05	1															
(6) Investorstart	0.07	-0.01	0.05	-0.05	0.31	1														
(7) Careerstart	0.01	0.03	0.02	0.01	0.14	-0.04	1													
(8) Followers	0.07	-0.06	-0.08	-0.05	-0.10	-0.14	0.00	1												
(9) Tweets	-0.05	0.00	-0.15	-0.08	-0.11	-0.21	0.04	0.64	1											
(10) Stimulation	0.01	-0.15	0.23	0.12	-0.03	-0.02	0.01	0.07	-0.05	1										
(11) Selfdirection	0.10	-0.19	0.07	-0.03	0.14	0.03	0.01	0.14	0.02	0.27	1									
(12) Hedonism	0.09	-0.03	0.12	-0.08	0.05	0.12	-0.08	0.07	0.07	0.09	0.08	1								
(13) Achievement	0.11	-0.17	0.23	0.02	-0.13	0.03	0.06	0.06	-0.03	0.36	0.23	0.19	1							
(14) Power	0.00	-0.22	-0.01	-0.03	0.00	-0.03	-0.09	-0.01	-0.04	0.22	0.02	-0.09	0.08	1						
(15) Security	0.15	-0.17	0.07	0.03	0.09	-0.08	0.09	0.13	0.15	0.22	0.28	0.07	0.17	0.03	1					
(16) Conformity	0.07	-0.14	0.04	0.03	0.08	-0.06	0.13	0.17	0.16	0.16	0.38	0.04	0.16	0.05	0.24	1				
(17) Tradition	0.04	-0.06	0.02	-0.01	0.11	0.03	0.04	0.04	-0.01	0.11	0.15	-0.04	0.13	0.11	0.08	0.15	1			
(18) Benevolence	0.07	-0.22	0.14	-0.02	0.02	0.01	0.05	0.01	-0.05	0.20	0.32	0.20	0.30	-0.04	0.30	0.14	0.13	1		
(19) Universalism	0.21	-0.19	0.15	0.07	0.08	0.01	0.12	0.05	-0.04	0.23	0.26	-0.01	0.28	-0.01	0.31	0.23	0.19	0.31	1	

Notes. Pearson's correlation matrix. Correlations with an absolute value greater than 0.14 are significant at $p < .05$.

CONCLUSION

By presenting three studies, each dealing with a distinct type of investor, this cumulative dissertation sought to enhance the understanding of the diverse landscape of entrepreneurial finance. In particular, by addressing the field from different perspectives, the papers offer a multifaceted view of start-up financing. Study 1 presents an overview of how scholars in finance, strategic management, and entrepreneurship explore research questions related to venture capital. While Study 2 investigates corporate venture capital through the lens of strategic management, Study 3 examines entrepreneurial finance investors from a psychological perspective, offering a novel approach to existing research and thereby encouraging future studies. Collectively, the three studies provide insights into the dynamics of start-up financing, with implications for both practitioners and scholars.

Summary of Findings

As the number of venture capital-related publications has grown dramatically in recent years (Nguyen et al., 2021), the field of research has become increasingly fragmented and complex. Thus, **Study 1** aims to provide a detailed overview of the existing state of venture capital research by conducting a co-citation analysis based on a sample of 1,410 papers. The exploratory study emphasizes the diverse nature of venture capital research, as it identifies three broad research areas: A) venture capital life cycle, B) interfirm relationships and knowledge exchange as well as C) economic and policy perspectives. In total, the research areas consist of 13 thematic clusters. These research areas, their clusters and evolution, and the strength of the co-citation links to neighboring clusters have been visually presented. Furthermore, two additional categories of papers are created for studies that show strong links to more than one cluster. By introducing connecting and methodology papers, the bibliometric study highlights the interdisciplinarity of the research field (Benzouai & Djeflal, 2021).

Study 2 analyzes the impact of corporate venture capital (CVC) investments by established firms on the strategic change of the investing firms. Unlike independent venture capitalists, incumbent companies invest in start-ups not only to pursue financial motives but also strategic ones (Drover et al., 2017), such as fostering interorganizational learning (Yang, 2012). Consequently, this study investigates whether CVC-induced learning affects the investing firm's strategic change level. The paper addresses two key dimensions of strategic change, product portfolio and geographic strategic change, and finds that CVC plays a significant positive role in driving both types of change. Accordingly, using longitudinal data from 1,458 CVC units and 6,751 transactions, Study 2 characterizes CVC as a catalyst for strategic change. CVC investments facilitate the identification of new knowledge about technologies and foreign markets, which is then incorporated into the investing firm's processes. This integration of knowledge allows incumbent firms to expand their product range or enter new geographic markets, which is equivalent to strategic change. However, the study also indicates that the positive change effects diminish with increasing industry and cultural distance, as higher investment uncertainty and risk arise from identifying heterogeneous knowledge (Baldi et al., 2015; Pak et al., 2009). Thus, the results suggest that a higher distance between the investing firm and the start-up hampers the effectiveness of CVC-induced knowledge transfer, learning, and the associated strategic change.

Study 3 investigates the personal value disparities between business angels (BAs) and venture capitalists (VCs) by applying psycholinguistic text analysis. The paper examines the language investors use in their Twitter posts. It compares 500 BAs with 478 VCs. On the one hand, the results reveal a substantial level of similarity between BAs and VCs, as both investor groups demonstrate comparable scores across five value dimensions. On the other hand, the study shows significant value variations between the two investor types, enhancing the understanding of start-up investors' psychological profiles. The results suggest that the overarching value dimension of self-enhancement is particularly relevant for VCs, as they score

higher on the values of power and achievement orientation compared to BAs. Regarding the second overarching dimension, openness to change vs. conservation, VCs place emphasis on security. This finding aligns with expectations, as VCs face pressure to meet return targets for their limited partners, which may lead them to prioritize less risky ventures. In contrast, BAs act more independently in their decisions (Altmeier & Fisch, 2024). Due to the autonomy of BAs and their common background as former founders (Morrissette, 2007), they were expected to score higher in the stimulation dimension. Surprisingly, however, VCs reach higher scores in stimulation, possibly because they use Twitter as a means of communication and intentionally seek to present themselves in a multifaceted way.

Theoretical Contributions

Each of the studies included in this dissertation provides specific theoretical insights within the field of entrepreneurial finance. While Study 1 itself does not apply or develop any particular theory, it reveals the dominant economic theories relevant to venture capital research. It becomes evident that as venture capital research gained popularity in the 1990s, basic economic theories were applied to explain a variety of venture capital-related settings and phenomena. For instance, information asymmetries are not only critical when selecting start-ups for funding or assessing potential syndicate partners but also influence later investor involvement, potential agency conflicts, and the certification role in upcoming IPOs. Similarly, the resource-based view recognizes the investor's network, experience, and reputation as potential success factors in addition to financial support. As the entrepreneurial finance literature matured and became more complex, venture capital-specific theories such as Sorenson and Stuart's (2008) theory on venture capital syndication, were developed. Overall, Study 1 offers a detailed perspective on the (economic) theoretical frameworks shaping venture capital research.

The theoretical contributions of Study 2 are twofold. First, interorganizational learning theory serves as a framework to examine and explain the potential effects of CVC investments on the incumbent's strategic change level. Although the literature on both CVC and strategic change draws on learning theory, little research has combined both phenomena by applying the interorganizational learning framework. Due to the strategic considerations of CVC investments, it is argued that CVC is utilized to identify, acquire, assimilate, and finally integrate new knowledge into the investing firm's operations (Milagres & Burcharth, 2019). In turn, this CVC-induced interorganizational learning process can lead to strategic change, such as expanding the product portfolio or entering new regional markets. Thus, the results indicate that CVC can indeed be regarded as a strategic tool for fostering learning and associated strategic change. Second, the findings suggest that increasing distance between the CVC unit and the start-up reduces the effectiveness of the interorganizational learning process. Higher distance is accompanied by aspects such as heterogeneity of knowledge, cultural differences, or uncertainty (Baldi et al., 2015; Pak et al., 2009), which hinder efficient knowledge transfer and learning. As Study 2 finds negative moderation effects for both industry and cultural distance, the theoretical assumptions regarding the impact of distance within an interorganizational learning framework are also empirically confirmed in the context of CVC.

Study 3 expands knowledge of start-up investors' psychology by drawing on the personal values framework (1992), developed by Shalom Schwartz. To date, entrepreneurial finance research has largely ignored the role of investor psychology, particularly personal values. Only one study explores two personal values (security and self-direction) in the context of venture capital (Matusik et al., 2008). By examining the personal values of both BAs and VCs and analyzing the key differences, Study 3 is the first paper in the research field to comprehensively apply the personal values framework, resulting in a detailed description of the investors' dominant values.

Implications

For founders, investors, and managers alike, this dissertation has a number of implications. The dissertation, and in particular Study 1, provides a comprehensive overview of the broad and diverse supply of start-up investors to entrepreneurs. It highlights that traditional investor types, such as venture capital or angel investments, are being complemented - or substituted - by other forms of entrepreneurial finance like crowdfunding or accelerators (Drover et al., 2017). As a result, the entrepreneurial finance market has become increasingly fragmented and more difficult for new ventures to navigate. Nonetheless, start-ups have access to a variety of financing options, with new forms of funding constantly emerging, such as BA-VC syndicates or venture debt (Block et al., 2019; Dugar et al., 2024).

Study 2 highlights the strategic role of CVC investments for incumbent firms, indicating that they serve as a catalyst for fostering interorganizational learning and associated strategic change. More specifically, managers can utilize CVC to learn not only about evolving technologies, but also about the conditions of unknown geographic regions. Since the results suggest that CVC drives both product portfolio and geographic strategic change in subsequent years, Study 2 implies that CVC does indeed help generate new knowledge that is subsequently implemented into the incumbent's strategic approach. Thus, as a low-cost form of interfirm linkages, CVC is an attractive strategic tool for practitioners, enabling them to adapt product portfolios or enter new geographic markets. However, the study emphasizes that the change effects are reduced with increasing industry and cultural distance, as uncertainties and heterogeneous knowledge bases hinder efficient learning. Accordingly, the study advises managers to conduct a thorough analysis and set explicit learning objectives before investing to assess whether successful knowledge transfer can be ensured. Finally, practitioners should keep in mind that CVC is closely related to other forms of interfirm relationships and, therefore, needs to be coordinated with them in order not to jeopardize the incumbent's intended (change) goals (Dushnitsky & Lavie, 2010).

Study 3 emphasizes that the psychological profiles of start-up investors should be given more consideration in practice. Assessing investor psychology is especially important because, in addition to the business idea, the founding team, and the financial data of the new venture (Macmillan et al., 1987), the investor's psychological characteristics can also play a critical role in influencing funding decisions. The paper shows that although BAs and VCs operate in the same industry, they differ in terms of their personal values. For this reason, the study is of interest to entrepreneurs, as it highlights the need not only to prepare for the experience and industry expertise of a potential investor before pitching the venture, but also to analyze the investor's psychological profile in advance. Furthermore, the paper is relevant for investors themselves, as it may help them reflect on whether their funding decisions are influenced by their psychology and encourage them to adopt more objective assessment measures. Similarly, when forming syndicates, evaluating the value system of prospective co-investors can facilitate the identification of potential challenges arising from divergent or shared values (Block et al., 2019).

Limitations and Future Research Directions

This dissertation has several limitations that should be addressed in future research to provide a more nuanced understanding of the entrepreneurial finance landscape. Although the dissertation attempts to provide a comprehensive overview of the different forms of start-up funding (Drover et al., 2017), it is not possible to cover every investor type in only three studies. For instance, other forms, such as governmental venture capital, crowdfunding, or accelerators, are only briefly discussed in Study 1. To gain deeper and more recent insights into these additional types of investors, future researchers could again apply bibliometric analyses, with two methodological adjustments. On the one hand, researchers should conduct detailed bibliometric studies for each investor type. Just as Study 1 deals with venture capital, similar studies are needed for CVC, BAs, or accelerators, as well as for entrepreneurial finance-specific

phenomena like syndication or staged financing. In this regard, a precise selection of keywords and an appropriate choice of a threshold (e.g., minimum number of citations) are essential for a focused analysis of a specific investor type. On the other hand, future bibliometric studies should not solely rely on co-citation analysis, as older studies tend to be overrepresented in this approach (Zupic & Čater, 2015). To identify more recent seminal papers and the latest research trends, scholars could apply bibliographic coupling, a method that links two publications when they cite the same third study (Kessler, 1963).

A second avenue for future research is to place more emphasis on the interdisciplinary nature of entrepreneurial finance research. Study 1 highlights that the majority of scholars publishing in this field come from finance, entrepreneurship, or management research. Indeed, Study 2 demonstrates that CVC is highly relevant in the field of strategic management research and can serve as a valuable tool for adjusting the strategic approach of investing firms. In particular, the case of CVC illustrates the interdisciplinarity of entrepreneurial finance research. CVC units not only compete with other investor types (like independent VCs or private equity firms) for attractive new ventures, but also need to position themselves within the incumbent firm's strategic toolbox, which includes various forms of interfirm linkages, such as alliances or joint ventures (Lee et al., 2015). Thus, future research could examine how established firms manage and align their variety of interfirm linkages to optimize learning and avoid redundant knowledge transfer (Zahra & Hayton, 2008). In the context of entrepreneurial finance, it is especially interesting to understand how CVC units successfully integrate the acquired knowledge into the processes of investing firms, although other forms of interfirm linkages are more resource-intensive and possibly attract greater attention.

Finally, the co-citation map from Study 1 reveals "white spots": research gaps that have yet to be explored, not only in venture capital research but also in the broader field of entrepreneurial finance. For this reason, Study 3 investigates the psychological traits of start-up investors, an area of research that has not been addressed until now. Consequently, this paper

serves only as a starting point for further research on the psychology of entrepreneurial finance investors. Other psychological dimensions, such as personality traits or moral foundations, and their respective outcome effects, like deal performance or syndication behavior, should be examined. Furthermore, as existing research suggests (Feldman, 2021), strong interdependencies exist between different psychological traits. Therefore, a multidimensional analysis of investor psychology is needed, which could lead to the creation of distinct psychological profiles of start-up investors. Returning to the bird's eye view of the co-citation map, many more research gaps in entrepreneurial finance can be identified. As shown in Study 1, the majority of papers dealing with start-up funding have focused on venture capital. Since alternative types of start-up financing remain underexplored, future research could build on venture capital-related questions and adapt them to investigate other sources of entrepreneurial finance. Overall, this dissertation provides a comprehensive overview of entrepreneurial finance, but due to the dynamics of this rapidly changing industry, there remains ample potential for future research.

REFERENCES

- Altmeier, A., & Fisch, C. (2024). The relationship between business angels' psychological attributes and investments in successful portfolio ventures: An empirical investigation using Twitter data. *British Journal of Management*, *35*(2), 629–643.
- Baldi, F., Baglieri, D., & Corea, F. (2015). Balancing risk and learning opportunities in corporate venture capital investments: Evidence from the biopharmaceutical industry. *Entrepreneurship Research Journal*, *5*(3), 221–250.
- Benzouai, M. C., & Djeflal, K. (2021). A bibliometric review of research on venture capital. *Asian Academy of Management Journal*, *26*(1), 47–88.
- Block, J. H., Fisch, C. O., Obschonka, M., & Sandner, P. G. (2019). A personality perspective on business angel syndication. *Journal of Banking & Finance*, *100*, 306–327.
- Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. *Journal of Management*, *43*(6), 1820–1853.
- Dugar, P., Madhavan, V., Patel, P., & Kumar, S. (2024). Venture debt financing and firm development: Evidence from Indian entrepreneurial landscape. *Applied Economics*, 1–18.
- Dushnitsky, G., & Lavie, D. (2010). How alliance formation shapes corporate venture capital investment in the software industry: A resource-based perspective. *Strategic Entrepreneurship Journal*, *4*(1), 22–48.
- Feldman, G. (2021). Personal values and moral foundations: Examining relations and joint prediction of moral variables. *Social Psychological and Personality Science*, *12*(5), 676–686.
- Kessler, M. M. (1963). Bibliographic coupling between scientific papers. *American Documentation*, *14*(1), 10–25.

- Lee, S. M., Kim, T., & Jang, S. H. (2015). Inter-organizational knowledge transfer through corporate venture capital investment. *Management Decision*, 53(7), 1601–1618.
- Macmillan, I. C., Zemann, L., & Subbanarasimha, P. N. (1987). Criteria distinguishing successful from unsuccessful ventures in the venture screening process. *Journal of Business Venturing*, 2(2), 123–137.
- Matusik, S. F., George, J. M., & Heeley, M. B. (2008). Values and judgment under uncertainty: Evidence from venture capitalist assessments of founders. *Strategic Entrepreneurship Journal*, 2(2), 95–115.
- Milagres, R., & Burcharth, A. (2019). Knowledge transfer in interorganizational partnerships: What do we know? *Business Process Management Journal*, 25(1), 27–68.
- Morrisette, S. G. (2007). A profile of angel investors. *The Journal of Private Equity*, 10(3), 52–66.
- Nguyen, M.-H., Pham, T.-H., Ho, M.-T., Nguyen, H. T. T., & Vuong, Q.-H. (2021). On the social and conceptual structure of the 50-year research landscape in entrepreneurial finance. *SN Business & Economics*, 1(1), 2.
- Pak, Y. S., Ra, W., & Park, Y.-R. (2009). Understanding IJV performance in a learning and conflict mediated context. *International Business Review*, 18(5), 470–480.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In *Advances in experimental social psychology* (pp. 1–65). Elsevier.
- Sorenson, O., & Stuart, T. E. (2008). Bringing the context back in: Settings and the search for syndicate partners in venture capital investment networks. *Administrative Science Quarterly*, 53(2), 266–294.
- Yang, Y. (2012). Bilateral inter-organizational learning in corporate venture capital activity. *Management Research Review*, 35(5), 352–378.

- Zahra, S. A., & Hayton, J. C. (2008). The effect of international venturing on firm performance: The moderating influence of absorptive capacity. *Journal of Business Venturing*, 23(2), 195–220.
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472.

AFFIDAVIT

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- Schmidt, C. & Bausch, A. (2024). UNDERSTANDING VENTURE CAPITAL RESEARCH: AN IN-DEPTH-CLUSTER ANALYSIS. *Working Paper*.
- Schmidt, C., Kaiser, C., & Bausch, A. (2025). CORPORATE VENTURE CAPITAL AS DRIVER OF STRATEGIC CHANGE? AN INTERORGANIZATIONAL LEARNING PERSPECTIVE. *International Journal of Business Science & Applied Management*, 20 (1), 1-30.
- Schmidt, C. & Engel, E. (2024). EXPLORING THE PERSONAL VALUES OF ENTREPRENEURIAL FINANCE INVESTORS: A TWITTER ANALYSIS. *Working Paper*.

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