Pontifícia Universidade Católica
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Raoni Arruda Bacelar da Silva

The effects of different Venture Capital investors on early-stage ventures' performance in the United States and Brazil

Tese de Doutorado

Thesis presented to the Programa de Pós-graduação em Administração de Empresas of PUC-Rio in partial fulfillment of the requirements for the degree of Doutor em Administração de Empresas.

Advisor: Prof. Fábio de Oliveira Paula
Co-advisor: Prof. Jorge Ferreira da Silva

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Abstract

Silva, Raoni Arruda Bacelar da; Paula, Fábio de Oliveira (Advisor); Silva, Jorge Ferreira da (Co-advisor). **The effects of different Venture Capital investors on early-stage ventures' performance in the United States and Brazil**. Rio de Janeiro, 2023. 130 p. Tese de Doutorado – Departamento de Administração, Pontifícia Universidade Católica do Rio de Janeiro.

The Venture Capital industry has gained widespread attention from policymakers, investors, and entrepreneurs worldwide due to its success history in developed markets, particularly in the United States. However, its implementation in developing countries faces challenges that drive investors to adapt, particularly in the earliest and riskiest stages. In these segments, other investors, such as Angels, Accelerators, and Corporate Venture Capital (CVC), make the environment more competitive, providing more options to entrepreneurs seeking capital. Nevertheless, the literature still fails to address the effects these investors of different profiles have on their invested startups. The 'finance escalator' paradigm, implying that IVCs only act in advanced stages, is still present, but this has been changing in the last decade in the US and more recently in Brazil. In this thesis, we examine the effects of different investors on early-stage startups in the US and Brazil through three related research articles. In the first article, we conduct a systematic review of the CVC literature from 2005 to 2019, identifying driving mechanisms and effects on invested ventures. This provides a broader understanding of the multiple factors influencing the relationship between investors and ventures, the differences in profiles and incentives of distinct types of VC investors, and how they influence ventures. This article also reveals trends and gaps in the literature that guide the following articles. In the second article, we investigate the comparative and joint effects of the main VC investor types (IVC, CVC, Angel Group, and Accelerator) on 13,098 early-stage ventures that received their first investment round in the US from 2005 to 2016. The results show that early-stage ventures backed by IVCs achieved better results than their peers in all early-stage goals, contradicting the

‘milestone’ effect expected from investors like Angel Groups and Accelerators and raising questions on the validity of some aspects of the ‘finance escalator’ paradigm. In the third article, we focus on outcomes for 1,937 early-stage ventures that received their first investment round in Brazil between 2000 and September 2022. We examine ventures backed by IVCs, CVCs, Angels, and Accelerators, and the results indicate significant differences from the US. In Brazil, IVCs have not shown a pervasive presence as in the US, and the expected positive performance was only true for ventures backed by highly experienced IVCs. Additionally, Angels revealed the best performance for specific early-stage goals. Overall, our analysis of the two markets demonstrates significant differences in the effects VC investors have on the performance of early-stage ventures. The IVC model investor demonstrates superiority over its peers in the American market, while in Brazil, other investors also stand out, especially Angels. These differences may be due to factors in the local economic environment, shaping investors’ profiles and influencing the way they operate in the country.

Keywords

Venture Capital; Entrepreneurial finance; Corporate Venture Capital; Accelerator; Angel investor.

Resumo

Silva, Raoni Arruda Bacelar da; Paula, Fábio de Oliveira; Silva, Jorge Ferreira da. **O efeito de diferentes investidores de Venture Capital no desempenho de startups em estágio inicial nos EUA e Brasil**. Rio de Janeiro, 2023. 130 p. Tese de Doutorado – Departamento de Administração, Pontifícia Universidade Católica do Rio de Janeiro.

A indústria de Capital de Risco tem recebido atenção significativa de formuladores de políticas, investidores e empreendedores em todo o mundo devido à sua história de sucesso em mercados desenvolvidos, especialmente nos Estados Unidos. No entanto, sua implementação em países em desenvolvimento enfrenta desafios que levam os investidores a se adaptar, especialmente nos estágios iniciais e mais arriscados. Nesses segmentos, outros investidores, como Anjos, Aceleradoras e Corporate Venture Capital (CVC), tornam o ambiente mais competitivo, fornecendo mais opções para empreendedores que buscam capital. No entanto, a literatura ainda não aborda os efeitos que esses investidores de diferentes perfis têm em suas startups investidas. O paradigma da "escada financeira", que implica que os IVCs atuam apenas em estágios avançados, ainda está presente, mas isso tem mudado na última década nos Estados Unidos e mais recentemente no Brasil. Nesta tese, examinamos os efeitos de diferentes investidores em startups em estágios iniciais nos Estados Unidos e no Brasil por meio de três artigos de pesquisa relacionados. No primeiro artigo, realizamos uma revisão sistemática da literatura de CVC de 2005 a 2019, identificando mecanismos impulsionadores e efeitos em empreendimentos investidos. Isso fornece uma compreensão mais ampla dos múltiplos fatores que influenciam a relação entre investidores e empreendimentos, as diferenças nos perfis e incentivos de diferentes tipos de investidores de VC e como eles influenciam os empreendimentos. Este artigo também revela tendências e lacunas na literatura que orientam os artigos seguintes. No segundo artigo, investigamos os efeitos comparativos e conjuntos dos principais tipos de investidores de VC (IVC, CVC, Grupo de anjos e Aceleradoras) em 13.098

empreendimentos em estágios iniciais que receberam sua primeira rodada de investimento nos Estados Unidos de 2005 a 2016. Os resultados mostram que empreendimentos em estágios iniciais apoiados por IVCs alcançaram melhores resultados do que seus pares em todos os objetivos de estágios iniciais, contradizendo o efeito de "marco" esperado de investidores como Grupos de anjos e Aceleradoras e levantando questões sobre a validade de alguns aspectos do paradigma da "escada financeira". No terceiro artigo, focamos nos resultados de 1.937 empreendimentos de estágio inicial que receberam seu primeiro investimento no Brasil entre 2000 e setembro de 2022. Examinamos empreendimentos apoiados por IVCs, CVCs, Anjos e Aceleradoras, e os resultados indicam diferenças significativas em relação aos EUA. No Brasil, os IVCs não apresentaram presença tão marcante como nos EUA, e o desempenho positivo esperado foi observado apenas em empreendimentos apoiados por IVCs altamente experientes. Além disso, os Anjos apresentaram o melhor desempenho para objetivos específicos de estágio inicial. No geral, nossa análise dos dois mercados demonstra diferenças significativas nos efeitos dos investidores de VC sobre o desempenho de empreendimentos de estágio inicial. O modelo de investidor IVC demonstra superioridade em relação aos seus pares no mercado americano, enquanto no Brasil, outros investidores também se destacam, especialmente Anjos. Essas diferenças podem ser devido a fatores no ambiente econômico local, moldando os perfis dos investidores e influenciando a maneira como eles operam no país.

Palavras-chave

Capital de Risco; Financiamento Empreendedor; Corporate Venture Capital; Aceleradoras; Investidor Anjo.

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1 Introduction

1.1. Contextualization and Research Problem

Since the 1990s we have seen an exponential growth in the importance of new technology companies in our lives. Given the amount of information and trust we give to companies like Google, Facebook, Uber, among many others, it is amazing how vaguely we remember that these companies were not in our midst a few years ago.

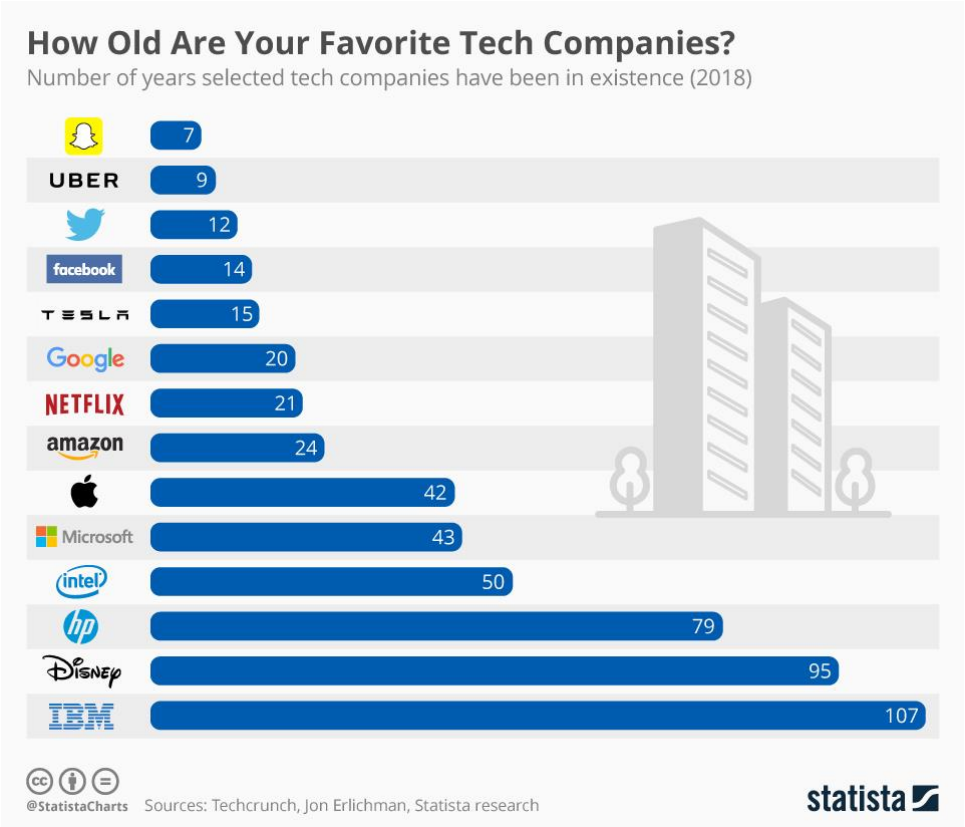

Figure 1 – Selected technology companies and their ages (McCarthy, 2018)

Similarly, the importance of younger technological companies has also grown enormously in the financial markets. Anthony, et al. (2018) showed that the average term of US companies in the S&P 500 index, dropped from 33 years in

1964 to 24 years in 2016 and is forecasted to shrink to just 12 years by 2027. The average life of companies listed on the S&P 500 has also dropped from nearly 60 years in the 1950s to less than 20 years more recently (Sheetz, 2017). At the current turnover rate, about half of the S&P 500 companies will be replaced in the next ten years.

The current scenario is a result of the boom of technology ventures that took place in the late 1990s and early 2000s, driven by the internet and other technologies, but also by the emergence of the Venture Capital (VC) industry (PitchBook, 2018). VC firms are professional, institutional managers of risk capital that invest and support innovative and promising young companies (National Venture Capital Association, 2022). In the United States, of the 1.339 companies that went public (through an Initial Public Offer – IPO) between 1974 and 2015, 42% were backed by Venture Capital investment firms. Furthermore, these 556 companies accounted for 63% of total market capitalization and 85% of Research and Development (R&D) investments (Gornall and Strebulaev, 2015). Similarly, Kaplan and Lerner (2010) pointed out that of the true start-ups (companies that started from scratch, and not as a result of some corporate movement, such as spin-offs) that came to carry out an IPO between 1999 and 2009, more than 60% had some investment from VC funds.

As a result of this success, the Independent Venture Capital (IVC) model received a lot of attention from the literature for the last 30 years, but it represents just a portion of the financing available for entrepreneurial ventures (Drover et al., 2017). Investors like Corporate Venture Capital (CVC), Business Angels (BAs), Accelerators, and others have also emerged and/or become more professionalized in recent decades (Cumming et al., 2019; Drover et al., 2017). One thing these ‘alternative’ investors share is that they mainly work with younger ventures, at investment stages like seed and early-stage, when startups are still developing their business models and products and beginning to grow (Fig 2). For this reason, they are usually seen as complementary to IVCs, as if belonging to a “financial escalator” of the startup’s financial growth cycle (Berger and Udell, 1998). This notion suggests that to get to an IVC investment, a venture would most likely have to find previous funding from investors like Angels and Accelerators.

Recent studies, however, have disputed the performance of Angels and Accelerators as intermediary investors in this cycle, at the same time as IVCs and

CVCs have been reported to invest in increasingly earlier stages (Choi and Kim, 2018; Cumming and Zhang, 2019; Kerr et al., 2014). Despite their growing importance, the available empirical research is limited when dealing with alternative investors (Drover et al., 2017; Crisan et al., 2019).

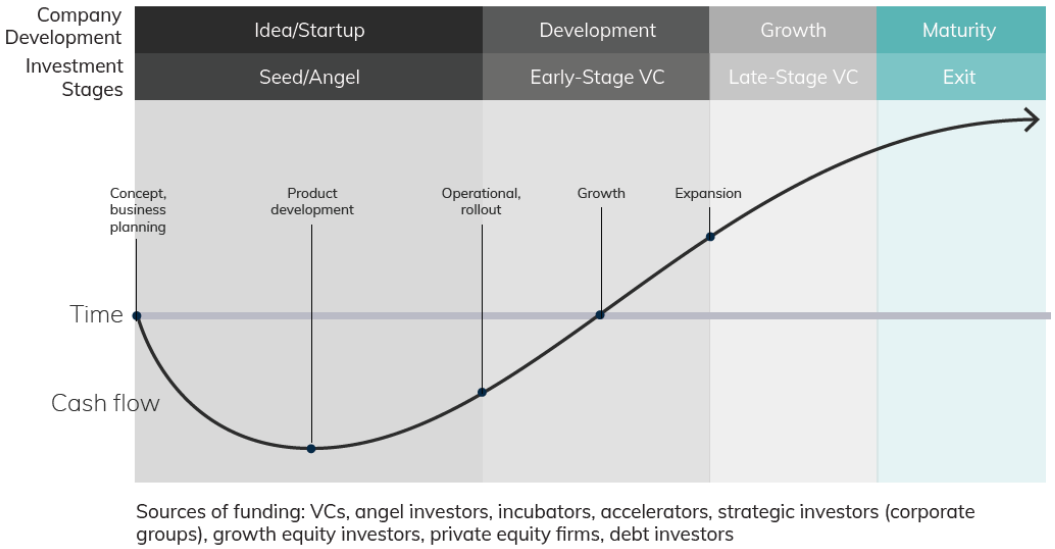

Figure 2 – Venture development cycle and investment stages (NVCA, 2022)

For instance, one of the most interesting research streams of the Entrepreneurial Equity Financing (EEF) literature developed so far is the one that examines the effects of the investment on the venture's success (Rosenbusch et al., 2013). It has been largely reported that IVCs look at an investment success strictly from its financial returns, which are usually maximized when they exit the investment through a sale of the venture to another investor or selling their stake in the venture in an IPO at the stock exchange (Cumming, 2008; Gompers and Lerner, 2001; NVCA, 2022). Historical data shows that IVCs have been successful at aiding ventures to get to those goals (Rosenbusch, et al., 2013).

But there is less research on the effects generated by CVCs, Angels, and Accelerators on the startups they invest in, especially for the latter two. Corporate Venture Capital, which are venture investment arms of established corporations, are more prone to evaluate the success of their investments by not only the returns they generate but also by the benefits they bring to their corporate strategies and standing businesses (Dushnitsky and Lenox, 2005). On the other hand, investors like Angels and Accelerators praise themselves for providing not only capital but also

validation, mentoring, and professional services that enable a venture to stay alive and grow until its next funding round (Crisan et al., 2019; Cumming and Zhang, 2019; Kerr et al., 2014). These differences in perspectives and goals may affect the paths chosen by ventures to grow.

Given the number of options, it has become more common that the highest potential ventures secure a pool of investors in each subsequent round (NVCA, 2022). Still, few studies consider a world where ventures receive investment (and are therefore influenced by) different actors, brought together in investment "syndications" – when two or more institutional investors share an investment in an entrepreneurial company (Kang, 2019; Park, LiPuma and Park, 2019).

When taken to the scenario of developing markets, the research on this topic is even more incipient. There is no guarantee that the effects observed by investors in ventures in the United States will be replicated in the same way in other regions, due to market, economic, and cultural particularities. In a lot of ways, investors in poorer countries try to mimic the US model, seeking the same performance as their colleagues, but to survive and prosper they must adapt to a less friendly business environment. Still, the VC industry has grown rapidly in countries like Brazil in the last decade, which makes it possible for researchers to make some first analyses on the effects these investors have brought to ventures.

In this research, we set out to address some of the research gaps mentioned above. We draw inspiration from two trends of research that were identified in our first article: The uprising of studies that take the point of view of the Venture when analyzing VC investments; and the growing investigation of the venture capital industry in different regions and cultures (e.g., in developing markets). We align these topics with the study of a segment of the market that is largely overlooked, the early-stage segment of venture capital, and from a perspective that considers the diverse ecosystem of the industry, with multiple types of investors (i.e., IVC, CVC, Angel, and Accelerator).

Ultimately, this research tries to answer the question of *What are the effects that different venture capital investors (i.e., Independent Venture Capital, Corporate Venture Capital, Angels, and Accelerators) have had on early-stage ventures' performance, in different markets' contexts, such as the United States and Brazil*?

1.2. Research Main and Secondary Objectives

The main objective of this thesis is to examine the effects of different venture capital investors on early-stage ventures' performance in the United States and Brazil.

To achieve this, our secondary objectives are:

1. Identify the trends and gaps in the literature concerning the effects of the most relevant types of Venture Capital investors on ventures.

2. Identify the effects of different Venture Capital investors on early-stage ventures' performance in the United States.

3. Identify the effects of different Venture Capital investors on early-stage ventures' performance in Brazil.

4. Identify the similarities and differences of the effects of different Venture Capital investors on early-stage ventures' performance in the United States and Brazil.

1.3. Research Relevance and Structure

The relevance of this study is linked to research gaps identified in the Venture Capital literature. The bulk of the literature focuses on issues concerning investors and the funds they manage. Only recently has there been more interest in the venture's perspective and the consequences of investment for them (Cumming and Groh, 2018; Cumming et al., 2019; Drover et al., 2017). Understanding the ventures' expectations of benefits from VC investors is essential to analyze the industry's long-term sustainability. Additionally, most of the research on investors is limited to IVCs, with little consideration for alternative types of investors, such as Angels and Accelerators, particularly in the early-stage venture segment (Crisan et al., 2019; Drover et al., 2017; Rosenbusch et al., 2013). Overconcentration of research on IVCs gives a narrow view of the diversified entrepreneurial financing scenario that startups encounter today. Furthermore, the research regional

concentration in the United States may give the impression that the model developed there is appropriate and applicable to any context and culture. However, the business environment varies significantly from country to country, necessitating industry adaptation (Colombo and Shafi, 2016; Ribeiro and Carvalho, 2008).

To address these gaps, this thesis includes extensive research on multiple subjects concerning the venture capital literature, particularly on the influence different types of early-stage venture capital investors exert on the ventures they invest in the United States and in Brazil. It is structured in the way of three research articles aimed at addressing the secondary objectives in sequence.

In the first article, we conduct a systematic literature review on Corporate Venture Capital (CVC) to identify the driving mechanisms and effects on invested ventures. CVC was chosen due to its significance as the primary 'alternative' type of VC investor. Despite a significant body of literature built in the last 15 years, little work has been done to review the combined output of these studies. This article results in a broader understanding of the multiple factors influencing how investors and ventures relate to each other, and the differences in profiles and incentives that characterize distinct types of VC investors and how they influence ventures. We partially address the first secondary objective and uncover the trends and gaps in the literature that guide the following articles.

In the second article, we examine a large dataset of early-stage VC investments in the US to investigate the comparative and joint effects of the main VC investor types on their invested ventures. The US serves as a parameter since it is where the venture capital industry originated and developed under its culture. This article addresses both the first and second objectives. In the third article, we investigate data on early-stage VC investments in Brazil for the same investor types as before. Brazil is an interesting choice for comparison to the US, as it reflects the limitations and issues intrinsic to a developing country while embodying western values and possessing highly relevant financial and capital markets for its economy. We address the third and fourth objectives here. The thesis concludes with a comparative analysis of both countries, highlighting the differences and similarities in the results found, and discussing the contextual factors that influence them. This analysis provides an answer to objective four. Figure 3 organizes the structure of the thesis and the links to the secondary objectives.

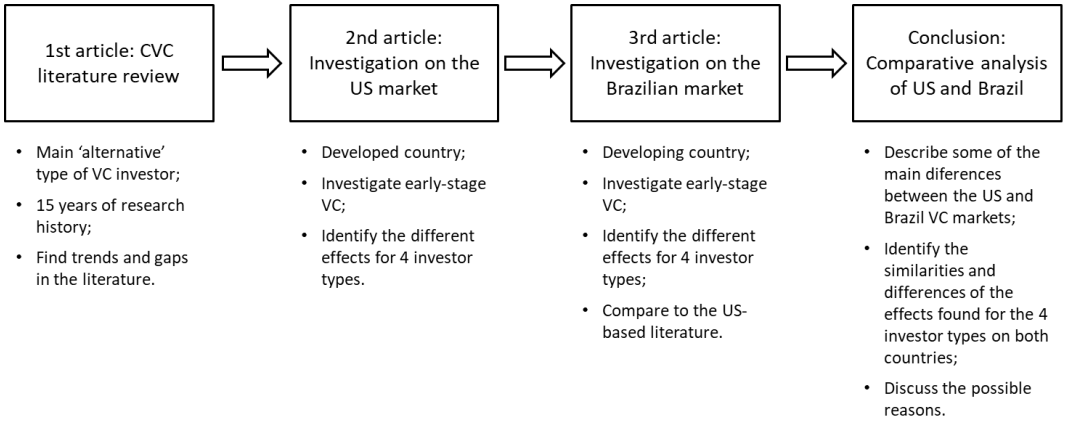

Figure 3 – Structure of the thesis

The theoretical contributions of this research address the gaps identified in the VC literature. To our knowledge, this is the first empirical analysis of the effects of multiple sources of equity funding on ventures' performance, focusing on the early-stage segment of the venture capital industry. By analyzing extensive data from VC investments and their outcomes in two countries with diverse backgrounds, the US and Brazil, this research provides insights into the effects of different investor types on ventures and the reasons behind them. For practitioners, this research offers insights into the funding paths that early-stage ventures can take and the expected outcomes. Investors can also assess their performance by comparing it to the industry average for their category in both countries, allowing them to stay competitive in the current VC market.

1.4. Research Delimitations

This research is delimited in a few ways. Firstly, its focus is on analyzing investments made under the venture capital context. This involves investments made by investors in promising and innovative young companies in the private market, with the objective of achieving exceptional returns in the long run. This focus is important because venture capital is a distinct form of finance that involves unique investment strategies, risks, and outcomes.

Secondly, this study is limited to two countries, the United States and Brazil. These countries were chosen because they represent two distinct contexts for

venture capital investment. The US is widely considered to be the birthplace of venture capital, with a long history of institutional support for the industry. Brazil, on the other hand, is a developing country with a relatively young and rapidly evolving venture capital market. By comparing these two countries, we can gain insights into the factors that shape venture capital investments and outcomes in different contexts.

Thirdly, this study focuses specifically on ventures in the early-stage segment of the VC industry. Particularly, we focused on ventures that are receiving their first investment round. This focus is important because early-stage ventures face unique challenges and opportunities that distinguish them from later-stage ventures. By delimiting the study in this way, we can gain a more nuanced understanding of the factors that influence early-stage venture capital investments and their outcomes.

Finally, our analyses are circumscribed by the variables employed. The main variable of interest is the presence of an investor as a venture's funding partner. We also assess performance using the most applicable measures within our scope and by the previous literature. By delimiting our analyses in this way, we can ensure that our findings are relevant and meaningful within the context of venture capital research.

2 First Article – The evolution of corporate venture capital research: A Systematic Review

2.1. Abstract

Corporate venture capital (CVC) is one of the main activities for firms to engage with entrepreneurial ventures and has drawn increasing attention from scholars in the last two decades. Nevertheless, the literature on CVC is fragmented, with several different issues under debate. This paper conducts a systematic review of the CVC literature with a two-step approach: First, a bibliographic coupling analysis is used on the 60 most relevant articles to find the research streams that guided the literature for the last 15 years. Second, from a content review of the articles, we raise the relevant factors that influence each stream. The results are synthesized in a conceptual framework that organizes the relevant factors and crosses the three traditional streams in CVC research (Antecedents, Patterns, and Outcomes) with two new streams (Corporate and Ventures), a major shift of how the literature is divided. Additionally, trends and gaps for future research are discussed to enlighten scholars in the area.

Keywords: Corporate venture capital (CVC), Corporate venturing, Corporate entrepreneurship, Systematic Review, Bibliographic coupling

2.2. Introduction

Corporate venture capital (CVC) activity is when a large established firm, denominated corporation, makes an equity investment in an independent entrepreneurial venture (Gompers and Lerner, 2000). It has been present among corporate practices for more than 30 years, as a way for these large players to open a window to new technologies by accessing the vitality of startups (Dushnitsky and Lenox, 2005). By doing so, they hope to improve their innovative efforts, as well as benefit from a profitable investment (Chesbrough, 2002; Gompers and Lerner, 2000). Moreover, it is not only the investors that benefit. Studies have demonstrated

the positive effects on the innovation output of invested startups as well (Chemmanur, Loutskina, and Tian, 2014; Park and Steensma, 2013).

CVC investment is one mode of the corporate venturing subject, together with alliances, joint ventures, and acquisitions (Schildt, Maula, and Keil, 2005). Interestingly, it is not exactly a category started by big firms. Corporate ventures grew on the back of the previously developed Venture Capital (VC) industry, benefiting from the experience accumulated by the independent investment community (Rind, 1981). Over the last three decades, corporations became one of the most relevant sources of investments in the VC industry. CVC investors participated in 1.776 venture deals in the United States in 2019, representing 24% of the total VC deal count. In that year, those deals meant $57 billion in aggregate deal size (including non-CVC investors), or 47% of the total amount (US National Venture Capital Association [NVCA], 2020). Just as the CVC practice became more diffused in the corporate world, also the managerial and financial literature followed, provoking great debate over several related issues, and resulting in a significant body of accumulated knowledge.

This article intends to answer the following questions: *What are the main research streams that guided the literature on CVC from the last 15 years? How did they evolve? What are the relevant factors related to them? And finally, which are the trends and research gaps to be addressed by future research?* To answer these questions, a systematic review was conducted of the CVC literature for the last 15 years (from 2005 to 2019) in a two-step approach. First, we selected the 60 most prominent studies published in this period to apply bibliographic coupling (BC) analysis in the three subsequent 5-year periods, to capture the evolution of the research streams through time. This technique allows us to find clusters of articles according to the strength of their common references, which indicates thematic conversion. As a result, we discover that the CVC literature in the first two periods can be divided into three research streams: *Antecedents*, *Patterns*, and *Outcomes*. In the last 5 years of our study, a major shift occurs, and the research is then divided according to its focus on the perspective of the *Corporation* or *Venture*. We describe the main findings in each of the three periods. Second, a content review of each article was made to scout the relevant factors that influence each theme. We found that factors can be organized by their level of analysis, as indicated by Drover et al. (2017). These were Environmental, Firm, Venture, and Individual.

The result of this two-step approach is summarized in a Conceptual Framework of the literature that categorizes the relevant factors in the research streams in which they emerge, consolidating the knowledge of the CVC field visually. At last, considering the findings presented by the bibliographic coupling and content review we discuss different trends and promising research topics on the subject.

Previous reviews have engaged in the investigation of the subjects of corporate entrepreneurship and corporate venturing (Bierwerth et al., 2015; Drover et al., 2017; Narayanan et al., 2009). But these subjects are broad in scope and, as a result, the reviews just scratch the surface of the issues concerning CVC. However, one previous review by Rohm (2018) tackled the CVC literature. Despite using similar methods, this study differs in fundamental ways from our own. First, the author reaches an underlying structure of the CVC literature that is divided into two dominant logics, management, and finance. This is true when you compare the editorial line of the journals where CVC research was most published. But we feel that this division is somewhat format related, while we unveiled a content-related structure, that is the literature research streams. Second, by dividing the analysis into three subsequent 5-year periods, we were able to identify how these major streams evolved through time, including a significant shift in the last period. Thirdly, we scout the relevant factors that emerge in each period and categorize them in their related stream in a new Conceptual Framework of the CVC literature. Finally, we discuss different trends and promising research topics for future research.

2.3. Literature Review

The first corporate venture funds were set in the mid-1960s, boosted by two decades of success in the venture capital industry, which spurred several high-growth tech ventures. During the late 1960s and early 1970s, more than 25 percent of US Fortune 500 companies attempted CVC programs, but after the 1973 stock market crash, most of these programs were discontinued. Over the following two decades, CVC adoption fluctuated with market conditions, in tune with the independent venture capital industry (Gompers and Lerner, 2000). Early literature on CVC was mainly descriptive and somewhat associated with the logic and

concepts of the independent venture capital literature (Gompers and Lerner, 2000; Siegel et al., 1988). Scholars promptly realized, though, the strategic benefits of CVC. It was viewed as a promising tool for corporations to make growth viable in technology-based competitive markets, with flexibility and reduced costs (Rind, 1981; Roberts, 1980; Winters and Murfin, 1988).

The interest in the subject grew in the 2000s with a more robust understanding of the influence of external knowledge acquisition on a firm's innovation efforts. In this context, CVC was put alongside other corporate strategies (i.e., alliance, joint venture, acquisition) as sources of external learning. The advantage of CVC in the context is the offering of a connection with more agile and innovative partners (ventures) with a reduced commitment and in a systematic way (Dushnitsky and Lenox, 2005; Maula et al., 2013; Tong and Li, 2011). Despite all the theoretical advantages, it has not always been the case that CVC was found to be beneficial, with several contingent factors emerging to the understanding of the conditions under which CVC was appropriate and how to manage it properly (Dushnitsky and Lenox, 2005a; Schildt et al., 2005). The investigation of these factors represents the bulk of the literature on CVC, which is mainly composed of studies on high-tech industries in the US (e.g., Dushnitsky and Lenox (2005a); Katila, Rosenberger, and Eisenhardt (2008)).

In the last ten years, authors demonstrated an increasing interest in the analysis of CVC from the perspective of the venture. Scholars focused mainly on the conditions for ventures to take corporate investment and the effects on their innovation performance and value. Katila et al. (2008) focused on how to deal with the misappropriation of knowledge suffered by ventures that decided to align with incumbent firms. Ventures, in this case, can use several defense mechanisms that vary depending on the institutional setting (e.g., industry, country, region) (Hallen, Katila, and Rosenberger, 2014; Katila et al., 2008; Kim et al., 2019). Also, attention was given to the consequences of technological relatedness and industry overlap between the venture and its corporate investors (Ivanov and Xie, 2010; Schildt et al., 2005; Weber and Weber, 2007). Additionally, there is a significant part of the literature focused on understanding the influences of different investors on ventures (Alvarez-Garrido and Dushnitsky, 2016; Pahnke et al., 2015; Uzuegbunam et al., 2019).

As we can see, the literature on CVC evolved considerably in the last 15 years, with many issues under debate. However, we notice that the literature is somewhat fragmented and distributed between several different issues. Therefore, authors can benefit from a consolidation of knowledge to advance further research.

2.4. Research methods

2.4.1. Sample selection procedures

We apply a systematic approach to select the articles used in our review, which is consisted of the following procedures. First, we used the Web of Science™ Core Collection of Thomson Reuters as the article database, as it includes most journals with high-impact factors in the field and offers features through which a broad set of metadata can be collected and analyzed. Only articles from "peer-reviewed" journals were selected because these can be considered validated knowledge and are likely to have the highest impact in the field (Podsakoff et al., 2005). The search consisted in using the following criteria: i) topic: title, keywords, or abstract): ii) keywords: 'corporate venture capital' OR 'CVC' OR 'corporate venturing', the last one included to assure comprehensiveness, although it comprises other related fields which were excluded in the following step; iii) document type: 'article' and 'review'; iv) subject area: 'business', 'management', and 'business finance'. Besides, we employed the Association of Business Schools Academic Journal Guide (2018) to filter for the more influential publications (classified as 3, 4, and 4*) in their fields. We decided to add two journals that did not fit the last criteria but presented relevant work on the search results; they are related to innovation and technology subjects, which are considered newer[1] (Park and Bae, 2018; Weber and Weber, 2007). Our initial search yielded 856 papers from 59 academic journals.

The following step was to read the topic items (title, keywords, and abstract) for all articles in order to select only those of interest to our subject. We left out subjects that were not at the core of our study. Therefore, topics like 'corporate

[1] The included journals were 'The Journal of Engineering and Technology Management' and 'Technology Analysis and Strategic Management'.

entrepreneurship', 'entrepreneurial orientation', and 'spin-offs' were dropped. The articles under the 'corporate venturing' topic were particularly examined to check if they were under our scope. For instance, articles about 'internal corporate venture', were only considered if they also dealt with the subject 'external corporate venture'. Our initial sample was comprised of 104 articles from 36 leading academic journals.

2.4.2. Analytical procedures

First, we give an overview of the essential characteristics of the sample of articles and employ citation analysis to identify and discuss the most cited studies within it. We are based on the premise that frequently cited documents are likely to have exerted a more substantial influence on the discipline than less frequently ones (Ramos-Rodriguez and Navarro, 2004).

Then, we applied the bibliographic coupling technique (BC) to access the evolution of the thematic trends in the field over the last 15 years. Through grouping publications by the strength of their common references, BC identifies clusters of research themes (Dagnino et al., 2015). The 15 years were divided into three 5-year windows (2005-2009, 2010-2014, and 2015-2019) to capture the evolution of the research agendas through time. The analysis was restricted to the top 20 articles in citations per year in each window to assure a better visual representation. Also, only documents with at least ten references in common with their period peers were included. As a result, the BC analysis considered 60 articles, 72% of the articles in the sample from the last 15 years, and 58% of the total sample. The Visualization of Similarities (VOS) technique was used to build distance-based maps (where the distance between two items reflects the strength of their relationship). VOS has been found to produce results theoretically similar to the more known Multidimensional Scaling (MDS) with a more appropriate graphic representation of the underlying dataset (Van Eck and Waltman, 2010). The VosViewer™ software was used for the analysis.

Finally, after a content review of each article to scout the relevant factors that influence the themes found in the BC analysis, the results are summarized in a conceptual framework of the literature, to organize the most relevant factors by research stream, focus, and level.

2.5. Evolution of the CVC research

In this section we describe the sample, demonstrating how the CVC literature evolved in the last 15 years, and an overview of the most active journals and the relevant studies. Afterward, we make a description of the main findings in each of the three periods of the bibliographic coupling analysis, using the Visualization of Similarities (VOS) technique to build distance-based maps. The technique yields maps with segmented clusters of papers which, after a thorough review of their content, revealed underlying research streams (also referred to as themes). The first two periods present similar themes: Antecedents, Patterns, and Outcomes. While, in the last period, two themes better represent the clustered papers: (a focus on) Corporate and Ventures.

2.5.1. Descriptive analysis

We begin by presenting a descriptive analysis of the sample. Fig 1. presents the evolution of the number of papers in the last 20 years (2000-2019), which comprises 90 papers in total, 86,5% of the total sample. The other 14 papers were published in the previous 20 years (1980-1999), with the first one by Roberts (1980). The analysis of Figure 4 does not show a continuous growth pattern, as we previously expected, with periods of growth and fall alternating. Figure 5, which shows the number of citations of the articles published in the field, on the other hand, presents a continuing increase, indicating a growing interest in the subject.

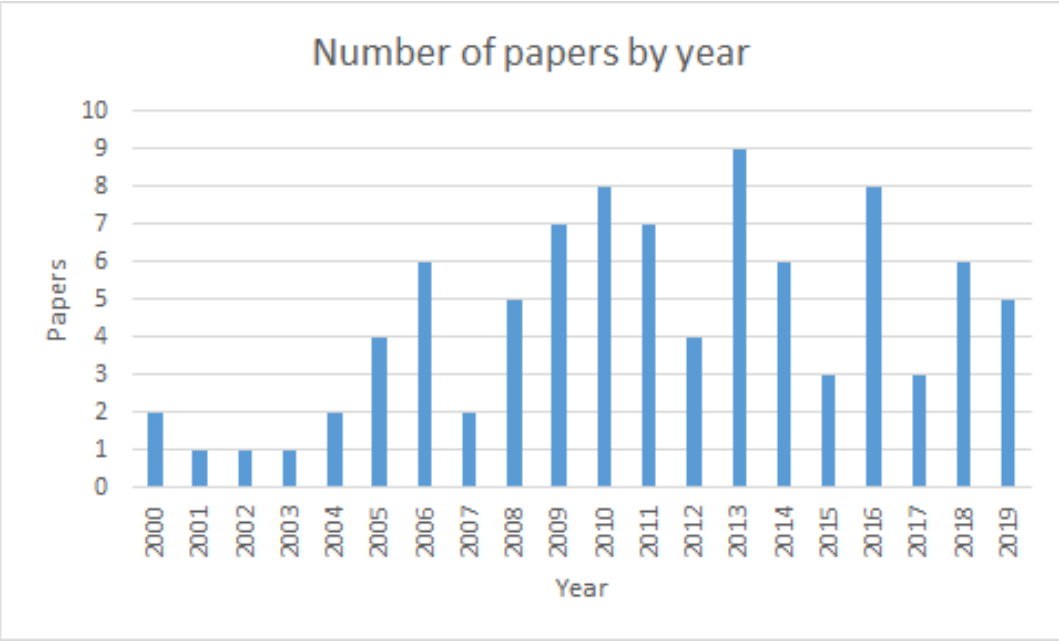

Figure 4 – Number of papers by year (elaborated by author)

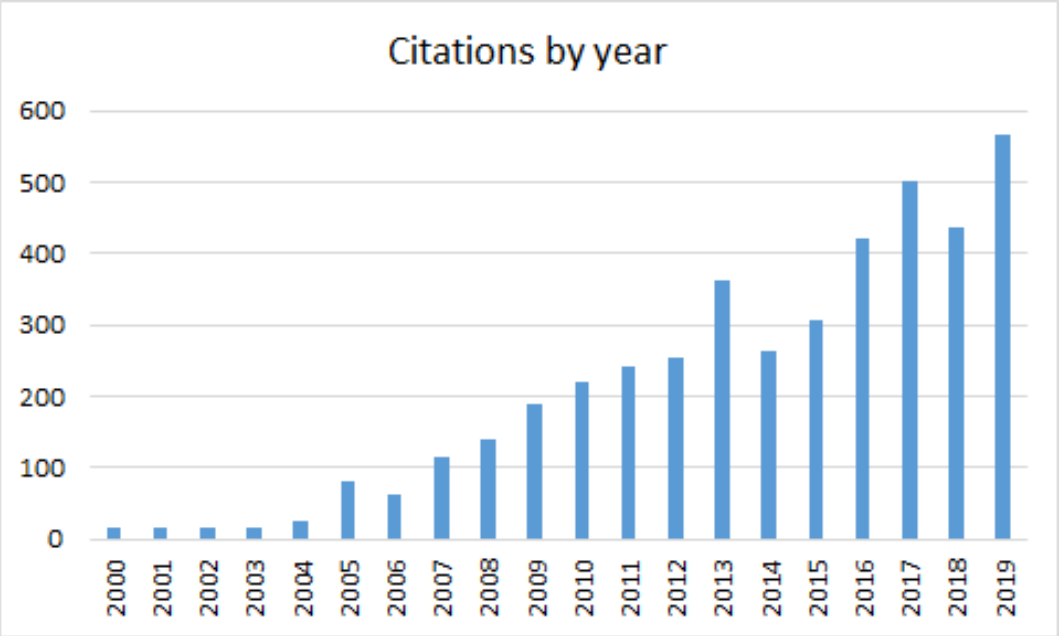

Figure 5 – Number of citations by year (elaborated by author)

Table 1 displays the distribution of papers in the top 10 journals with the highest number of publications from the sample. The top 3 journals stand out for being the go-to place where the discussion on CVC is happening, containing 40% of the studies, with particular mention to the 'Journal of Business Venturing', which owns 22% of the work, more than double the second place, and almost the 4th to 10th combined (25%). Altogether, the top 10 publications provide more than 65%

of the sample. Apart from these journals, the sample is distributed among 12 more journals with two papers each, and 14 journals with one paper.

Table 1 – Number of papers in top 10 journals with most publications

Journal Title	Number of papers	Percentage of total	ABS Field
Journal of Business Venturing	23	22,12%	ENT-SBM
Strategic Management Journal	10	9,62%	STRAT
Strategic Entrepreneurship Journal	9	8,65%	ENT-SBM
Entrepreneurship Theory and Practice	5	4,81%	ENT-SBM
Journal of Business Research	4	3,85%	ETHICS-CSRMAN
Organization Science	4	3,85%	ORG STUD
Research Technology Management	4	3,85%	INNOV
Harvard Business Review	3	2,88%	ETHICS-CSRMAN
Academy of Management Journal	3	2,88%	ETHICS-CSRMAN
Journal of Management	3	2,88%	ETHICS-CSRMAN

2.5.2. Citation analysis

Table 2 displays a summary of the ten most cited articles from the sample, classified by their research streams, focus, and factors studied, among other relevant information. Most of the articles are from the last 15 years, with only two being published before this period. Siegel, Siegel, and McMillan (1988) are one of the first to focus on CVC as a research subject. Moreover, it is noteworthy the impact of the research conducted by Dushnitsky and Lenox (2005, 2005a, 2006) as the main authors that researched CVC, particularly focusing on antecedents of CVC from the perspective of the corporations. From the perspective of the venture, only one article stands out in the beginning years, by Katila et al., (2008), which is the precursor of the investigation on CVC antecedents for ventures, opening the discussion on the misappropriation issue faced by entrepreneurs and their defense mechanisms.

The most referenced themes are Antecedents and Outcomes, with a minor role of Patterns. The most studied measures of outcomes are related to innovation

performance, like patents count and patent citation. Interestingly, both articles that focus on CVC patterns were published before 2005. We assume that this is because CVC research was at its beginning at that time, so the work was mainly descriptive of how the activity was conducted. This analysis is further corroborated by the research design applied by both articles since they are the only two not implementing longitudinal studies. Lastly, it is not surprising that all ten papers take the United States as the research setting, as the VC market was created there, and it was where large corporations first began investing systematically. Also, most longitudinal studies on the list used samples from technological industries, even when identified as cross-sectors, and their research generally takes place during the 1990s.

Table 2 – Summary of most cited articles

Autor / Journal	Research Stream	Focus	Research Design	Research setting	Dependent variable	Independent variable	Citations
Dushnitsky and Lenox 2005 (*Research Policy*)	*Outcomes*	Corporate	Longitudinal Study	- US / Cross-sector / 2.289 firms / 1969-1999	- IP (Patent citation)	- [E] Intellectual property regime (-) - [F] Absorptive capacity (+) - [F] Technological fit (inverted U-shape)	49
Dushnitsky and Lenox 2005 (*Strategic Management Journal*)	*Antecedents*	Corporate	Longitudinal Study	- US / Cross-sector / 1.171 firms / 1990–1999.	- Firm Amount of CVC investment	- [E] High tech sector (+) - [E] Weak intellectual property regime (+) - [E] Complementary assets (+) - [F] Cash flow (+) - [F] Absorptive capacity (+) - [F] R&D (+)	47
Dushnitsky and Lenox 2006 (*Journal of Business Venturing*)	*Outcomes*	Corporate	Longitudinal Study	- US / Cross-sector / 1.173 firms / 1990–1999.	- Firm Value (Tobin's Q)	- [F] CVC objective: Strategic (+) - [F] CVC objective: Financial (-) - [E] High tech opportunity sector (+) - [E] Low tech opportunity sector (-) - [F] Magnitude of CVC investment (+)	41
Wadhwa and Kotha 2006 (*Academy of Manamegent Journal*)	*Outcomes*	Corporate	Longitudinal Study	-US / Telecom / 36 CVCs / 1989 to 1999	- IP (Patent count)	- [F] Low Involvement (inverted U-shape) - [F] High Involvement (+) - [F] Firm's technological diversity (null)	38
Siegel, Siegel and McMillan 1988 (*Journal of Business Venturing*)	*Patterns*	Corporate	Survey	- US / Cross-sector / 52 CVCs	- CVC performance	- [F] CVC objective: Strategical (-) - [F] CVC objective: Financial (+) - [F] CVC independency (+) - [F] CVC experience (+) - [F] Firm`s understanding of CVC activity (+)	36
Chesbrough 2002 (*Harvard Bussiness Review*)	*Patterns*	Corporate	Theoretical	- None	- CVC performance	- [F] CVC objective: Strategical (+) - [F] CVC objective: Financial (-) - [F] Firm-Venture tight operational link (+) - [F] Firm-Venture loose operational link (+)	33

Dushnitsky and Shaver 2009 (*Strategic Management Journal*)	*Antecedents*	Corporate	Longitudinal Study	- US / Cross-sector / 1.646 Ventures and 87 CVCs / 1990-1999	- CVC investment formation	- [E-F] Weak intellectual property regime X Industry overlap (-) - [E-F] Strong intellectual property regime X Industry overlap (+)	27
Schildt, Maula and Keil 2005 (*Entrepreneurship Theory and Practice*)	*Outcomes*	Corporate	Longitudinal Study	- US / ICT industries / 110 firms / 1992–1999	- IP (Patent citation)	- [F] CVC investments (weak +) - [F] Technological relatedness (strong -) - [F] Industry relatedness (null) - [F] Downstream relatedness (weak -)	27
Katila, Rosenberger and Eisenhardt 2008 (*Administrative Science Quarterly*)	*Antecedents*	Venture	Longitudinal Study	- US / Cross-sector / 701 Ventures / 1979-2003	- CVC investment formation	- [E] Patent defense effectiveness (null) - [E] Secrecy defense effectiveness (+) - [E] Timing defense (+ Strong) - [E] Manufacturing resources need (+) - [E] Marketing resources (null) - [F] Magnitude of investment (+ Strong)	22
Benson and Ziedonis 2009 (*Organization Science*)	*Antecedents*	Corporate	Longitudinal Study	- US / IT / 34 CVCs and 273 ventures / 1987-2003	- Firm`s stock performance	- [F] CVC/R&D ratio (S-shape) - [F] CVC consistency (+)	22

Obs: [E] - Environmental; [F] - Firm

The following three topics present the main findings in the content review of the articles in the sample and how they align with the underlying research streams.

2.5.3. Initial period (2005-2009)

The initial period, from 2005 to 2009, is when the interest in CVC as a research topic took off and comprises the most relevant work, with nine of the ten most cited papers (see Table 2). Most studies are directed towards the investigation of antecedents and outcomes of CVC, with little work on patterns at this stage. Also, attention is focused on environmental and firm-level analysis, but with a few remarkable contributions towards the end of the period with a venture-centered perspective. Figure 6 features the clusters generated by VosViewer™ software for the initial period.

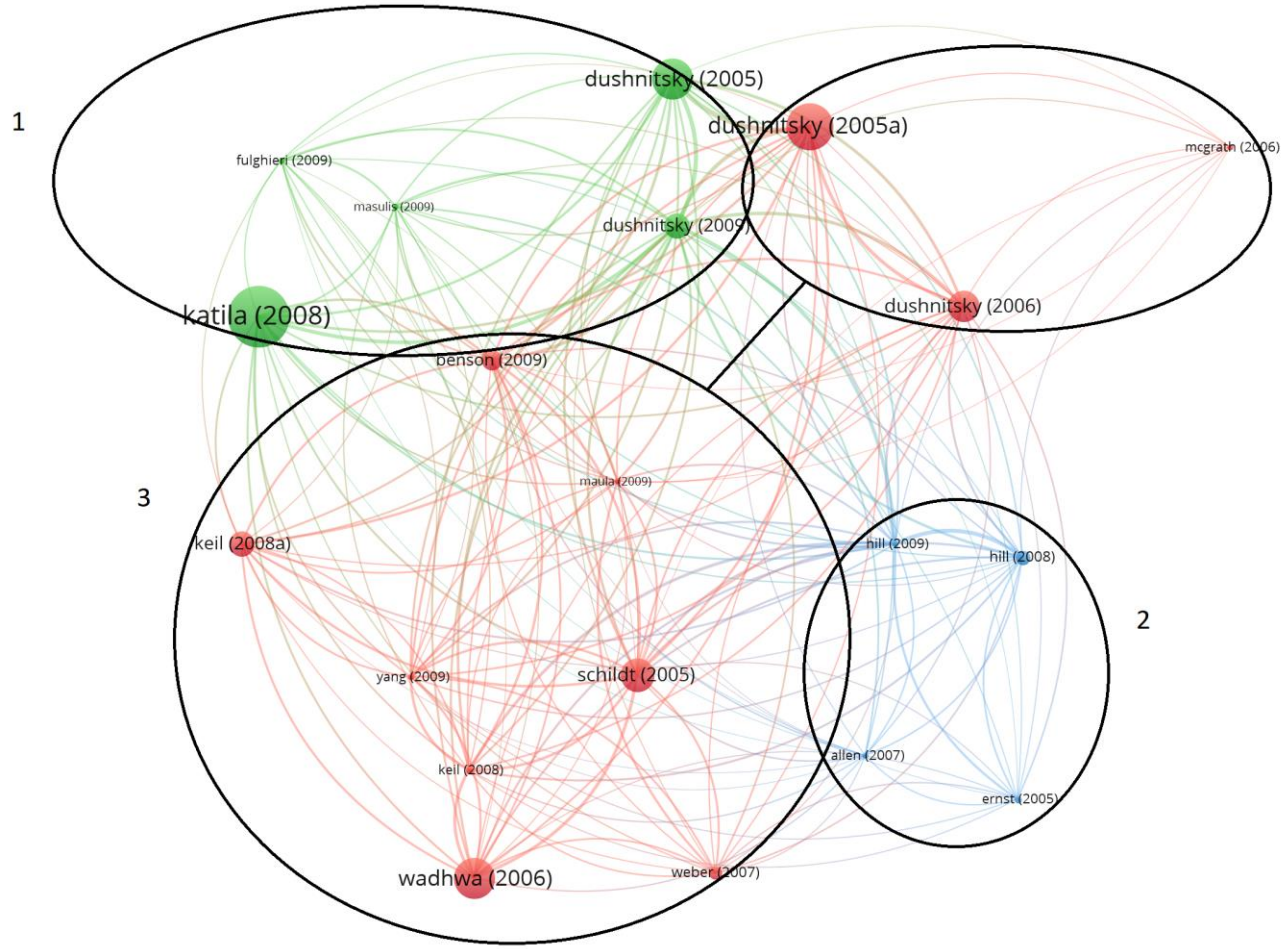

Figure 6 – BC Cluster Analysis for Initial Period (2005-2009)

Antecedents. The first cluster identified is related to a research stream that investigates antecedents of CVC activity and the most cited paper from it is Katila et al., (2008) which is represented by the widest sphere. From the beginning, CVC has been primarily related to high technology industries, where intellectual property protection (IPP) regimes are weaker and complementary distribution capability is important (Dushnitsky and Lenox, 2005; Fulghieri and Sevilir, 2009). Those corporations with more resources and higher absorptive capacity are more prone to engage in it, perhaps attracted by the possibilities to extract sensible knowledge from ventures for their own purposes (Dushnitsky and Lenox, 2005).

As a result, scholars during this period paid special attention to the agency problem that is created by CVC investment: Incumbents have a strong incentive to assimilate and copy the venture's innovation once they get hold of them in an investment relationship, a great risk to entrepreneurs. This issue has become known by the "swimming with sharks" metaphor proposed by Katila et al., (2008). This process can happen by different means, like incumbents taking a position on the board of directors, joint research work, or even during the due diligence before a deal is made (Dushnitsky and Lenox, 2005). When dealing with corporate investors, ventures find ways to limit their risks, like withholding board representation, only taking corporate investment in later stages, and demanding higher valuations (Masulis and Nahata, 2009).

Nonetheless, ventures have been found to form investment deals with firms even when they have overlapping technology or shared industries. Those deals are formed predominantly in industries with strong IPP regimes tough, where entrepreneurs feel less threatened by misappropriation (Dushnitsky and Shaver, 2009). In a highly influential study, Katila et al., (2008) take the venture's point of view and find evidence that other defense mechanisms like 'timing' investment from corporations to late-stage funding rounds (when it is more difficult for a partner to appropriate intellectual property) and keeping 'secrecy' about sensitive information on their technology are more frequently used and more effective than patenting.

Patterns. The second cluster is related to a research stream that examines CVC patterns. The most relevant work identified is from Hill and Birkinshaw (2008) although the cluster is less significant during this period. Scholars here are mainly interested in CVC's investment logic and practices, what drives them, and

to what results. Hill and Birkinshaw (2008) explored the fundamental discussion on whether the corporate venturing arm should adopt an exploration-oriented (which experiments with new alternatives) or exploitation-oriented (that aim at refining and extending existing competencies, technologies, and paradigms of the firm) logic. The authors claimed that CVC units (business units in charge of corporate venturing activities in the corporation) perform better when aligned with organizational profiles set out by their corporate parent. Additionally, they gathered that exploitation-oriented CVC units have a better survival rate than exploration-oriented ones because they would be subject to a lower level of risk.

Another recurring issue is the proposition that corporations can benefit from applying independent venture capital investment firms' (IVC) practices to CVC. For instance, active management and investment consistency (which requires capital commitment) were found to be positively related to returns, and CVC managers, as investment professionals, should be aware of economic cycles (Allen and Hevert, 2007). Likewise, IVC managerial practices, such as high-powered incentives, autonomy, syndication, and investment staging (dividing investment into successive rounds, upon performance) are positively related to performance, both strategic and financial (Hill et.al., 2009).

Outcomes. The other articles (cluster 3) from this period are associated with a research stream that focuses on CVC outcomes and the most prestigious work is from Dushnitsky and Lenox (2005a). Historically, CVC is not linked to traditional investment financial returns due to its structural deficiencies when compared to independent venture capital (IVC). Still, there is an argument to be made that it creates (somewhat intangible) value for firms by harvesting novel technology from the external environment, when directed for strategic purposes (Dushnitsky and Lenox, 2006). Then again, CVC is not the only way by which firms can access that knowledge. There is extensive research on several corporate venturing activities (i.e., CVC, alliance, joint venture, acquisition) and their benefits (Narayanan et al., 2009). Schildt et al., (2005) compared CVC with these other activities in terms of their effect on explorative (rather than exploitative) learning. They discover that Alliances and JV have a significant positive impact on explorative learning, while CVC also is positively related, but mildly significant. The authors argued that this result may come from the incapacity of some CVC units to absorb technological

knowledge, perhaps by missing making valuable connections between corporate and ventures.

Absorptive capacity is often related to learning (Cohen and Levinthal, 1990), which is not different in the case of CVC. Empirical evidence demonstrates that investing in one's internal R&D capabilities is a significant determinant of the advantages a corporation can take from external venturing (Benson and Ziedonis, 2009; Dushnitsky and Lenox, 2005a). But it also seems that to take the most advantage of learning, a certain level of involvement is required of corporate parents, like forming alliances with the ventures and integrating their board of directors (Wadhwa and Kotha, 2006). Being able to make connections is a substantial part of the CVC manager's job. These professionals take the role of 'Knowledge brokers' and should be able to use their prior experience, and extended network inside and outside of the company to leverage learning through interaction (Keil et al., 2008). There is no surprise then that their accumulated experience in CVC activities promotes better performance (Yang et al., 2009). Greater interaction has also been found to reduce relationship safeguards by the investee firm (Maula et al., 2009), and building trust, positive posture, common norms, and a shared willingness to cooperate is essential to creating knowledge-sharing routines that ultimately benefit mutual learning (Weber and Weber, 2007).

Of course, harvesting interaction is easier for parties that complement each other, rather than compete (Maula et al., 2009), and a great deal of attention is shown in this research stream to the effect of industry overlap and technology relatedness between investing parents and ventures, on the outcomes of learning. While some authors displayed technological relatedness as prejudicial to explorative learning (Schildt et al., 2005), others have found evidence of an inverted U-shape effect (Weber and Weber, 2007) in industry overlap, even more, pronounced in CVC than in Alliances and JVs (Keil et. al., 2008a).

2.5.4. Intermediate period (2010-2014)

The intermediate period of our analysis encompasses the years from 2010 to 2014. The same three research streams from the previous period were identified, as shown in Figure 7. However, there is a change in their composition, with an increase of papers on the Patterns and Antecedents clusters, migrating from

Outcomes. More importantly, we observe a significant change concerning the unit of analysis for the Outcomes cluster: In this period, all papers from this theme are focused on the ventures; that is, they study the effects of CVC activities on entrepreneurial firms.

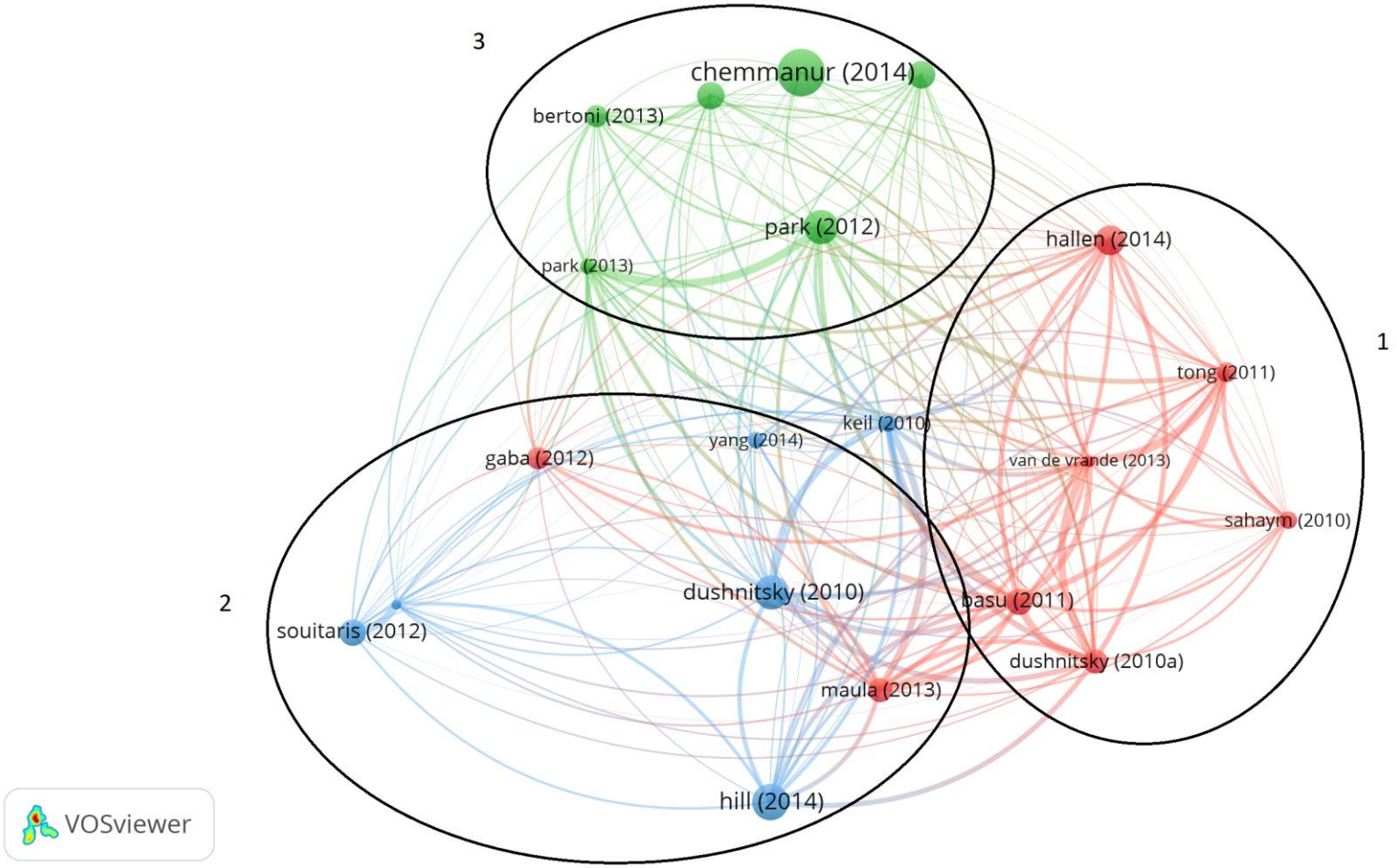

Figure 7 – BC Cluster Analysis for the intermediate period (2010-2014)

Antecedents. The most representative article from cluster 1 is from Hallen et al., (2014). Some of these studies build on previous work, confirming that high-tech competitive markets with large R&D spending ferment CVC activity (Sahaym et al., 2010) sometimes replacing other external venturing modes. For instance, under these conditions, CVC investing beats acquisitions for its reduced costs and greater flexibility (Tong and Li, 2011). On the other hand, alliance formation seems to have a reinforcing association with CVC adoption, except for when the two become redundant in terms of external learning (Dushnitsky and Lavie, 2010). CVC investing can be a way of breeding future alliances since ventures can develop to become partners with parent firms, especially when they share technological proximity (Van de Vrande and Vanhaverbeke, 2013). Despite that, CVC investing is still favorable to alliances when it comes to identifying technological tendencies and discontinuities. This is because most alliances are formed between known industry peers and as such suffer from an inertial effect when reacting to early-stage technology (Maula et al., 2013).

With a behavioral perspective, Gaba and Bhattacharya (2012) introduced an individual-level factor to firms' CVC antecedents. They found that corporate top management team (TMT) aspirations play a relevant role in the decision to initiate and maintain/terminate CVC activities. Decision makers are more inclined towards CVC when their innovation performance is leveled with industry companions, rather than lower or higher. Finally, building on the "Shark" issue faced by ventures when lacing with incumbents, Hallen et al., (2014) presented a new defense mechanism: Social ties. Investment ties with IVCs, particularly prestigious ones, allow ventures to better filter corporate hazardous behavior, which is even more relevant when legal and timing defenses are weak.

Patterns. Continuing the CVC patterns research, cluster 2, the most cited article is by Hill and Birkinshaw (2014). Souitaris, Zerbinati, and Liu (2012) drew on multiple case study research to delve into how CVC units cope with two different institutional settings, corporate and VC-industry, to constitute their investment logic. They extracted two underlying mechanisms that influence the CVC unit's logic: The way that the CVC management team is built (from corporate managers or VC professionals) and how they seek legitimacy (from inside the corporate hierarchy or from VC industry peers). In turn, investment logic affects structure and practices like screening, evaluation, due diligence, deal structuring, and approval.

They also direct how CVC monitors and add value to ventures after the investment (Souitaris and Zerbinati, 2014). Still, Hill and Birkinshaw (2014), evolving on their previous work, proposed that CVC units are intrinsically ambidextrous vehicles, by which firms build new capabilities, while simultaneously leveraging their existing resources. They do this by maintaining high levels of interaction with three principal stakeholders – corporate executives, other business units, and members of the VC community – and the ones that find a better balance, outperform.

This period also gives rise to a set of studies that focus on particular investment practices. Portfolio diversification, for one, is found to have a positive impact on firm value up to a certain point (Yang et.al., 2014). The same parsimony seems to be advised when it comes to syndication (i.e., partnering with other investors, usually in a dedicated fund, for venture investments). The large pool of resources behind CVCs is a powerful 'ticket' to access these select partnerships, and some CVCs have consistently used it (Keil et.al., 2010). Despite that, most CVCs enter syndications with a high number of participants, lowering their risks, but also potential returns (Dushnitsky and Shapira, 2010). On the other hand, high-performing CVCs tend to invest in earlier-stage ventures, embracing risks with caution. This is intimately linked to compensation schemes based on incentives and performance pay, another managerial practice inherited from classic VC (Dushnitsky and Shapira, 2010).

Outcomes. Cluster 3, with the leading paper from Chemmanur et al. (2014), represents a remarkable change from the initial period. While before most studies were focused on the outcomes of CVC activities to incumbent firms, during this period the focus shifted toward the ventures. Overall, scholars here were trying to understand the different effects of receiving investments from CVCs and IVCs.

IVC-backed ventures are incentivized to boost growth from sales early on after investment, but there is no difference in employment growth (Bertoni et al., 2013). They also appear to be less sensitive to cash flow to maintain investments in their operations (Bertoni et al., 2010). On the other hand, CVC-backed ventures perform better in high-tech industries, which are more uncertain and require specialized complementary assets (Park and Steensma, 2012). Furthermore, it is noticeable how ventures with CVC backing present higher innovation outcomes, like patent count and citations, although being younger, riskier, and less profitable than IVC-backed ventures (Chemmanur et al., 2014). This performance gap in

innovation is reflected both by selection and nurturing effects, that is, corporations select ventures with greater innovative capabilities and boost them after investment, especially highly reputable CVCs (Park and Steensma, 2013). Not all corporate investing relationships achieve the same results though, and much of the benefit is attributed to partners that share strategic fit and CVCs with a greater tolerance for failure (Chemmanur et al., 2014; Ivanov and Xie, 2010).

2.5.5. Final period (2015-2019)

The final period of the analysis is marked by a significant change in how articles assemble, as bibliographic coupling analysis resulted in clusters that are mainly defined by their unity of analysis (Figure 8). We attribute this to the substantial increase in interest in the venture's perspective of CVC. Nonetheless, it is possible to observe that the three research streams (i.e., *Antecedents*, *Patterns*, and *Outcomes*) are still present during this period in both clusters.

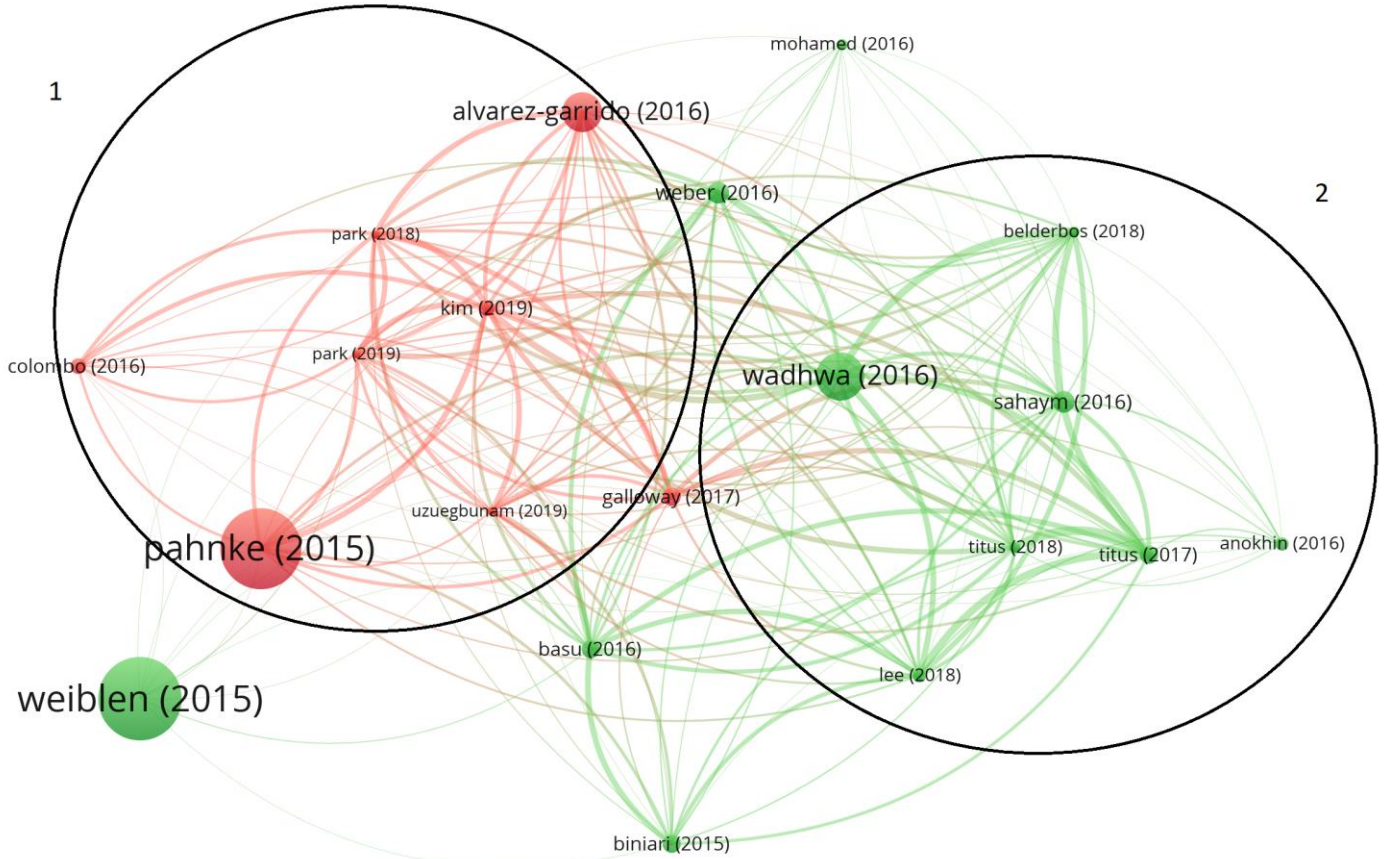

Figure 8 –. BC Cluster Analysis for Final Period (2015-2019)

Venture. The first cluster relates to articles that focus their analysis on the ventures, from which the most frequently cited are Pahnke, Katila, and Eisenhardt (2015). Much of the literature during this period drew on institutional theory to examine CVC from the venture perspective. To begin, there is greater recognition that different institutional context affects how entrepreneurs defend against misappropriation. In Europe, for instance, where the VC market is less developed than in the US, ventures have less bargaining power, so 'timing' and 'secrecy' defenses are diminished by high opportunity costs, while 'social' defense is reduced by a less dense VC syndication network (Colombo and Shafi, 2016). At the micro level, scholars proposed that incumbent firms differ in their opportunistic propensities, and as a result, social ties enable ventures to strongly repel opportunistic incumbents but also encourage ties with non-opportunistic ones (Kim et al., 2019).

In the US, where the VC market is stronger, technology-based ventures can often choose from different types of financing partners, like CVCs, IVCs, and the Government. But these options differ widely on the institutional logic they operate. Extensive evidence shows that CVCs and Government nurture better their investees when it comes to R&D outcomes, like patents and copyrights, but fail on innovation outcomes, like trademarks and product launches, where IVCs take the lead (Alvarez-Garrido and Dushnitsky, 2016; Pahnke et al., 2015; Uzuegbunam et al., 2019). One possible explanation is a lack of interest by some corporate investors to develop the venture's marketing capabilities, keeping them as extended R&D departments (Uzuegbunam et al., 2019). So, while IVC-backed ventures seek exploitative options for market insertion and growth, CVC-backed ventures are more prone to develop exploration activities related to R&D. This process is even more intense when the venture's founders hold on to their equity and come from a technology background (Galloway et al., 2017). Considering this dichotomy, ventures that manage to balance their partners, taking part in IVC and CVC investing together, witness better results (Park and Bae, 2018).

Corporate. The second cluster identified for this period constitutes articles that take the corporate perspective of CVC. The most cited article is from Weiblen and Chesbrough (2015). We see further support for CVC as the preferred external venturing mode for external learning in highly competitive markets, especially when given enough autonomy (Lee et al., 2018; Titus, House, and Covin, 2017).

There is an increase in interest in individual-level antecedents of CVC for firms. Studies show that boards and top management teams (TMT) that have more "skin in the game", that is, that are highly committed to corporate long-term results through equity stakes or multiple mandates, support risker investment and positively influence CVC adoption. On the other hand, institutional ownership is negatively related to CVC activities, which could be a result of risk aversion (Anokhin et al., 2016). Additionally, CEO duality (when the CEO is simultaneously the chair of the board) is negatively related to CVC activities and TMT heterogeneity has an inverted U-shape relationship with it (Anokhin et al., 2016; Sahaym et al., 2016).

Regarding CVC patterns and outcomes, a new theory emerges from a broader understanding of how corporate and CVC managers negotiate to construct their venture logic, influenced by pressures from each other and the external environment (Biniari et al., 2015). At the same time, evidence is presented to support that firms that operate in a concentrated manner achieve better results, which is true either when dealing with internal operations (Titus and Anderson 2018) or with their investment practices. Specifically, CVC portfolio diversity and geographical dispersion are positive to innovation performance only up to a certain threshold, after which external learning may suffer from redundancy and higher costs (Belderbos et al., 2018; Wadhwa et al., 2016).

Other practices, like syndication with IVCs, focusing on thematic areas or taking board seats on ventures have become more diffused among CVCs. At the same time, we got a glimpse into novel practices attributed to successful performers, like reducing complexity to fasten deal closure, protecting venture interests (safeguarding IP), early-stage investing (with subsequent follow-ons), developing collaborative blueprints for a firms-venture relationship, and collaborating with other business units in the corporation (Basu et. al., 2016). The practices that improve human relations and knowledge-sharing routines between parent firms and ventures should be the most promising (Weber et al., 2016).

On that matter, Weiblen and Chesbrough (2015) look at other emerging ways by which firms can benefit from relating with ventures. Some of them, like incubation and platform programs, are considered more agile for not involving equity stakes. The authors pose that equity-based models are not obsolete tough, as different approaches address different necessities.

2.5.6. CVC research Conceptual framework and Relevant Factors of influence

Based on the results of bibliographic coupling analysis and content review of the last 15 years of the literature on CVC, we developed a conceptual framework (Figure 9) of the thematic clusters that emerged and the factors that influence them. The cluster's themes are Antecedents, Patterns, and Outcomes on the vertical dimension, while Corporate and Venture on the horizontal dimension. The themes on the vertical dimension are the main research streams we identified and can be seen as subsequent stages in a CVC activities' lifecycle, while the two themes on the horizontal dimension are where scholars focus their attention when analyzing these stages.

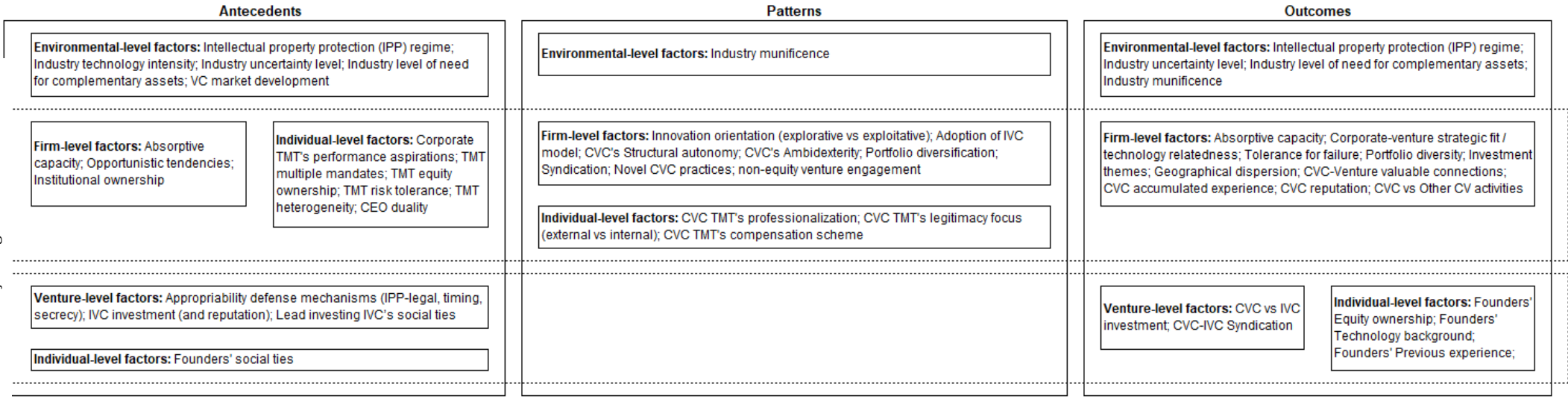

Figure 9 – Conceptual framework: CVC literature (Elaborated by author)

An important contribution from our study is to identify the relevant factors that influence each of the themes, how they evolved and group them by their level of analysis. An overview of the factors that emerged in the different periods can reveal how the literature has evolved through time and what are the most interesting subjects being discussed in recent years.

In the first period of our analysis, from 2005 to 2009, scholars were mainly focused on research streams related to *Antecedents* and *Outcomes* of CVC, with some work on *Patterns*. The relevant factors on *Antecedents* most discussed here were first on the environmental level, such as industries' Technology intensity, Uncertainty level and Need for complementary assets, and countries' Strength of IPP regime. At the firm level, Absorptive capacity was raised as important. These factors are all related to the attractiveness of CVC activity as a way for corporations to increase learning and competitiveness (Dushnitsky and Lenox, 2005; Fulghieri and Sevilir, 2009). Sometimes that learning comes due to firms appropriating ventures' technology, so the only venture-level factor raised in this period was the use of Defense mechanisms against misappropriation (Dushnitsky and Shaver, 2009; Katila et al., 2008). When it comes to *Patterns* of CVC, scholars focused on firm-level factors of Innovation orientation (explorative vs exploitative), debating which strategy would better apply to CVC units (Hill and Birkinshaw, 2008), and just how much of IVC's model and practices should CVCs adopt (Allen and Hevert, 2007; Hill et.al., 2009). On *Outcomes*, the relevant factors listed are the same as for *Antecedents* in the environmental level. As for firm-level factors, again Absorptive capacity is brought up (Benson and Ziedonis, 2009; Dushnitsky and Lenox 2005a) and two intertwined factors emerged: The degree of Valuable connections made between firms and ventures (Keil et al., 2008; Maula et al., 2009; Wadhwa and Kotha, 2006; Weber and Weber, 2007) and the Strategic fit, also referred to as technology relatedness or industry overlap, between both parties (Keil et. al., 2008a; Schildt et al., 2005; Weber and Weber, 2007). Also, some authors debate the effectiveness of CVC in increasing firms' learning, in comparison to other corporate venturing activities, such as alliances, joint ventures, and acquisitions (Narayanan et al., 2009; Schildt et al., 2005). Finally, CVC's Accumulated experience is too considered a relevant factor here (Yang et al., 2009).

In the second period, between 2010 and 2014, *Antecedents* related factors also include industry Technology intensity, at the environmental level (Sahaym et al., 2010; Tong and Li, 2011), and the Comparison with other CV activities (i.e., alliances), on the firm level (Dushnitsky and Lavie, 2010; Maula et al., 2013; Van de Vrande and Vanhaverbeke 2013). Emerging factors include corporate Top management team (TMT) aspirations (Gaba and Bhattacharya, 2012), one of the first individual-level factors reported, and the presence and reputation of IVC investment, at the venture level (Hallen et al., 2014). The period witnessed a significant rise in factors concerning CVC *Patterns* with CVC TMT's Compensation scheme (Dushnitsky and Shapira, 2010), Professionalization and Legitimacy focus (Souitaris et. al., 2012), at the individual level, and CVC's autonomy (Souitaris and Zerbinati, 2014), Ambidexterity (Hill and Birkinshaw, 2014), Portfolio diversification (Yang et.al., 2014) and Syndication (Dushnitsky and Shapira, 2010; Keil et.al., 2010), at the firm level. Meanwhile, new *Outcome* related factors include Tolerance for failure, in the firm level (Chemmanur et al., 2014) and Comparison between CVC vs IVC investment at the venture level (Bertoni et al., 2010; 2013; Chemmanur et al., 2014; Ivanov and Xie, 2010; Park and Steensma, 2012; 2013). This last factor shows how the literature begins to change the perspective from seeing CVC's outcomes only from a firm's point of view to starting to see it from the venture's one.

The last period (2015-2019) is marked by a boost in the interest in the venture's perspective of CVC and individual-level factors. Related to *Antecedents*, VC market development arrives as a relevant factor at the environmental level, affecting defense mechanisms against misappropriation (Colombo and Shafi, 2016). Furthermore, at the firm level, Opportunistic tendencies (Kim et al., 2019) and Institutional ownership (Anokhin et al., 2016) are studied for discouraging CVC investment formation, while on the venture level, lead investing IVC's social ties are considered when observing misappropriation defense mechanisms (Kim et al., 2019). Several factors emerge at the individual level: Ventures Founders' social ties to investing firms (Kim et al., 2019) are important for defense mechanisms; While Corporate CEO duality, TMT's "skin in the game" (Multiple mandates, Equity ownership, and Risk tolerance) and Heterogeneity are related to the adoption of CVC and investment formation (Anokhin et al., 2016; Sahaym et al., 2016). On

the stream concerning *Patterns* of CVC activities, Industry's munificence emerges as a factor on the environmental level, (Titus and Anderson, 2018). Simultaneously, on the firm level, Novel CVC practices are reported for firms to engage with their portfolio companies (Basu et. al., 2016; Weber et al., 2016). Particularly, Non-equity venture engagement ways are brought up as relevant to the CVC discussion (Weber et al., 2016). Finally, related to *Outcomes*, at the firm level, Portfolio diversity is again remembered in the context of not only portfolio companies but also investment themes and geographical dispersion (Belderbos et al., 2018; Titus and Anderson, 2018; Wadhwa et al., 2016). At the individual level, Founders' Equity ownership, Technology background, and Previous experience are related subjects of study (Galloway et al., 2017), while CVC-IVC Syndication is considered relevant at the venture level (Park and Bae, 2018).

Based on the Conceptual Framework and evolution of the most relevant factors in the CVC literature, we encountered several trends and gaps concerning the literature. We bring them to the discussion in the following section to inform future research.

2.6. Trends and Gaps for Future Research

Uprising of the venture point of view

It is possible to see that the corporation has been the center point in CVC research for most of the last 15 years. Of the 60 articles, only 17 had a venture-centered perspective of which half was published in the last 5 years. But the growing interest was enough to change the way the research is clustered recently. It seems that scholars are turning their eye to the ventures.

The effect of CVC investment on ventures' performance has become the preferred subject of study in the most recent period. Nonetheless, most of these studies have compared these effects solely based on investor type (CVC vs IVC). Only a few researchers deepen the analysis into different CVC investment patterns and their effects on venture outcomes, and when they do it is mostly regarding intra-industry investments, which relates to technological relatedness. Some remarkable exceptions are Maula et al. (2009) investigation on the impact of CVC-venture's social interactions and relationship safeguards on the venture`s learning benefits,

and Chemmanur et al. (2014) findings on CVC's tolerance for failure on the venture's innovation output.

On the other hand, several studies have examined different CVC patterns on the corporate firm's outcomes (Dushnitsky and Shapira, 2010; Hill and Birkinshaw, 2008; Yang et al., 2014). We propose that a promising path for future research includes more empirical investigation on different patterns (logics or practices) of CVC investments and their impacts on the venture's performance.

Uncovering the venture's ways

It is also noticeable how the literature targeted overwhelmingly more firm-level factors then venture-level ones. Other than appropriability defense mechanisms, we observed only a few factors on this level, such as the CVC vs IVC duality and Syndication. But what other factors may affect the venture's perspective of CVC investing?

For instance, is it safe to assume that all ventures relate to corporate investors in the same manner? We can see from studies related to the appropriability issue that this is not the case, in fact, entrepreneurs actively differ how they handle CVCs depending on their opportunistic behavior (Kim et al., 2019). We also know that ventures are attracted to corporate investors by much more than only capital commitment, but also complementary assets, easier access to consumers, and signaling properties (Park and Steensma, 2012; 2013). But how do different ventures see these advantages? It seems that we are a long way to understanding the venture's idiosyncrasies. Future research can reveal how ventures from different backgrounds, entrepreneurs, and with different necessities and aspirations, behave before and after entering an investment relationship with CVCs.

Swimming with sharks in different cultures

Another pressing issue is the geographical concentration of markets studied. From a total of 58 empirical articles, only 15 are from multiple countries or outside the United States. Although it is undoubtedly the origin of the model and still the most active venture capital market in the world, other economies see growing activity, and the lack of greater institutional variety may put in question the generalization of the findings.

One topic we believe deserves special attention for research in different settings is the use of defense mechanisms by ventures against technological appropriability, since it is closely related to the regulatory context of the country in which they are inserted and cultural aspects concerning trust and opportunistic behavior (Hallen et al., 2014; Katila et al., 2008; Kim et al., 2019; Masulis and Nahata, 2009). Colombo and Shafi (2016) make a significant contribution towards extending this research, by taking it to the European environment. Nonetheless, we believe there is a great opportunity in expanding it to emerging economies with possibly weaker IPP regimes, different legal and regulatory contexts, and increased government involvement.

Different venturing experiences

Despite the increasing number of studies regarding the interaction of CVCs with IVCs, in areas such as investment syndication, we see little work on the joint effects of other types of venture investors, like Angel investors, Crowdfunding, Accelerators, and Government on CVCs. It is vital to understand the influence of these actors, as the growing options available to entrepreneurs will give them more bargaining power in selecting and managing investors (Drover et al., 2017). Also, we see that Corporations are trying to bring new ventures into their umbrellas, not always in ways that involve equity investments. Therefore, we believe it will be increasingly important to understand how activities like Alliances, Hackathons, Incubation, Acceleration, and others, relate to CVC and affect ventures and incumbents (Titus et al., 2017; Weiblen and Chesbrough, 2015).

2.7. Conclusion

This article has conducted a systematic review of the Corporate Venture Capital literature in a two-step approach. First, we looked for the research streams that guided the literature for the last 15 years and how they developed in time. Using the bibliographic coupling technique, we encountered five main themes (i.e., Antecedents, Patterns, Outcomes, Corporate, and Ventures) with a major shift in the last period. We attribute this shift to the increasing interest in the academy for the entrepreneurial venture perspective of CVC. Subsequently, we conducted a content review of the articles in the sample to scout the factors that emerged from

the research streams. The result is a conceptual framework of the thematic clusters that guided the literature and the factors that influence each of them, categorized by their levels. Finally, we discussed trends and gaps in the literature to inform future researchers in the area.

Our results do not come without limitations. Methodologically, the clustering applied by the visualization of similarities (VOS) technique results in somewhat fluid boundaries, with articles not addressing exclusively just one of the themes. The BC analysis also suffers from drawbacks. It relies on citation data but is not able to say why a particular reference is cited in the first place. Therefore, it is assumed that studies that cite common references are related. To minimize this issue, we employed a qualitative analysis and took the liberty to adjust clustering when found necessary, but that is somewhat of a subjective effort. Significantly, the sample selection parameters and the restriction to include only 20 articles per period narrow the view, although allowing for more careful qualitative analysis. Despite these shortcomings, we understand that the dataset under review is not segregated from the broader literature and makes several references to colleagues' works, which grants reviewers a more holistic understanding.

Aware of these limitations, we believe our results contribute to a more consistent overview of the CVC literature. Also, the Conceptual Framework should help corporate executives, CVC managers, and entrepreneurs to navigate their interactions, and understanding the factors that affect that relationship. Finally, we believe academics and future research will also benefit from the identification of the relevant factors of the CVC literature, how they evolved, and the trends and research gaps that arise.

3 Second Article – Assessing the Finance Escalator paradigm: The comparative effects of different entrepreneurial equity financing sources on seed and early-stage ventures.

3.1. Abstract

The “finance escalator” is a paradigm long entrenched in Entrepreneurial Equity Finance research, by which ventures would have to go through “milestone investments" at an early stage before getting to an Independent Venture Capital. Nonetheless, there is little investigation on the comparative effects of different investor types on the ventures at this stage. We investigate these effects on US-based ventures and find that IVCs perform better not only in exit-related outcomes but also in securing further funding, a crucial goal at early-stage. Also, the poor performance of alternative investors disputes the “milestone” effect.

Keywords: Finance escalator; Entrepreneurship finance; Venture Capital; Corporate Venture Capital; Accelerator; Angel Group.

3.2. Introduction

The topic of Entrepreneurial Equity Finance (EEF) encompasses a variety of sources of capital for new ventures, including support from Family and Friends, Crowdfunding, Angels, and Angel Groups (AG), Incubators, Accelerators, Government grants, Independent Venture Capital (IVC), Corporate Venture Capital (CVC), and others (Cumming and Groh, 2018; Cumming et al., 2019; Drover et al., 2017). These providers of funding have been traditionally seen as complementary in a startup's financial growth cycle and researchers usually study them separately, as if belonging to different stages in that cycle (Berger and Udell, 1998). The notion of a "finance escalator" suggests that to get, for instance, to an IVC investment, a venture would most likely have to find previous funding from investors like Angels

and Accelerators (Berger and Udell, 1998; Cumming et al., 2019). However, with the rising interest by investors in early-stage companies and the movement by corporations to build investment arms aiming at nascent technological ventures, this segment has been ever more crowded, sparking disputes among different investors (Bonini et al., 2019; Hellmann and Thiele, 2015). Particularly when considering seed and early-stage investing (the first rounds of funding that a startup would receive from institutional investors), the last decade has experienced a new level of competition in the venture capital (VC) industry with a steady rise in deal sizes, valuations, and (younger) company ages. In 2019, seed and early-stage investments represented 76% of the total deal count and nearly 40% of the total capital deployed by the VC industry in the United States (National Venture Capital Association Yearbook, 2020).

However, the complexity of the venture capital ecosystem is not reflected in the literature, which is predominantly focused on traditional IVCs and to a lesser stand on CVCs, for which interest grew considerably only since 2005, despite more than 30 years of academic research on the VC industry (Drover et al., 2017). For investors like Business Angels and Accelerators, the available literature is much more recent, with most of the work published in the last five years (Crisan et al., 2019; Drover et al., 2017). This in part reflects how novel these types of organizations are – the first reported venture Accelerator, Y combinator, was founded in 2005, and its principal counterpart, Techstars, is from 2007 – but also the difficulties of researching into the earliest stages of venture investing, which is sometimes referred to as "informal venture capital" (Cavallo et al., 2019; Cohen et al., 2019). Fortunately, with the growing organization of angel investors in Business Angel Networks (BANs) and Angel Groups (AGs), to provide support and formal processes among its members, researchers have been able to further explore the subject (Bonini et al., 2019; Cavallo et al., 2019; Kerr et al., 2014).

Recent empirical studies have reported conflicting results concerning the performance of ventures backed by Angel Groups (Bonini et al., 2019; Cumming and Zhang, 2019; Dutta and Folta, 2016; Kerr et al., 2014) and Accelerators (Choi and Kim, 2018; Gonzalez-Uribe and Leatherbee, 2018; Yu, 2020), casting doubt on their roles as milestones in the financial growth cycle. Meanwhile, the research on CVC has focused on R&D and innovation outcomes, and not enough on the growth

and investment success of their portfolio companies, despite notes on its propensity for investing in earlier stages (Chemmanur et al., 2014; Ivanov and Xie, 2010; Uzuegbunam et al., 2019). These issues have driven researchers to call for new studies considering a scenario in which ventures are influenced by multiple types of investors, sometimes in mixed syndications, that is when a group of diverse investor types participates in a round (Bonini and Capizzi, 2019; Cumming et al., 2019; Drover et al., 2017).

This study aims to address those gaps and provide an analysis of the effects of a more competitive and multi-faced EEF environment on seed and early-stage ventures' performance. We investigate how different types of early-stage investors perform relative to traditional IVCs in various success measures achieved by their investees. To answer this question, we analyzed US-based ventures that received their first investment round between 2005 and 2016. Our findings indicate that seed and early-stage ventures backed by IVCs achieved better results than alternative EEF sources not only in exit-related measures but also in securing further funding, an important early-stage goal. At the same time, Angel Groups and Accelerators performed poorly on all those measures. This directly contradicts the “milestone” effect expected from these investors and raises questions on the validity of some aspects of the "finance escalator" paradigm. We also encounter nuances that affect the performance of CVCs, such as their previous experience and their syndication with IVCs.

3.3. Literature Review

Entrepreneurial equity finance relates to the mechanisms by which young and often innovative ventures secure funding to put forward their ideas into product development and market entry (Cumming et al., 2019). It encompasses several external equity provider types, but empirical research has focused mainly on Independent Venture Capital (IVC) firms and, to a lesser stand, on their corporate counterparts (CVC). It was not until recently that the interest grew toward newer investor categories like Incubators, Accelerators, and Crowdfunding, as also new organization modes of existent investors, like Angel Groups (Crisan et al. 2019; Drover et al., 2017). A major similarity between these investors is that they operate in the seed and early stages of entrepreneurial funding, a segment that has only in

the last decade caught the attention of organized investors and academic researchers (Cavallo et al., 2019; Kerr et al., 2014). This interest also signals how competitive the early VC market has become for investors looking for investments with high potential returns (Bonini and Capizzi, 2019).

3.3.1. The different Entrepreneurial Equity Finance sources

Independent Venture Capital (IVC)

IVC firms are professional, institutional managers of risk capital that invest and support innovative and promising entrepreneurial ventures. They usually operate with dedicated fund structures in a limited liability partnership model, raising capital from third-party investors (e.g., Pension funds, previous successful entrepreneurs, and high-net-worth families) (NVCA, 2022). These funds have a limited lifespan, usually ranging from 8 to 12 years, until all investments must be terminated, and the returns are distributed to the partners. Their investments are made in private companies (with no formal secondary market available to exchange their stock) with hopes that the company will mature and become valuable to a future buyer. Additional funding is generally required through follow-on investment "rounds" until that happens. Also, these investors traditionally expect a small number of their portfolio companies to give significant returns, compensating for the failure of many others (Gompers and Lerner, 2001). Such returns are often realized when those companies succeed in entering the public capital markets by issuing an initial public offering (IPO) or being acquired by a larger investor, like an incumbent competitor or a private equity firm. It is said that the investor had a successful exit when that happens (Cumming, 2008; Gompers and Lerner, 2001).

Corporate Venture Capital (CVC)

Corporate venture capital (CVC) is the activity by which an incumbent firm (corporation) invests in independent entrepreneurial ventures, through a designated investment arm (Dushnitsky and Lenox, 2005). They differ from IVCs in the way they are structured and the objectives they seek. While the traditional IVC relies on a segregated investment fund structure, with professional management and a defined mandate with a limited lifespan, most CVCs are structured as corporate subsidiaries, with the degree of autonomy varying from case to case and indefinite

duration (Gompers and Lerner, 2000, 2001; Chesbrough, 2002). Corporate investment arms also hold mandates that outreach the financial returns from their portfolio companies, since many of them share the purpose of strengthening their corporate mothers standing business (Dushnitsky and Lenox, 2005). Many studies examined the agency problem created by this double mandate, like opportunistic incumbents trying to appropriate technology and market insights from their portfolio companies for their own benefit (Hallen et al., 2014; Katila et al., 2008; Kim et al., 2019).

Angel Groups

Angel investors are usually wealthy individuals that make personal private investments in venture companies, mostly in their seed and early stages (Kerr et al., 2014). Despite angels being arguably one of the most widespread sources of capital for startups in their earliest stages, researchers long faced difficulties in identifying their operations. That is why since the growth of Angel Groups, in the mid-1990s, several decided to focus on them instead (Bonini et al., 2019; Cavallo et al., 2019; Kerr et al., 2014). AGs are congregations of several individual investors that choose to invest together, following some common rules. They offer various benefits for angels, like raising larger amounts of capital for each investment; increasing the formalization of investment processes; facilitating diversification, since each angel can participate with smaller investments in a greater number of ventures; diluting due diligence and selection costs; increasing visibility and attractiveness for ventures; and benefiting from multiple opinions in investment decisions, sometimes from more skilled and reputable angels (Cumming and Zhang, 2019; Kerr et al., 2014).

Accelerators

Accelerators are organizations that help entrepreneurs define and build their ventures by guiding them in the development of their products and business model, while also securing resources like capital and employees (Cohen et al., 2019). Originally presented as a kind of Incubator, the Accelerator differs in the way they provide ventures with a much shorter period of support programs (usually about 3 months), less focused on providing physical resources and office space, but more

on encouraging business development, providing networking opportunities and offering financial support (funding) (Cohen et al., 2019; Crisan et al., 2019). With the first accelerators founded some 15 years ago, (i.e., Y Combinator, in 2005) research on this type of organization is the least developed stream of the EEF literature (Crisan et al., 2019).

3.3.2. The mechanisms for differentiated performance of EEF sources on ventures outcomes

Mechanisms for IVCs improved performance

Independent Venture Capitalists create and capture value for ventures in two major ways: selecting the most promising industries and ventures, through screening and due diligence activities, and providing their portfolio companies with value-added services beyond the invested capital (Baum and Silverman, 2004; Gompers and Lerner, 2001; Hellmann and Puri, 2002). IVCs are considered the gold-standard organizational structure for investing in young high-technology ventures due to the mechanisms they have developed to cope with information asymmetries and higher agency costs, such as convertible ownership contracts, aligned compensation schemes for managers, participation in the board of directors, staging investments in subsequent rounds, and syndication with groups of investors, among others (Brander et al., 2002; Gompers, 1995; Gompers and Lerner, 2001; Hellmann and Puri, 2002).

Agency costs increase with assets' intangibility, specificity, and increasing growth options attributes common to new technology industries (Gompers, 1995). In this type of setting, it is difficult for investors to keep track of the entrepreneur's decisions, which might seek to benefit their personal interest in jeopardy of other shareholders. To cope with that, IVCs monitor entrepreneurs with increased frequency and make capital commitments in a sequential manner, while adjusting their knowledge and expectations for the portfolio company. They also establish flexible convertible contracts which give them the option to formalize a minority stake in the company, while preventing any legal risks if things go wrong (Gompers, 1995).

Venture capitalist managers are the main ingredient in the VC model. They usually have previous technology or industry-specific background in their careers

and are prone to keep close relationships with experts, while following technology and market development to make good investment decisions (Hellmann and Puri, 2002). They also keep close relationships with their portfolio companies, sometimes taking on a role in their board of directors, to better understand, monitor and influence decisions (Gompers and Lerner, 2001). These managers are personally invested in the successful outcome of their funds' investments since their compensation is greatly impacted by performance fees. Also, they must sustain an impressive track record to keep being able to raise funds. This incentive-based mentality largely contrasts with other investor types, like CVCs, where key personnel are usually compensated in line with corporate standards and don't share the same ability to raise future funds (Dushnitsky and Shapira, 2010).

To obtain significant financial returns and improve their track record, IVCs turn to the most profitable opportunity to exit their investment. Typically, the preferred choice is to issue the portfolio companies' shares in the public market, through an initial public offering (IPO) (Gompers and Lerner, 2001). To do that, IVCs greatly push ventures to grow their operations and revenues as quickly as possible, since these are desirable attributes by stock market investors interested in IPOs. As a result, IVCs investments are largely associated with a boost in market-related outcomes like the introduction of stock option plans, hiring of key employees on sales and marketing, and reduction in the time to bring a product to market (Hellmann and Puri, 2000; 2002).

Alternative EEF investment practices and their performance implications

Corporate Venture Capital has been associated with boosting R&D-related outcomes, like the number of patents, citations, and scientific publications, while not being as effective in boosting market innovation outcomes, like trademarks and product launches, where IVCs take the lead (Alvarez-Garrido and Dushnitsky, 2016; Chemmanur et al., 2014; Pahnke et al., 2015; Uzuegbunam et al., 2019). One explanation for this effect is a possible interest by corporations in keeping ventures as extended R&D departments, to benefit their operations, without really developing their go-to-market capabilities (Uzuegbunam et al., 2019). Likewise, IVC-backed ventures, more than their CVC-backed counterparts, are incentivized to grow sales immediately after investment (Bertoni et al., 2013). Some of CVCs'

features, like their less performance-driven compensation schemes, industry and technology expertise from the incumbent company, and no predefined time horizon for investments (in contrast to IVCs) enable them to provide great support for technological development while being more tolerant towards failure from their portfolio companies (Chemmanur et al., 2014). But the same characteristics, aligned with the incentives they carry from corporate goals, make them less pushy for rapid growth in the ventures they invest in (Uzuegbunam et al., 2019).

Despite these differences, IVC and CVC managers share the fact that they make decisions on third parties' capital (from passive investors or parent corporations). Angel investors, on the other hand, are principal to their investments and bear the downside risks of ventures' failures. Having to make decisions on their own limits Angels' ability to monitor their portfolio companies and lead the way to behavioral biases, more common among individual investors (Cumming and Zhang, 2019; Van Osnabrugge, 2000). Angel Groups and Business Angels' Networks (BANs) seek to reduce some of those biases, by increasing formalization and organization. For instance, being a part of a group has been shown to mitigate angel-specific limitations, like a post-investment hands-off approach and non-contractual-based monitoring (Bonini et al., 2018). Still, Angels suffer from bigger capital constraints and should be more risk averse than IVCs (Cumming and Zhang, 2019).

Hellmann and Thiele (2015) proposed that Angels and IVCs have interdependent relationships based on stage financing. In their theory, IVCs rely on Angels' seed investments to reach a late-stage round, but conflicts arise when IVCs dilute Angels' shares by making larger follow-on investments. This theory assumes that IVCs do not operate in seed and early stages, making Angels a "milestone" investment for ventures to reach higher scale rounds. This would explain why angel-backed companies performed poorly in getting to an IPO or acquisition in previous studies (Cumming and Zhang, 2019; Dutta and Folta, 2016). But it doesn't explain why they also underperformed when assessed by intermediary goals, like securing follow-on funding rounds (Kerr et al., 2014).

Like Angels, Accelerators also operate in the very early stages of a venture's investment cycle. But they hold a more particular role in guiding and validating ventures' business models in addition to investing. Therefore, the acceleration

process is expected to inform the entrepreneurs of their probability of success, allowing them to decide whether to continue or shut down the business early on. As a result, accelerator-backed ventures present a lower survival rate, when compared to IVCs (Yu, 2020). When reviewing 81 empirical studies that included venture-level outcomes from accelerators, Crisan et al. (2019) identified that (subsequent) funding was the most studied one with validation (product or idea) being the second.

Based on the previous research, we posit that IVC-backed ventures will outperform their counterparts on exit-related outcomes and growth through subsequent rounds of investment. Therefore, we propose the following hypothesis:

Hypothesis 1. Ventures funded by IVCs will achieve more successful exits by IPO than the ones funded by (a) CVCs, (b) AGs and (c) Accelerators.

Hypothesis 2. Ventures funded by IVCs will achieve more successful exits by Merger & Acquisition (M&A) than the ones funded by (a) CVCs, (b) AGs and (c) Accelerators.

Exit-related measures, like IPO and M&A, are the most used ones to evaluate the performance of EEF. However, they are criticized for not being best suited to evaluate early-stage investments, since it usually takes several years until a venture can achieve those goals (Bonini et al., 2019). Even so, Rosenbusch et al. (2013) meta-analytical review found that most empirical studies emphasize stock market-related performance measures (such as exits by IPO). Such an emphasis leads to a shortage of studies that focus on smaller and newer ventures, and that take different forms of funding into account (Rosenbusch et al., 2013). To better address the early-stage scenario, we add a hypothesis considering an extra performance measure, the securing of additional funding, to account for a nearer-term goal of young ventures. This measure has previously been used to evaluate the performance of ventures at this stage (Crisan et al., 2019).

Hypothesis 3. Ventures funded by IVCs will secure more subsequent funding than the ones funded by (a) CVCs, (b) AGs and (c) Accelerators.

Several reviews of empirical studies have also claimed that future investigations should include factors that have been proven significant in previous research (Rosenbusch et al., 2013). Attending that call, we control for two important

factors that have been found to play a role in the impact of EEF on the performance of investees: Investor's Previous Experience and Syndication.

Investor's Previous Experience effects

A large body of studies has demonstrated the relevance of investors' experience and reputation (essentially seen as proxies for one another) on the performance of their portfolio companies. More experienced and highly reputable IVCs respond to a disproportional share of the overall higher performance from these investors (Chemmanur et al., 2011; Fitza et al., 2009; Nahata, 2008; Sorensen, 2007). There are multiple arguments to justify this performance distinction. For one, having a reputable investor signal to other key stakeholders the quality and good prospects of the venture. Also, reputable investors make use of their extended network to benefit their portfolio companies, in cases like getting access to potential clients, helping with the recruitment of key personnel, and looking for M&A prospects (Hsu, 2004; Sorensen, 2007).

Naturally, these effects are also there for alternative investors in the VC market (Kerr et al., 2014; Park and Steensma, 2013). But it is important to note that the traditional VC structure was formed in the 1970s when regulatory changes boosted the inflow of capital to the industry, while the volume of CVC activity increased in the 1990s and Angel Groups and Accelerators have become more relevant only recently. Generally, then, IVC firms are older and more experienced, having been participants in more investment rounds than these competitors. It is reasonable to believe that a substantial amount of the effect these investors have on their ventures is linked to their previous experience. Therefore, when comparing different EEF sources on venture performance, we control for investors' previous experience.

Syndication effects

Syndication is when two or more institutional investors share an investment in an entrepreneurial company. There are several reasons for investors to syndicate. One is the value of a second opinion when selecting a risky project. Also, different actors can bring complementary contributions to the venture, like heterogeneous skills, information, industry expertise, and networks. And then, there are the risk-

sharing benefits of co-investing, since a smaller amount of capital commitment can minimize the downside (Brander et al., 2002; Tian, 2012). On the other hand, research on syndication has often been done under the assumption that the participants share homogeneous preferences and goals for their ventures. But when dealing with syndications composed of different types of VC investors (mixed syndications), the interests are not necessarily aligned. Multiple agency theory posits that firms deal with multiple principals that sometimes speak with "conflicting voices", affecting firm behavior and ultimately its' performance (Arthurs et al., 2008; Hoskisson et al., 2002). Therefore, when comparing different EEF sources on venture performance, we control for mixed syndication between IVCs and alternative investors.

To summarize our hypotheses, we propose a theoretical model (Figure 10) for the expected relationships between our investor types and ventures' performance measures based on the previous literature.

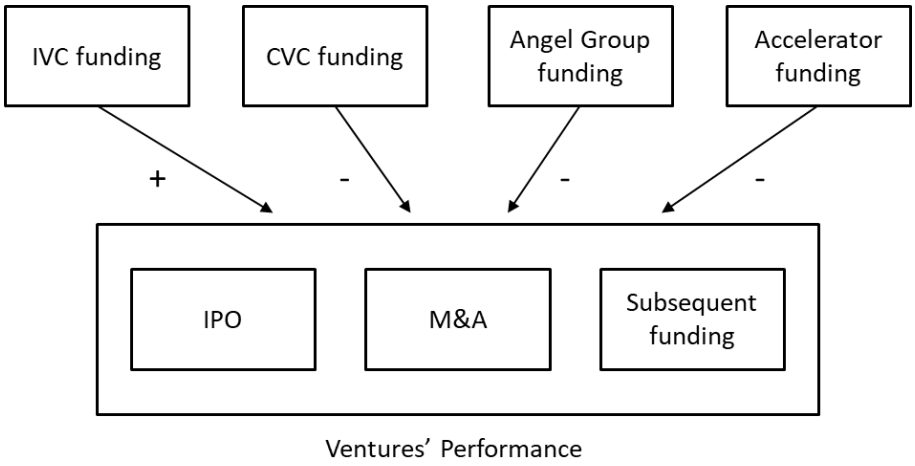

Figure 10 – Theoretical model

3.4. Research method

3.4.1. Data source and sample selection

To test the proposed hypothesis, we collected data for US-based VC investments between 2000 and 2019, from Thompson Reuters Eikon. The initial population was comprised of 227.518 investor-venture dyads (any single round is

usually represented by more than a single dyad, therefore composing syndicates), 93.258 investment rounds in 35.208 ventures. We used the Crunchbase database to verify Accelerators and Angel group's identity and correct misclassifications. Missing or undisclosed investor names (for all investor types) had their attributed investor types removed, as their correct classifications were not verifiable. Also, data with undisclosed equity amount and/or undisclosed company age at the investment round were dropped. We then narrowed the sample to the first investment round of each company, to focus on seed and early-stage funding only. Finally, we limited our timeframe to twelve years from 2005 to 2016. The reason for doing so was first to set equal grounds of comparison for Accelerators, which reportedly began as a consolidated investor organization in 2005 (Crisan et al., 2019), and to establish a 3-year out-of-sample window to observe the effects of investments. Our final sample consisted of 13.098 ventures.

3.4.2. Variables and statistical analysis

Our dependent variables are three dummies for (1) E*xit by IPO*, (2) *Exit by M&A*, and (3) A*chievement of subsequent funding over the $ 1 million mark*. Also, we employ an additional measure for (4) *Total subsequent funding, conditional on surpassing the $ 1 million mark*. The reason for segregating subsequent funding into two variables is that a large portion (approximately 45%) of companies never successfully secure further funding after their first investment. Failing to achieve such a mark can be interpreted as a failure for a venture in the VC market. So, while the third dependent variable measures the ability of the venture not to prematurely fail, the fourth measures how successful it ultimately becomes. Altogether, we expect these different outcome variables to better project the performance of seed and early-stage ventures than anyone isolated.

The independent variables of interest are dummies for the presence of each type of funding investor (i.e., *IVC, CVC, Angel Group,* and *Accelerator*). As highlighted in the literature review, we also add the control variables: *Natural log of Previous experience*, measured by the count of previous investment rounds by the most experienced investing firm of each type in the ventures' first round, and dummies for the presence of *Mixed-syndication* between IVC-CVC, IVC-AG, and IVC-Accelerator in their respective comparison models.

The EEF research pays particular attention to endogeneity issues when accessing investment outcomes (Nahata, 2008; Sorensen, 2007). The concern is that omitted variables may affect a venture's probability of receiving a particular type of funding while also influencing their chances of getting to a successful exit or receiving subsequent funding (Sorensen, 2007). To address that problem, we adopted an instrumental variable (IV) approach which consists of a two-stage logistic (2SL) estimation method for our binary dependent variables and a logistic-OLS method for our continuous dependent variable. In the first stage, the endogenous regressors (which are the dummies for the presence of each type of funding investor and their mixed syndications) are regressed on the chosen instrumental variables, controlling for self-selection effects. Afterward, the resulting fitted probabilities are used in the second-stage regression (for the dependent variables) together with the control variables. This approach is similar to the two-stage least squares approach described by Bascle (2008), the most commonly used IV estimator.

The instrumental variables used in the first-stage equation are (1) *the Natural log of company age at financing (in months)*, (2) *the Natural log of number of firms (investors) in the investment round*, (3) *the Natural log of the disclosed equity amount invested in the round*; (4) *Investment round year*, (5) *Company nation*, and (6) *TRBC (The Refinitiv Business Classification) industry group*.

3.5. Empirical Results

In this session, we present the results of the analysis of the different EEF effects on ventures' performance. Table 3, Panel A presents the descriptive statistics for the continuous variables. The average amount of capital raised by ventures in their first round was about $ 11 million and after this stage was about $ 28 million. It is noteworthy, in the following panel, that almost half the ventures never secured further funding over $ 1 million. The average age at first financing was about 56 months and the number of firms in these rounds averaged 1,78. Looking at previous experience, we can see that IVCs stand out among other investor types for having substantially higher numbers, measured in rounds of investment. Despite being largely inferior to IVCs, Corporate investors also presented a higher number of previous rounds than Accelerators and AGs. That's expected since those are the

more traditional investors in VC. Also, we report skewness statistics that show highly distorted distributions for our continuous variables. This is somewhat expected when dealing with this type of variable, so we use natural logarithmic transformations when applying them to our analyses.

Table 3, Panel B shows the frequencies for valid cases among our dichotomous variables. First and foremost, we can see the discrepancies between the different success measures. From the sample of 13.098 ventures, only 5,1% achieved an IPO, while a substantially higher amount (26%) got acquired or merged, and roughly 55% raised subsequent capital (over $ 1 million) after the first investment. We also can see how IVC is the predominant source of capital for ventures in this stage, with 77,8% of ventures getting funding from it, while CVC got about 7%, and Angel Groups and Accelerators about 5% each. These numbers represent all valid cases for each investor, including pure and mixed rounds. Mixed syndication with IVCs is present in approximately 60% of all CVC-backed ventures, while 30% for AG-backed ones and 50% for accelerator-backed ones. An early interpretation of the data indicates that CVCs and Accelerators are more closely related to IVCs than AGs.

Table 3 – Descriptive Statistics

Panel A. Descriptive statistics for continuous variables

	Mean	*SD*	*Skewness*
Total subsequent funding (US$)	27.915.657,55	107.072.640,14	25,11
Company age at financing (months)	56,42	100,30	6,85
Number of firms in investment round (units)	1,78	1,20	2,17
Equity amount disclosed (US$)	10.843.897,95	133.425.027,20	61,30
Previous Experience IVC (rounds)	365,08	645,60	4,24
Previous Experience CVC (rounds)	22,34	158,41	9,51
Previous Experience Angel Group (rounds)	3,09	22,57	9,04
Previous Experience Accelerator (rounds)	6,82	139,09	102,16

Panel B. Frequencies for dichotomous variables

	Valid cases	*% of total*
Company exits by IPO	673	5,10%
Company exits by M&A	3.404	26,00%

Company achieved subsequent funding (over $ 1 million)	7.270	55,50%
Funding by IVC	10.189	77,80%
Funding by CVC	951	7,30%
Funding by Angel Group	541	4,10%
Funding by Accelerator	711	5,40%
Mixed-syndication IVC x CVC	567	4,30%
Mixed-syndication IVC x Angel Group	171	1,30%
Mixed-syndication IVC x Accelerator	359	2,70%

This table reports descriptive statistics for the sample of 13.098 VC-backed ventures who received their first investment round between 2005 and 2016.

Table 4 presents Pearson's correlations between each pair of variables. We can see that our dependent variables of interest, here represented by the first four items, are positively correlated with IVC funding, while generally not significantly related to CVC and negatively related to both AGs and Accelerators. This is consistent with our hypothesis. The same relationships are observed for the Previous experience control variables for each investor type employed, except for Accelerators' experience which displayed no significant correlations with the dependent variables. Meanwhile, the mixed-syndication variables presented diverse effects, with IVC-CVC positive for subsequent funding while the IVC-Accelerator negative for exits by IPO and M&A. The others show little effect on our dependent variables. When proceeding with the regression analysis, we also ran multicollinearity diagnosis and found no indications of multicollinearity among the variables used, except for those expected between mixed-syndications and their respective investor types (e.g., between IVC-CVC mixed-syndication and the dummy for CVC).

Table 4 – Correlation Matrix

	1	2	3	4	5	6	7	8	9
1. Company exit by IPO	1								
2. Company exit by M&A	-,138**	1							
3. Company achieved subsequent funding	,041**	,041**	1						
4. Total subsequent funding	,143**	-,042**	,233**	1					
5. Company age at financing	,073**	0,00	-,123**	-,053**	1				
6. No. of firms in investment round	-0,01	,052**	,176**	,081**	-,093**	1			
7. Equity Amount Disclosed	,027**	0,01	-,028**	0,01	,039**	-0,01	1		
8. Funding by IVC	,033**	,106**	,197**	,067**	-,025**	,268**	-0,02	1	
9. Funding by CVC	0,01	0,00	,030**	0,01	-0,01	,232**	0,00	-,122**	1
10. Funding by Angel Group	-,036**	-,045**	-,049**	-,034**	-,017*	,055**	-0,01	-,231**	-,033**
11. Funding by Accelerator	-,053**	-,051**	-0,01	-0,01	-,048**	,202**	-0,01	-,157**	-0,01
12. Mixed-syndication IVC x CVC	0,01	0,01	,067**	,021*	-,034**	,333**	0,00	,114**	,760**
13. Mixed-syndication IVC x Angel Group	-0,01	-0,01	0,00	-0,01	-,024**	,172**	-0,01	,061**	-0,02
14. Mixed-syndication IVC x Accelerator	-,037**	-,017*	,019*	0,00	-,038**	,342**	-0,01	,090**	,020*
15. Previous Experience IVC	,057**	,048**	,147**	,112**	-,052**	,199**	0,01	,302**	0,00
16. Previous Experience CVC	0,00	0,00	-0,01	0,00	0,01	,063**	0,00	-,109**	,504**
17. Previous Experience Angel Group	-,026**	-,039**	-,051**	-,025**	-0,01	-,022*	-0,01	-,207**	-,033**
18. Previous Experience Accelerator	-0,01	0,00	-0,01	0,00	-0,01	,039**	0,00	-,035**	0,00

**. Correlation is significant at the 0,01 level (2-tailed). *. Correlation is significant at the 0,05 level (2-tailed).

(continues)

	10	11	12	13	14	15	16	17	18
10. Funding by Angel Group	1								
11. Funding by Accelerator	-0,01	1							
12. Mixed-syndication IVC x CVC	-,033**	0,01	1						
13. Mixed-syndication IVC x Angel Group	,554**	,026**	0,00	1					
14. Mixed-syndication IVC x Accelerator	0,01	,701**	,049**	,055**	1				
15. Previous Experience IVC	-,099**	-,054**	,078**	-,032**	,018*	1			
16. Previous Experience CVC	-,022*	-0,01	,286**	-0,01	0,00	-0,02	1		
17. Previous Experience Angel Group	,659**	-,026**	-,025**	,164**	-0,02	-,068**	-0,01	1	
18. Previous Experience Accelerator	-0,01	,205**	0,00	0,00	,136**	-0,01	0,00	-0,01	1

**. Correlation is significant at the 0,01 level (2-tailed). *. Correlation is significant at the 0,05 level (2-tailed).

Table 5 presents the results for the first-stage logistic regression models. We can see that the instrumental variables that are most relevant for determining the type of investors to fund a venture are the Number of firms in the round and the Equity amount of the round. The latter is more important to differentiate the investor types, since it is expected that IVCs and CVCs would make bigger investments, while Angels and Accelerators smaller ones. Interestingly, IVCs funding was influenced by younger ventures, while Angel Groups by older ones, differently from what we would have expected.

Table 5 – First-stage Logistic Regression Models

	IVC	CVC	Angel Group	Accelerator	Mix IVC-CVC	Mix IVC-AG	Mix IVC-Accelerator
Constant	13,135	-23,508	-34,364	-10,192	-43,470	-31,874	-30,857
	(1,00)	(1,00)	(1,00)	(1,00)	(1,00)	(1,00)	(1,00)
Company Age	-0,143***	0,053	0,273***	-0,045	-0,028	0,305***	0,012
	(0,00)	(0,10)	(0,00)	(0,27)	(0,52)	(0,00)	(0,85)
Number of Firms in Investment Round	1,759***	1,466***	0,806***	1,787***	2,635***	2,762***	3,442***
	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)
Equity Amount Disclosed	0,398***	0,163***	-0,444***	-0,657***	0,234***	-0,550***	-0,543***
	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13.098	13.098	13.098	13.098	13.098	13.098	13.098
Pseudo-R square	0,29	0,16	0,15	0,31	0,32	0,27	0,46

This table reports the results of the first-stage logistic regression models for the independent variables. P-values are reported in parentheses. *** and ** indicate significance at the 1% and 5% levels, respectively.

Table 6 present the results of the second-stage logistic regression analysis of the different EEF effects on ventures' successful exit by IPOs. Models 1, 2, and 3 consist of regressions including the fitted probabilities of our independent variables of interest in a two-by-two comparison, IVC-CVC, IVC-AGs, and IVC-Accelerator, respectively. The results presented in table 6 agree with hypothesis 1. Funding by IVC is positively related to IPOs in all three models. This was even

when controlling for previous experience by IVC, which was also significant, consistent with previous studies that highlighted the role of funding from highly reputable IVCs on ventures going public (Chemmanur et al., 2011; Fitza et al., 2009; Nahata, 2008; Sorensen, 2007). CVC funding was not significant, supporting H1 (a), while both Angel Groups and Accelerators displayed a negative significant impact, supporting H1 (b and c). This impact was mitigated by mixed syndication with IVCs in the case of Accelerators, but not for CVCs and AGs.

Table 6 – Company exit by IPO

	(1)		(2)		(3)	
Constant	-22,034	(1,00)	-22,510	(1,00)	-21,701	(1,00)
Funding by IVC	1,138***	(0,01)	1,342***	(0,00)	1,633***	(0,00)
Previous Experience IVC	0,070***	(0,00)	0,060***	(0,00)	0,060***	(0,00)
Funding by CVC	2,103	(0,25)				
Previous Experience CVC	-0,015	(0,66)				
Mixed-syndication IVC x CVC	-0,503	(0,69)				
Funding by Angel Group			-12,718***	(0,00)		
Previous Experience Angel Group			-0,142	(0,21)		
Mixed-syndication IVC x Angel Group			-1,332	(0,64)		
Funding by Accelerator					-12,296***	(0,00)
Previous Experience Accelerator					-0,693**	(0,02)
Mixed-syndication IVC x Accelerator					5,789***	(0,01)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	13.096		13.096		13.096	
Pseudo-R square	0,22		0,20		0,21	

This table reports the results of logistic regression models for Successful exit by IPO. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Table 7 offers the results for the second-stage logistic regression analysis of the different EEF effects on ventures' successful exit by a Merger and Acquisition (M&A) deal. The results are similar to the previous table and confirm hypothesis 2. IVC again displayed a significant positive relationship in every model, while CVC did not present significant results, giving support to H2 (a). At the same time, both AGs and Accelerators had negative influences, supporting H2 (b and c). The results from the two tables confirm our belief that IVCs were unmatched by the alternative

investor types when it comes to getting their portfolio companies to exit-related goals.

Table 7 – Company exit by M&A

	(1)		(2)		(3)	
Constant	-25,132	(1,00)	-25,044	(1,00)	-24,894	(1,00)
Funding by IVC	1,922***	(0,00)	1,348***	(0,00)	1,457***	(0,00)
Previous Experience IVC	0,053***	(0,00)	0,043***	(0,00)	0,048***	(0,00)
Funding by CVC	-2,005	(0,11)				
Previous Experience CVC	0,018	(0,31)				
Mixed-syndication IVC x CVC	0,335	(0,71)				
Funding by Angel Group			-3,258***	(0,00)		
Previous Experience Angel Group			-0,084**	(0,02)		
Mixed-syndication IVC x Angel Group			0,219	(0,82)		
Funding by Accelerator					-1,512***	(0,01)
Previous Experience Accelerator					-0,021	(0,48)
Mixed-syndication IVC x Accelerator					0,712	(0,18)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	13.096		13.096		13.096	
Pseudo-R square	0,16		0,16		0,16	

This table reports the results of logistic regression models for Successful exit by M&A. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Table 8 shows the results for the second-stage logistic regression analysis of the different EEF effects on ventures' achievement of subsequent funding over the $ 1 million mark. In this analysis, we used a success measure targeted for early-stage ventures, so presumably one could expect new investor types, like AG and Accelerators, to increase their performance, compared to the two previous measures. The results, though, contradict that expectation, putting IVC investments in the front run again, with positive impacts in all three models, confirming hypothesis 3. Moreover, AGs and Accelerators again presented negative significant influences – confirming H3 (b and c), partially mitigated by previous experience in the case of Accelerators, which is consistent with the disparate performances previously observed for them (Gonzalez-Uribe and Leatherbee, 2018). These results lead us to interpret that the negative effect of Accelerators is reduced when

compared to AGs and that some Accelerator firms do positively influence ventures, especially the highly experienced ones. Finally, the findings for CVCs are interesting. While in the baseline scenario, the effect was negative, supporting H3 (a), the impact is mitigated for experienced CVCs and for the ones that choose to align with IVCs in syndications.

Table 8 – Company achieved subsequent funding over $ 1 million

	(1)		(2)		(3)	
Constant	19,900	(1,00)	19,815	(1,00)	19,926	(1,00)
Funding by IVC	2,921***	(0,00)	1,883***	(0,00)	2,217***	(0,00)
Previous Experience IVC	0,139***	(0,00)	0,130***	(0,00)	0,139***	(0,00)
Funding by CVC	-6,631***	(0,00)				
Previous Experience CVC	0,046***	(0,01)				
Mixed-syndication IVC x CVC	3,908***	(0,00)				
Funding by Angel Group			-4,682***	(0,00)		
Previous Experience Angel Group			-0,036	(0,18)		
Mixed-syndication IVC x Angel Group			0,067	(0,94)		
Funding by Accelerator					-1,370***	(0,00)
Previous Experience Accelerator					0,078***	(0,00)
Mixed-syndication IVC x Accelerator					-0,495	(0,24)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	13.096		13.096		13.096	
Pseudo-R square	0,18		0,18		0,18	

This table reports the results of logistic regression models for Successfully achieving subsequent funding of over $ 1 million. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Finally, Table 9 displays the results for the second-stage OLS linear regression analysis of the different EEF effects on ventures' total amount of subsequent funding conditional on surpassing the $ 1 million mark. The results are very similar to Table 8 and corroborate once again hypothesis 3 (a, b, and c). It is possible to say, then, that the superior performance of IVCs over alternative EEFs is not due only to the negative effects of those companies that failed to secure

further funding but also persist for those that manage to secure further rounds over $ 1 million. We can conclude that IVCs facilitate their portfolio companies not only to get to further rounds but also to achieve a higher total funding amount in their trajectory.

Table 9 – Company total subsequent funding

	(1)		(2)		(3)	
Constant	14,529	(0,00)	15,578	(0,00)	15,088	0,00
Funding by IVC	2,708***	(0,00)	1,638***	(0,00)	1,878***	(0,00)
Previous Experience IVC	0,098***	(0,00)	0,087***	(0,00)	0,094***	(0,00)
Funding by CVC	-5,660***	(0,00)				
Previous Experience CVC	0,028**	(0,03)				
Mixed-syndication IVC x CVC	3,279***	(0,00)				
Funding by Angel Group			-7,589***	(0,00)		
Previous Experience Angel Group			-0,059**	(0,02)		
Mixed-syndication IVC x Angel Group			1,165	(0,07)		
Funding by Accelerator					-3,835***	(0,00)
Previous Experience Accelerator					0,038**	(0,04)
Mixed-syndication IVC x Accelerator					1,613	(0,00)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	7.269		7.269		7.269	
Adjusted R square	0,15		0,13		0,15	

This table reports the results of logistic regression models for Total subsequent funding. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

3.6. Robustness Test

To evaluate the robustness of our results, we conducted Propensity Score Matching (PSM) analyses as a different method for addressing the endogeneity issues. The logic behind PSM is to construct balanced subsamples through matching cases based on a single propensity score of being selected. The score is built out of regressing the treatment variable on chosen covariates. We applied as covariates the same instrument variables used in the previous analyses, so the results for the selection models are the same in Table 5. Then, the probabilities of selection for each of the investor types were used to construct a subsample of

matching treatment and control cases for each of them. Note that the subsamples used in each PSM model will be smaller than our original sample of 13,096 ventures, as the number of ventures funded by alternative investor types is much lower.

Table 10 presents the results of PSM logistic regression analysis for different investors' effects on ventures' successful exit by IPO. The results don't corroborate the positive impact observed for IVCs in our original analysis. In none of the models IVCs or its high experience players displayed significant coefficients not supporting H1 (a, b, and c). But, in the second model AGs displayed a negative influence, which partially supports H1 (b).

Table 10 – Propensity Score Matching - Company successful exit by IPO

	PSM CVC		PSM AG		PSM AC	
Constant	2,299	(1,00)	-19,723	(1,00)	30,396	(1,00)
Funding by IVC	-0,733	(0,27)	-0,264	(0,81)	-1,048	(0,37)
Previous Experience IVC	0,099	(0,27)	0,033	(0,86)	0,154	(0,42)
Funding by CVC	-0,980	(0,16)				
Previous Experience CVC	0,153	(0,06)				
Mixed-syndication IVC x CVC	0,145	(0,82)				
Funding by Angel Group			-3,205**	(0,04)		
Previous Experience Angel Group			-0,060	(0,82)		
Mixed-syndication IVC x Angel Group			2,185	(0,09)		
Funding by Accelerator					-2,845	(0,12)
Previous Experience Accelerator					-0,804	(0,08)
Mixed-syndication IVC x Accelerator					1,771	(0,33)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	2.543		1.404		2.037	
Pseudo-R square	0,32		0,38		0,59	

This table reports the results of PSM logistic regression models for Successful exit by IPO. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Table 11 presents the results of PSM logistic regression analysis for different investors' effects on ventures' successful exit by M&A. The results also don't corroborate the base-line scenario observed for IVCs in our main analysis but show

a positive influence for the experienced ones in the first and second model. On the other hand, CVCs displayed a positive role here, disputing H2 (a). H2 (b and c) were not supported in this analysis.

Table 11 – Propensity Score Matching - Company successful exit by M&A

	PSM CVC		PSM AG		PSM AC	
Constant	-43,821	(1,00)	-19,833	(1,00)	-20,607	(1,00)
Funding by IVC	-0,403	(0,21)	-0,851	(0,07)	-0,695	(0,07)
Previous Experience IVC	0,094**	(0,02)	0,172***	(0,01)	0,081	(0,10)
Funding by CVC	0,773**	(0,02)				
Previous Experience CVC	-0,050	(0,16)				
Mixed-syndication IVC x CVC	0,043	(0,89)				
Funding by Angel Group			-0,317	(0,53)		
Previous Experience Angel Group			-0,113	(0,13)		
Mixed-syndication IVC x Angel Group			0,665	(0,13)		
Funding by Accelerator					-0,692	(0,08)
Previous Experience Accelerator					-0,042	(0,44)
Mixed-syndication IVC x Accelerator					1,362***	(0,00)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	2.543		1.404		2.037	
Pseudo-R square	0,19		0,20		0,19	

This table reports the results of PSM logistic regression models for Successful exit by M&A. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Table 12 shows the results of the PSM logistic regression analysis for different investors' effects on ventures' successfully achieving subsequent funding over the $1 million mark. Also like in the previous table, the base-line funding from IVC have not shown significance, failing to support H3 (a, b, and c). But in this case, all the three models displayed positive influence from high-experienced IVCs.

Table 12 – Propensity Score Matching - Successfully achieved subsequent funding over $ 1 million

	PSM CVC		PSM AG		PSM AC	
Constant	-1,830	(1,00)	-20,313	(1,00)	1,762	(1,00)
Funding by IVC	0,291	(0,16)	0,161	(0,57)	0,196	(0,42)

Previous Experience IVC	0,122***	(0,00)	0,141***	(0,00)	0,141***	(0,00)
Funding by CVC	-0,090	(0,69)				
Previous Experience CVC	0,041	(0,18)				
Mixed-syndication IVC x CVC	0,091	(0,65)				
Funding by Angel Group			0,011	(0,97)		
Previous Experience Angel Group			-0,058	(0,25)		
Mixed-syndication IVC x Angel Group			0,053	(0,85)		
Funding by Accelerator					-0,145	(0,58)
Previous Experience Accelerator					0,066	(0,07)
Mixed-syndication IVC x Accelerator					-0,062	(0,79)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	2.543		1.404		2.037	
Pseudo-R square	0,23		0,21		0,19	

This table reports the results of PSM logistic regression models for Successfully achieving subsequent funding of over $ 1 million. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Lastly, Table 13 presents the results of the PSM OLS regression analysis for different investors' effects on ventures' total amount of subsequent funding conditional on surpassing the $ 1 million mark. IVCs have also not displayed significant influence in general funding for this outcome variable, but positive influence for its high-experience cases. CVCs, on the other hand, demonstrated positive impact here, disputing H3 (a). Note that the number of cases was further reduced here due to the condition of having achieved subsequent rounds surpassing the $ 1 million mark. Overall, the results for the robustness tests further emphasized the importance of IVCs' previous experience to their invested ventures' performance.

Table 13 – Propensity Score Matching - Company total subsequent funding

	PSM CVC		PSM AG		PSM AC	
Constant	15,745	0,00	15,621	0,00	15,975	0,00
Funding by IVC	0,137	(0,46)	0,310	(0,21)	-0,039	(0,86)
Previous Experience IVC	0,157***	(0,00)	0,124***	(0,00)	0,161***	(0,00)

Funding by CVC	0,677***	(0,00)				
Previous Experience CVC	0,061**	(0,02)				
Mixed-syndication IVC x CVC	-0,709***	(0,00)				
Funding by Angel Group			0,360	(0,23)		
Previous Experience Angel Group			0,011	(0,81)		
Mixed-syndication IVC x Angel Group			-0,514**	(0,04)		
Funding by Accelerator					-0,039	(0,88)
Previous Experience Accelerator					-0,033	(0,34)
Mixed-syndication IVC x Accelerator					-0,086	(0,70)
Year dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Observations	1.230		596		878	
Adjusted R square	0,12		0,19		0,13	

This table reports the results of PSM logistic regression models for Total subsequent funding. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

3.7. Discussion

The results from our analysis of US-based ventures that received their first investment round between 2005 and 2016 corroborate, in the seed and early stages, the previously established dominance of IVC in later stages (Rosenbusch et al., 2013). We have identified that IVC-backed ventures performed better not only in exit-related measures, like going public or being part of an M&A deal but also in achieving subsequent funding, a crucial objective for any startup seeking to grow with the backing of the VC industry. These results, together with the pervasiveness of IVC in early rounds (being involved in 78% of all investments), contradicts the notion of the "finance escalator" and puts IVC at the center of the early funding environment.

One can argue that new funding sources like Angel Groups and Accelerators are not well evaluated by exit-related outcomes (Bonini et al. 2019). However, we have demonstrated that AGs and Accelerators performed poorly even when assessed by subsequent funding, while only the more experienced Accelerators had a positive influence. Considering that our analysis focused only on ventures that received their first investment round, these results refute the idea that receiving funding from these investors would be a ‘milestone’ for securing further

investments. Also, our results indicate that the experience factor is relevant for distinguishing those accelerator-backed ventures more prone to succeed in procuring additional funding (Choi and Kim, 2018; Crisan et al., 2019). Furthermore, Accelerators slightly outperformed AGs in securing further funding over $ 1 million, especially when considering highly experienced investors. Our findings are consistent with the comparatively poor performance of AGs seen in previous studies (Cumming and Zhang, 2019; Kerr et al., 2014), and corroborate the heterogeneous performance observed among Accelerators (Gonzalez-Uribe and Leatherbee, 2018). Still, future research can explore the conditions under which ventures prefer one of these early funding sources over the other and the mechanisms for their nurturing effects.

Finally, there are interesting results concerning the role of CVCs in ventures at this stage. While there were no significant effects for their influence on IPO, there were mixed results about M&As and securing further funding. This is consistent with previous indications that CVCs are not as pushy for growth in their portfolio ventures as IVCs tend to be (Chemmanur et al., 2014; Pahnke et al., 2015; Uzuegbunam et al., 2019). On the other hand, previously experienced CVCs and the ones that syndicated with IVCs did achieve better results. This could be explained by the positive impact IVCs have demonstrated before in alleviating agency conflicts between CVCs and ventures, preventing the misappropriation of ventures' resources (Hallen et. al., 2014). Also, it has been previously shown that CVC investments were more beneficial for ventures after a previous investment from IVCs, at least from an innovation perspective (Park and Bae, 2018). So, future research could explore how the sequencing of investment from different EEF sources and particularly involving IVCs and CVCs affects market-related performance.

3.8. Conclusions

The "finance escalator" paradigm has been long entrenched in the EEF literature (Berger and Udell, 1998; Cumming et al., 2019). Nonetheless, recent studies and the increased competition for early-stage investments seen in the market have raised questions on its validity, especially on the issue of "milestone" investment effects attributed to some early-stage investors, like Angels and

Accelerators. To the best of our knowledge, this research is the first to assess this issue and evaluate multiple sources of EEF on different performance measures, focused on seed and early-stage ventures. Our findings reaffirm the place of independent venture capital (IVC) firms in the VC industry and bring them to the center of the early funding scenario. It also assesses important factors when evaluating the performance of investments from CVCs, Angel Groups, and Accelerators, like the previous experience of the investment firms and the mixed syndications they put together.

This study answers a series of calls for improvements in the empirical analysis of entrepreneurial financing and venture capital research, contributing to the evolution of the literature. As theoretical contributions, we first filled a gap for more empirical studies regarding multiple sources of equity funding effects on ventures' performance (Cumming and Groh, 2018; Drover et al., 2017). Also, our focus on seed and early stages extended the existing literature on EEF effects on ventures in general by addressing the particularities of investing in companies at that stage. For instance, traditionally used performance measures, such as successful exits, may not always capture the expected outcomes from these investments in due time, so other, more appropriate measures should apply (Bonini et al., 2019; Rosenbusch et al., 2013). Finally, we tried to include contextual factors (i.e., investor's experience, industry effects) that have been found to play a role in the impact of EEF on the performance of investees, responding to calls that studies should report findings including elements that were previously found significant (Rosenbusch et al., 2013).

Practical contributions include firstly the indication for entrepreneurs that it's possible to access larger investors such as IVCs in their early stages aiming for better results. Furthermore, our study indicated the possible paths for ventures seeking funding depending on which outcomes they pursue in the short and long terms. For instance, getting an investment from a highly reputable Accelerator is generally a better off start than from Angels if they seek to secure further investments. But getting to an IPO will usually go through an investment from an IVC. Also, we show that ventures seeking funding from CVCs are better off doing so with the syndication of an IVC investor.

Our analysis has some limitations. Among other things, our focus is only on seed and early stages, which were defined by our sample parameters (i.e., ventures in their first investment round). Also, our analysis included only US-based investments, while previous research has indicated that institutional settings moderate the extent to which agency conflicts occur among syndicate members (Cahine et al., 2014). Our conclusions, then, are not necessarily to be extended to other countries, which should be subject to additional research. But, most importantly, our study is focused on just one type of relationship between ventures and investors: the investment itself. We acknowledge that other services and relationships are built among both parts, like the acceleration program by Accelerators or coaching and mentoring by Angels. Still, we assumed that these are intrinsic to each type of investor and are stronger when an equity investment is made. Relationship-specific factors, like entrepreneurship schooling by accelerators (Gonzalez-Uribe and Leatherbee, 2018), can affect ventures' success and should be subject to further research related to the nurturing effects of each investor type.

4 Third Article – A venture perspective of different investor effects in the Brazilian VC market

4.1. Abstract

Venture Capital has attracted great attention from policymakers, investors, and entrepreneurs around the world for its successful history in developed markets like the United States. But in emerging nations, its implementation has been faced with challenges that have prompted investors to adapt, especially in the seed stage segment of the market which is intrinsically riskier. This can lead to differences in how the investments are received by startup ventures and the impact they exert on them. We study the effects that different investor types have had on seed-stage ventures' performance in Brazil and compare them to what the literature has shown in the United States. Our results indicate that there are significant differences, possibly driven by factors in the Brazilian market that molded the profiles of investors and the way they operate in distinct ways from the developed world.

Keywords: Entrepreneurship finance; Venture Capital; Corporate Venture Capital; Angels, Accelerator.

4.2. Introduction

The Venture Capital (VC) industry has played a crucial role in the development of some of the most advanced startup ecosystems in the world (e.g., the United States, and Israel). As a source of funding for early-stage companies, VC investors enable entrepreneurs to bring their innovative ideas to fruition and scale their businesses. The supply of VC capital in an area has been linked to more start-up creation, employment, and aggregate income (Popov and Roosenboom, 2013; Samila and Sorenson, 2011). Also, productivity growth and innovation have been connected to the industry, due to mechanisms like better capital allocation in

high-potential technologies and technological spillovers to other companies not directly invested by the VCs (Keuschnigg, 2004; Schnitzer and Watzinger, 2022).

In emerging markets, the development of the VC industry must deal with challenges facing the business environment. Factors like smaller capital markets, higher cost of capital, higher taxes, labor market rigidity, less enforceable legal rights, and fewer investor and IP protections, have been shown to restrict the industry's growth. (Groh and Wallmeroth, 2016; Jeng and Wells, 2000). Ultimately, these factors can also influence how VC investments in the country perform. In the United States (US), where the VC model has been shaped, for decades the Independent Venture Capital (IVC) firm, run by professional managers of third-party capital, has been the gold standard investor type and the one with the best prognosis for startups' outcomes (Gompers and Lerner, 2001; Hellmann and Puri, 2002; Rosenbusch et al., 2013). In Brazil, however, professional managers who have tried to duplicate those characteristics had to adapt in several ways, like concentrating on late-stage investments to avoid higher risks and finding ways other than IPOs to exit their investments (Ribeiro and Carvalho, 2008). This has left the seed stage segment of the VC market in the country to be attended by smaller investors, like Angels and Accelerators. These investors have characteristics that connect them to younger ventures, but also make it harder for them to deliver the services and guidance these ventures need (Choi and Kim, 2018; Cumming and Zhang, 2019; Yu, 2020). More recently, this situation has started to change, with a growing interest from IVCs and Corporate Venture Capital (CVC) in the seed stage scenario (ABVCAP, 2021). The beginning of the 2020s has been marked by a spur in seed-stage funding in Brazil, with more options for early ventures that seek capital and an increasingly competitive scenario for investors.

The question is posed, then, whether these actors are affecting their portfolio ventures in a positive way for them to grow and achieve their goals and if this is in line with what the literature has shown in developed countries, mainly the US. To answer, we examined the investments made in the Brazilian seed stage VC market between 2000 and September 2022, and the outcomes for ventures that received investments from IVCs, CVCs, Angels, and Accelerators. Our results show that there are significant differences in the observed performance of these actors in Brazil and what has been indicated from mainstream literature from the US. For

one, IVCs have not shown a pervasive presence in this market as in that country, and the expected positive performance was only true for ventures backed by highly experienced IVCs. CVCs, whose presence is still modest in the segment, have boosted M&As but performed poorly on specific seed-stage goals. Angel investors were a positive surprise, revealing the best performance for ventures to secure more funding, while Accelerators confirmed the worst performance, except for the highly experienced ones. These results indicate that there are factors in the Brazilian market that distinguishes these performances from what has been shown in the United States, possibly by molding different profiles for the investors themselves or how they operate in the country.

This article is organized in the following way: In section 2 we explore the scenario for the Venture Capital industry in Brazil, the environmental factors that affect its impacts, the different actors involved in the seed-stage segment, and how they're expected to influence ventures. Section 3 explains our data, methodology, and variables. Section 4 presents our results. Section 5 discusses their implications and Section 6 concludes.

4.3. Literature Review

4.3.1. The Brazilian startup ecosystem and venture capital industry

Brazilian entrepreneurs and investors must deal with the country's challenges and limitations. Ribeiro and Carvalho (2008) highlighted some of those that most affect the entrepreneurial environment and VC industry: The country's labor market rigidity; highly bureaucratic procedures for opening a business, getting a license, or paying taxes, which lead to corruption; a high tax burden, both in costs and complexity, which also increases the risk of fiscal and labor liabilities; the inefficiency of a legal system that is hard and costly to enforce, partially overturned by arbitration practices; insufficient infrastructure; and relatively small capital markets, that constrains potential exists through IPOs. We should also add to the list a poor educational system that contributes to the restriction of qualified labor; and one of the highest income and wealth inequality rates in the world, which limits both the number of high potential entrepreneurs and investors (Chancel et al, 2022).

Despite these challenges, the Venture Capital industry began to develop in the country in the 2000s, in part due to government support from developing agencies and legislative changes. On the regulatory side, there was the passing of the Innovation Law (2004), the Law of Good (2005), the Science, Technology, and Innovation (CT&I) Code (2016), and the CT&I's New Legal Mark (2015-18). These changes boosted the amount of capital that flowed to R&D efforts, fostered the link between universities and business, and the development of Incubators, Accelerators, and Technology parks (Gonzalo et al., 2022). Also, the regulation changes that created the Investment Participation Funds (FIPs) and the promotion of pension funds participation in the VC industry expanded the amount of available capital (Leonel, 2019). Also important was the creation of the sectorial funds in the early 2000s, and government initiatives like the INOVAR program and the CRIATEC funds, which were composed of pioneer investments made by government actors such as FINEP and BNDES. These programs provided funding for the first VC managers in the country to begin to operate (ANPROTEC, 2019; Gonzalo et al., 2022).

The industry grew alongside Brazil's best economic performance years in decades in the 2000s and seemed to have suffered less than expected from the 2015-2016 recession. In the following years, it spiked following the high interest in technology companies before and during the pandemic, a growing flow of foreign capital to the industry, and the consolidation of new players like CVCs. According to ABVCAP (2021), Brazil's VC industry, which accounts for more than 50% of the investments in Latin America, surpassed Private Equity (PE) for the first time in history in 2020 with a total amount of R$ 14.6 billion in investments, up from just R$ 0,9 billion in 2017. The number of startups funded annually has also risen to 200, with an average investment of around R$ 70 million. This number is highly skewed due to success stories in the industry, such as Acesso Digital, Credits, Fazenda Futuro, Loft, Nelogica, Nubank, Tembici, Zee.dog, among others (ABVCAP, 2021). The year of 2020 has also witnessed the debut of VC-backed Enjoei and Meliuz at the Brazilian stock exchange, despite successful IPO stories like these still being exceptions in the industry.

4.3.2. Environmental factors that affect the VC industry in Brazil

There has been extensive research on the determinants for the development of the Private Equity and Venture Capital (PE/VC) industry in a region or country (Dalal, 2022; Dias and Macedo, 2016; Groh and Wallmeroth, 2016; Jeng and Wells, 2000). The determinants are usually divided into the ones that affect the supply of capital from investors and the ones that affect the demand for this type of investment from entrepreneurs and startups. Supply-side determinants include (i) Pension funds participation in PE/VC (which often requires regulatory changes), (ii) Volume of IPOs and M&As (which are the preferable ways to exit investments), (iii) Capital markets capitalization, liquidity, and growth, (iv) Capital tax reduction, (v) Investor protection in the legal environment, and (vi) Government programs and public policy. Demand side determinants include (i) Technological and innovation opportunities, (ii) GDP growth, (iii) Labor market rigidities, (iv) Intellectual Property (IP) protection, and (v) Social and Cultural factors.

There is reason to believe that at least some of these factors would affect not only the growth of the available funding going towards VC and deal formation but also the behavior of investors and the expected results for ventures. For instance, the volumes of IPOs and M&As in a country have been proven to be some of the factors with the greatest impact on the flow of new VC capital (Dias and Macedo, 2016; Jeng and Wells, 2000). But this impact has also been found to be reduced in emerging economies, where capital markets are usually less developed (Groh and Wallmeroth, 2016). It is possible, then, that VC investors in these countries find other ways to exit their investments with proper returns. The authors also found that the historical volume of IPOs doesn't have the same impact on the formation of early-stage VC deals as for late-stage, probably because ventures at this stage are still far from an IPO possibility, and VCs may seek shorter-term goals, like further and bigger investment rounds.

4.3.3. The different VC investor types in Brazil

The growing importance of venture investing has encouraged more actors to enter the VC industry, increasing the diversity of the funding scenario in Brazil and giving startups more options for different profiles of investors. Traditionally, the

industry, molded in the United States (US), was dominated by Independent Venture Capital (IVC) firms, which are professional managers investing in and supporting young ventures. These managers usually come from an investment background or their own previous experience as successful entrepreneurs. They usually operate with dedicated funds in a limited liability partnership model, with a limited lifespan of around 8 to 12 years and raising capital from third-party investors (e.g., Pension funds, government funds, and previous successful entrepreneurs) (NVCA, 2022). In the VC literature, IVCs are considered the most advantageous type of investors for startups, for they provide support not only with capital but also in value-added services, guidance, and connections (Gompers and Lerner, 2001; Hellmann and Puri, 2002). They also created mechanisms to deal with issues concerning early investing, like information asymmetries and agency cost, such as making staged investments, using convertible contracts, taking place on portfolio companies' boards of directors, participating in investments syndication, using compensation schemes for managers that are aligned with funds' returns, etc. (Brander et al., 2002; Gompers, 2000; Gompers and Lerner, 2001; Hellmann and Puri, 2002).

When investigating the Brazilian VC market, Ribeiro and Carvalho (2008) noted that IVC firms in that country hold similarities with the US model in how they are organized, like maintaining independent management of third-party capital (as FIPs), employing highly qualified managers, concentrating regionally and sectorally. But also had to adapt to Brazilian peculiarities, so they focused on later-stage investments, avoiding uncertainty, and, since credit was scarce and the capital market underdeveloped, they relied less on Leverage Buyouts (LBOs) and IPOs to exit their investments. In more recent years, we begin to see a change in behavior from this type of investor, with an increasing interest in earlier stages, mimicking the same movement of IVCs in the US (ABVCAP, 2021; NVCA, 2022). With the same organizational model and background, we expect IVC to maintain its status as the reference for investing in startup ventures and hold the best performance among its newer VC investor peers. Therefore, we propose:

Hypothesis 1a. IVC investors will positively influence Ventures in getting to an M&A deal in Brazil.

Hypothesis 1b. IVC investors will positively influence Ventures in securing subsequent funding in Brazil.

Corporate Venture Capital (CVC) is a type of big investor that has recently grown in Brazil. According to a 2018 study by Altivia Ventures, there are over 97 corporate venturing initiatives operating in the country, with 19% being CVCs that invest in new ventures (BID, 2020). CVCs are known for providing large capital pools and industry-specific resources to their portfolio companies (Chesbrough, 2002; Park and Steensma, 2012). However, concerns have been raised about their intentions, as they answer to a parent company that operates in the same market as the companies they invest in (Katila et al., 2008; Kim et al., 2019). CVC-backed ventures tend to increase R&D-related outcomes but may not be as effective in boosting market innovation outcomes. This is because corporations often treat these ventures as extended R&D departments without developing their go-to-market capabilities (Uzuegbunam et al., 2019). In contrast, IVC-backed ventures are incentivized to grow sales immediately after investment (Bertoni et al., 2013). Overall, we expect that most early-stage ventures will be negatively influenced by CVCs, as corporations may prevent their growth to avoid competition in their markets. Therefore, we propose:

Hypothesis 2a. CVC investors will negatively influence Ventures in getting to an M&A deal in Brazil.

Hypothesis 2b. CVC investors will negatively influence Ventures in securing subsequent funding in Brazil.

When considering early-stage funding, Angels are arguably the investor type that has been around the longest for startups. They are usually rich individuals, sometimes with previous venturing or industry experience, that invest in ventures in their very early years (Kerr et al., 2014). The amount of Angel investments in Brazil has risen recently from R$ 851 million in 2016 to R$ 1 billion in 2021, recovering to pre-pandemic levels. At the same time, the number of Angel investors rose 13% that year to around 7.8 thousand (Anjos do Brasil, 2022). Still, the number of Angels in the country is a fraction of the 300 thousand reported in the US (BID, 2020). Angels are not typically seen in the venture capital world as a distinct investor type that offers differentiated performance. The category is too broad because angels range from friends and family of entrepreneurs to experienced

investors with industry knowledge. They are generally less resourceful than institutional investors and have limited monitoring capabilities. Also, unlike IVC and CVC managers, Angels invest their own money and often use fewer formal monitoring practices, which can lead to behavioral biases (Cumming and Zhang, 2019; Kerr et al., 2014). Angel groups and business angel networks (BANs) attempt to overcome the limitations of individual angels by increasing formalization and organization. However, even when organized, angels often struggle to deliver meaningful outcomes such as IPOs, M&As, and additional financing for their portfolio companies (Cumming and Zhang, 2019; Dutta and Folta, 2016; Kerr et al., 2014). As a result, we expect Angels to exert a negative influence on their invested ventures in the Brazilian VC market. Therefore, we propose:

Hypothesis 3a. Angel investors will negatively influence Ventures in getting to an M&A deal in Brazil.

Hypothesis 3b. Angel investors will negatively influence Ventures in securing subsequent funding in Brazil.

One of the most recent investor types in the VC industry, Accelerators are organizations that offer support programs for new ventures to better refine their business models and market strategies, and sometimes seed funding in exchange for equity (Cohen et al., 2019; Shetty et al., 2020). They differ from Incubators in the way that they are more focused on go-to-market activities, offer a shorter period program, and provide fewer physical resources and more networking (Cohen et al., 2019; Crisan et al., 2019). In a broad study, ANPROTEC (2019) identified 57 startup accelerators actively operating in Brazil in 2019, most of which were created after 2010. Like Angels, Accelerators also target ventures in their earliest stages, testing their products and business models to the point of having the entrepreneurs decide whether to follow through with their plan, abandon it or pivot to a new one. As a result, evaluations of Accelerators' impact often consider getting to a subsequent funding round or getting an idea validated as goals for ventures (Crisan et al., 2019). Recent studies have found that Accelerator-backed ventures' performance vary according to different types of Accelerators, that offer distinct services and operate under various backgrounds (government, private, corporate, etc.) (Choi and Kim, 2018; Crisan et al., 2019; Shetty et al., 2020; Yu, 2020). In

Brazil, many Accelerators were developed under an umbrella of government and university programs, which have been found to particularly underperform on these measures, and just recently corporate-backed programs are growing larger (Crisan et al., 2019; Gonzalo et al., 2022; Shetty et al., 2020). Hence, when looking at the performance of Accelerator-backed ventures, we expect a poor general performance, that is alleviated for the most experienced players. Therefore, we propose:

Hypothesis 4a. Accelerator investors will negatively influence Ventures in getting to an M&A deal in Brazil.

Hypothesis 4b. Accelerator investors will negatively influence Ventures in subsequent funding in Brazil.

To summarize our hypotheses, we propose a theoretical model (figure 11) for the expected relationships between our investor types and ventures' performance measures based on the previous literature.

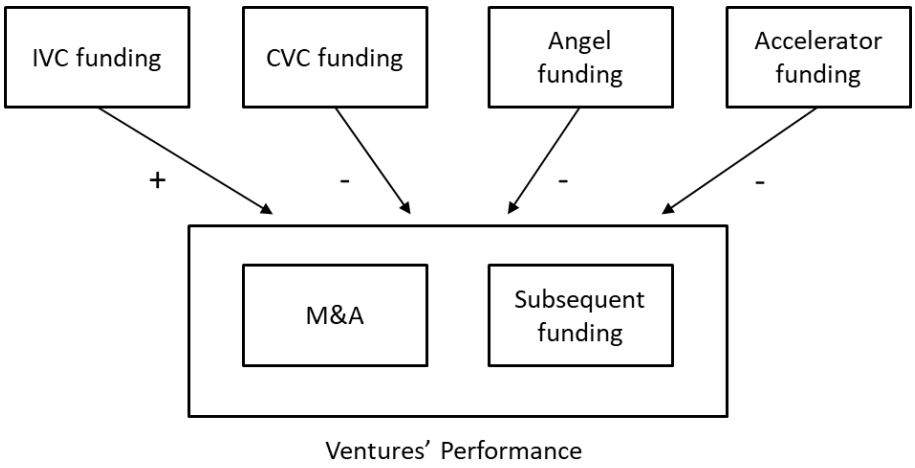

Figure 11 – Theoretical model

4.4. Research method

4.4.1. Data source and sample

To analyze our hypothesis concerning the Brazilian VC market, we gathered all the data from the Crunchbase database on VC investments in the country, dating

from 2000 to September 2022. This consisted of 5,137 rounds initially, which we filtered for only the first investment rounds and categorized at the seed stage by the platform (Crunchbase, 2022). The result was a sample of 1,937 investment rounds with a maximum of $ 30 million in a round. To run our models, though, rounds with missing data for our instrumental variables described below had to be discarded, leaving us with 784 cases for those analyses.

4.4.2. Variables and statistical analysis

Our dependent variables are (1) A dummy for *Successful exit by M&A*, (2) A dummy for *Successful achievement of subsequent funding over the $ 1 million mark,* and (3) *Total subsequent funding, conditional on achieving a second round of any amount*. The reason for segregating subsequent funding into two variables is that a large portion (approximately 80%) of companies never successfully secure further funding after their first investment. Failing to achieve such a mark can be interpreted as a failure for a venture in the VC market. So, while the second dependent variable measures the ability of the venture not to prematurely fail, the third measures how successful it ultimately becomes. We consider that these goals do a good job for analyzing the performance of seed-stage VC investments in a developing country.

Our independent variables of interest are dummies for the presence of each type of funding investor (i.e., IVC, CVC, Angel, and Accelerator). We also control for Investment round year, Venture's home estate in Brazil, Venture's industry group, and Previous experience for each type of investor, when assigned by Crunchbase as the lead investor in a round. The Previous experience variable is measured as the natural log for the count of previous rounds for an investor. These controls have also been employed before in this type of study on ventures performance (Crisan et al., 2019; Kerr et al., 2014; Park and Steensma, 2013; Yu, 2020)

To account for endogeneity issues, we employ an instrumental variable (IV) approach which consists of a two-stage logistic (2SL) estimation method for our binary dependent variables (1 and 2) and a logistic-OLS method for our continuous dependent variable (3). In the first stage, our independent variables of interest (dummies) are regressed on six instrumental variables: The natural log of the

ventures' age at financing (in months); the Natural log of the number of investors in the investment round, the Natural log of the disclosed equity amount invested in the round; Investment round year, Ventures' estate in Brazil and Ventures' industry group. Afterward, the resulting fitted probabilities are used in the second-stage regression (for the dependent variables) together with the control variables. This approach is similar to the two-stage least squares approach described by Bascle (2008), the most commonly used IV estimator.

4.5. Empirical Results

First, we present an overview of the general data. Figure 12 displays the distribution of the 5.137 VC investment rounds in Brazil by their announcement year. We can see that the industry took off in the late 2010s and spiked at the beginning of this decade (note that 2022 data were gathered just until September). From Figure 13, we can see that IVCs led the way in industry development. When considering only ventures' first round of investments at the seed stage, the picture changes. We can see from Figure 14 that IVCs became predominant at this stage just in the mid-2010s, whereas before that Accelerators disputed the leadership, while Angels came second. The significant number of investments by Accelerators in the 2010s is possibly a result of the regulatory and policy efforts made by the government in those years and before. On the other hand, the holdback from IVCs in seed-stage rounds was symptomatic of the problems facing a developing market, which pushed them to later rounds (Ribeiro and Carvalho, 2008). So, the more recent increase of IVC and Angel rounds at this stage is an indication of how the VC, and more broadly the capital market, is growing in the country. The downside is the still shy stake of CVC investments, which can also be seen as an opportunity for many established companies that are starting to notice this market.

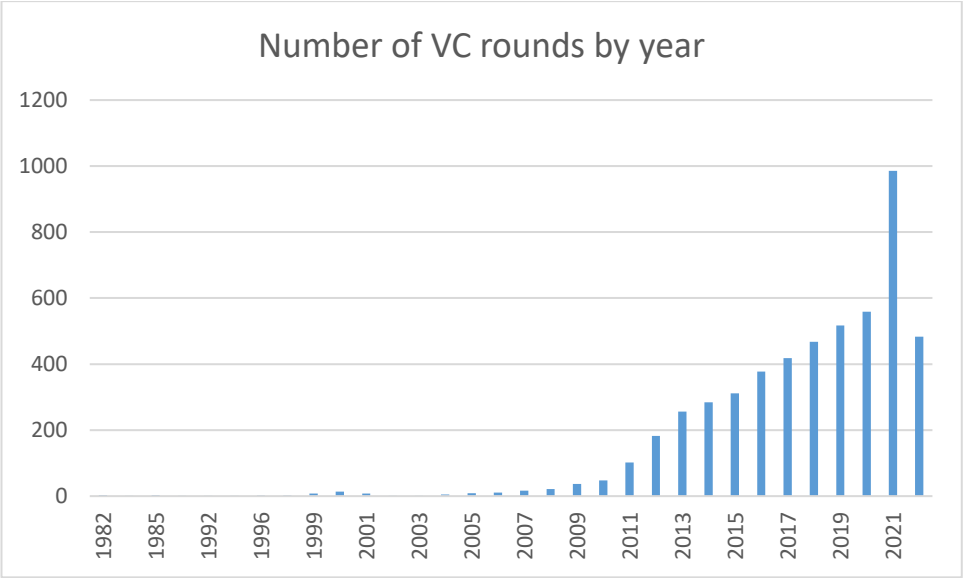

Figure 12 – Number of VC investment rounds in Brazil each year (created by author)

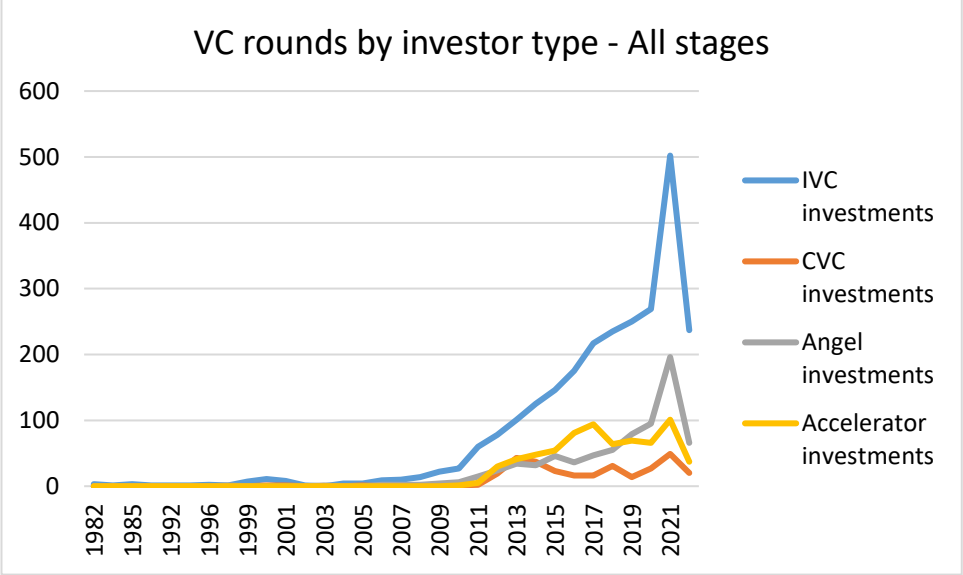

Figure 13 – Number of VC rounds per investor type in Brazil by year (created by author)

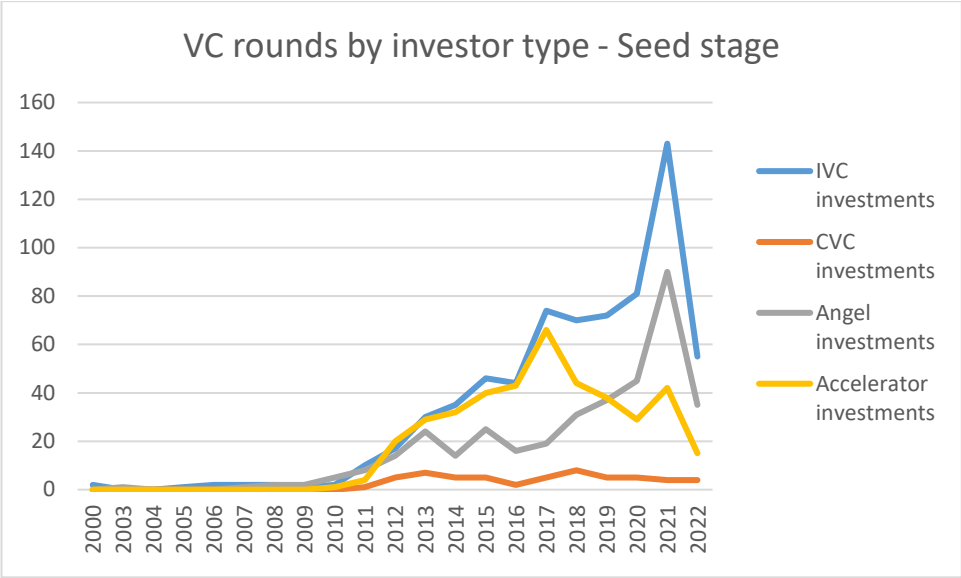

Figure 14 – Number of VC rounds per investor type in Brazil by year – First round and seed-stage only (created by author)

Focusing on the selected sample, Table 14 presents the descriptive statistics for this group. We can see in Panel A that on average these investments involve equity of less than $1 million, from 1-2 investors and in ventures that are about 5 years old. These numbers are largely dispersed, though, as is the total amount companies ultimately get in subsequent funding. There are also highly skewed, which is expected in the VC context, where success histories can achieve exponential growth. Consistent with what we saw before, IVCs are the ones with the most previous experience, closely followed by Accelerators. In contrast, Angels do not present the expected experience. In Panel B we observe that only about 8% of the ventures in the sample achieve an M&A deal, while about 17% managed to get to a subsequent round of investment above the $1 million mark. These rates of achievement are below what is observed in developed markets like the US (Silva et al, 2022). However, we must consider that most investments were made in the last few years and have had less time to mature. Also different is that the presence of IVCs, although higher than its peers, is far from the 75% observed in that market (Silva et al, 2022).

Table 14 – Descriptive Statistics

Panel A. Descriptive statistics for continuous variables

	Mean	*SD*	*Skewness*

Total subsequent funding (US$)	8.461.273,06	100.073.299,81	31,92
Company age at financing (months)	66,13	232,01	5,59
Number of firms in the investment round (units)	1,68	1,61	4,43
Equity amount disclosed (US$)	681.947,13	1.595.926,21	7,98
Previous Experience IVC (rounds)	94,54	349,02	4,16
Previous Experience CVC (rounds)	10,94	112,60	10,42
Previous Experience Angel (rounds)	1,64	13,27	15,76
Previous Experience Accelerator (rounds)	79,59	463,10	7,87

Panel B. Frequencies for dichotomous variables

	Valid cases	*% of total*
Successful exit by M&A	153	7,90%
Successfully achieved subsequent funding (over $ 1 million)	332	17,14%
Funding by IVC	689	35,57%
Funding by CVC	56	2,89%
Funding by Angel	369	19,05%
Funding by Accelerator	403	20,81%

This table reports descriptive statistics for the sample of 1.937 VC-backed ventures which received their first investment round at the seed stage.

Table 15 presents the results of Pearson's correlations between variables for the same sample. It is possible to observe positive relations between the three dependent variables (indicated as 1-3) and IVCs, and a positive relation between Subsequent Funding above $1 million and Angels. At the same time, there was a negative relationship between Accelerators and Subsequent Funding. CVCs presented no significant relations to our dependent variables. Notably, highly experienced Angels were associated with M&As and Subsequent funding, which is not what we expected based on the literature.

Table 15 – Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. ccessful exit by M&A	1													
2. ccessfully achieved subsequent fu ng (over $1 million)	,076**	1												
3. tal subsequent funding	-0,031	,142**	1											
4. mpany age at financing	-0,035	-,073**	-0,012	1										
5. . of firms in the investment ro l	-0,007	,137**	0,054	-,061*	1									
6. uity Amount Disclosed	-0,038	,156**	,126**	0,015	,469**	1								
7. nding by IVC	,054*	,155**	,111**	,059*	,278**	,244**	1							
8. nding by CVC	-0,005	0,012	-0,006	-0,020	,062*	0,022	0,033	1						
9. nding by Angel	0,024	,098**	-0,005	-,046*	,381**	,096**	-0,028	-0,037	1					
10 unding by Accelerator	-0,023	-,087**	-0,044	,062**	-,068**	-,140**	-,152**	-,066**	-,171**	1				
11. Previous Experience IVC	0,039	,126**	,102**	,052*	,099**	,259**	,707**	-0,002	-,094**	-,243**	1			
12. Previous Experience CVC	-0,002	-0,007	-0,014	-0,017	-0,044	-0,035	-,069**	,682**	-0,036	-,060**	-,063**	1		
13. Previous Experience Angel	,047*	,046*	-0,004	-0,015	-,056*	-0,037	-,146**	-0,041	,462**	-,121**	-,126**	-0,028	1	
14. Previous Experience Accelerator	-0,015	-,081**	-0,034	,046*	-,125**	-,161**	-,172**	-,076**	-,176**	,858**	-,235**	-,052*	-,105**	1

**. Correlation is significant at the 0,01 level (2-tailed). *. Correlation is significant at the 0,05 level (2-tailed).

Table 16 presents the results for the first-stage logistic regression models. We can see that the instrumental variables that are most relevant for determining the type of investors to fund a venture are the Number of investors in the round and the Equity amount of the round. The latter is more important to differentiate the investor types, since it is expected that IVCs would make bigger investments, while Angels and Accelerators smaller ones. This is in part observed here.

Table 16 – First-stage Logistic Regression Models

	IVC		CVC		Angel		Accelerator	
Constant	-11,629	(1,00)	-24,037	(1,00)	-37,888	(1,00)	53,015	(1,00)
Company age at financing	0,119	(0,12)	0,002	(0,99)	-0,157**	(0,04)	0,150	(0,07)
Number of firms in investment round	1,353***	(0,00)	0,798**	(0,02)	1,729***	(0,00)	1,005***	(0,00)
Equity amount disclosed	0,788***	(0,00)	0,184	(0,24)	-0,142	(0,06)	-1,065***	(0,00)
Year dummies	Yes		Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes		Yes	
Estate dummies	Yes		Yes		Yes		Yes	
Observations	784		784		784		784	
Pseudo-R square	0,56		0,38		0,40		0,52	

This table reports the results of the first-stage logistic regression models for the independent variables of interest. P-values are reported in parentheses. *** and ** indicate significance at the 1% and 5%, respectively.

Table 17 presents the results of the second-stage logistic regression analysis for different investors' effects on ventures' successful exit by M&A. Model 1 includes only our independent variables of interest (after adjusting for the instrumental variables) and the control dummies, while in Model 2 the Previous experience controls are also included. The results show that the presence of CVC funding was positively related to a venture getting to an M&A deal. This result contradicts our hypothesis 2a. Furthermore, only highly experienced IVCs sustained a positive relation with this goal, not supporting our hypothesis 1a. No significant effects were visible from Angels or Accelerators, something that doesn't support our hypotheses 3a and 4a.

Table 17 – Successful exit by M&A

	(1)		(2)	
Constant	8,575	(1,00)	8,469	(1,00)
Funding by IVC	-1,210	(0,34)	-1,786	(0,18)
Funding by CVC	5,795**	(0,05)	7,367**	(0,02)
Funding by Angel	-,413	(0,78)	-,044	(0,98)
Funding by Accelerator	-2,453	(0,06)	-2,135	(0,14)
Previous Experience IVC			0,249***	(0,01)
Previous Experience CVC			-,077	(0,72)
Previous Experience Angel			,465	(0,12)
Previous Experience Accelerator			,057	(0,66)
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
Estate dummies	Yes		Yes	
Observations	784		784	
Pseudo-R square	0,37		0,40	

This table reports the results of logistic regression models for Successful exit by M&A. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Table 18 shows the results of the second-stage logistic regression analysis for different investors' effects on ventures' successfully achieving subsequent funding over the $1 million mark. Both models resulted in a positive influence of Angel investors, once again different from what we projected, and not supporting hypothesis 3b, and a negative influence from Accelerators, aligned with hypothesis 4b. Also, the only significance observed for IVCs came from highly experienced ones, with a positive impact, different from what we expected in hypothesis 1b. CVCs didn't present any significant impact, failing to support our hypothesis 2b.

Table 18 – Successfully achieved subsequent funding over $ 1 million

	(1)		(2)	
Constant	-53,682	(1,00)	-53,732	(1,00)
Funding by IVC	,131	(0,88)	-,262	(0,78)
Funding by CVC	-1,497	(0,48)	-1,087	(0,61)
Funding by Angel	3,706***	(0,00)	3,994***	(0,00)
Funding by Accelerator	-5,57***	(0,00)	-5,603***	(0,00)
Previous Experience IVC			0,235***	(0,00)
Previous Experience CVC			,003	(0,98)
Previous Experience Angel			,224	(0,21)
Previous Experience Accelerator			,135	(0,06)

Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Estate dummies	Yes	Yes
Observations	784	784
Pseudo-R square	0,50	0,52

This table reports the results of logistic regression models for Successfully achieving subsequent funding of over $ 1 million. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

Lastly, Table 19 presents the results of the second-stage OLS regression analysis for different investors' effects on ventures' total subsequent funding, conditional on having achieved a subsequent round of any amount. Like before, we see that Angel investors sustained a positive relation to this goal, refuting our hypothesis 3b. Together, the results from tables 18 and 19 indicate that the role played in Brazil by Angel investors is substantially different from what has been the case in the US. Accelerators presented a base negative impact, which supported hypothesis 4b, although the positive influence by the high-experienced ones may mitigate that. Such divergence among Accelerators has been previously reported (Choi and Kim, 2018; Crisan et al., 2019; Yu, 2020). Moreover, it's more clearly indicated that any positive influence from IVCs came from its higher experienced ones since the base effect from the first model was transferred to them in the second. The result only partially supported hypothesis 1b. Finally, previously experienced CVCs exerted a negative influence here, but the baseline result was not significant, failing to support hypothesis 2b.

Table 19 – Total subsequent funding

	(1)		(2)	
Constant	11,943	(0,00)	12,913	(0,00)
Funding by IVC	1,736**	(0,04)	1,285	(0,13)
Funding by CVC	-3,447	(0,07)	-2,084	(0,27)
Funding by Angel	2,658***	(0,01)	2,656***	(0,00)
Funding by Accelerator	-4,016***	(0,00)	-4,303***	(0,00)
Previous Experience IVC			0,137**	(0,02)
Previous Experience CVC			-0,272***	(0,01)
Previous Experience Angel			-,012	(0,94)
Previous Experience Accelerator			0,184***	(0,01)
Year dummies	Yes		Yes	

Industry dummies	Yes	Yes
Estate dummies	Yes	Yes
Observations	279	279
Adjusted-R square	0,44	0,48

This table reports the results of logistic regression models for Total subsequent funding. P-values are reported in parentheses. *** and ** indicate significance at 1% and 5%, respectively.

4.6. Robustness Test

To evaluate the robustness of our results, we conducted Propensity Score Matching (PSM) analyses as a different method for addressing the endogeneity issues. The logic behind PSM is to construct balanced subsamples through matching cases based on a single propensity score of being selected. The score is built out of regressing the treatment variable on chosen covariates. We applied as covariates the same instrument variables used in the previous analyses, so the results for the selection models are the same in Table 16. Then, the probabilities of selection for each of the investor types were used to construct a subsample of matching treatment and control cases for each of them. Note that the subsamples used in each PSM model may vary and be smaller than our original sample of 784 ventures, due to differences in the number of ventures funded by each investor type.

Table 20 presents the results of PSM logistic regression analysis for different investors' effects on ventures' successful exit by M&A. The results corroborate our analysis of IVCs, indicating that only previously experienced ones displayed a positive relationship with M&A, which doesn't support hypothesis 1a. The output for CVCs was different from the previous analysis and doesn't show significant coefficients, which doesn't support hypothesis 2a, but also doesn't contradict it. In this case though, we should be careful not to jump to conclusions, since the estimations for CVC were affected by a reduced sample size. Results for Angels and Accelerators also failed to present significant coefficients, leaving hypotheses 3a and 4a with no support.

Table 20 – Propensity Score Matching - Successful exit by M&A

	PSM IVC		PSM CVC		PSM AG		PSM AC	
Constant	4,257	(1,00)	-22,982	(1,00)	4,205	(1,00)	32,632	(1,00)
Funding by IVC	-,101	(0,87)						
PE IVC	0,246**	(0,03)						

Funding by CVC			1,381	(1,00)				
PE CVC			-1,711	(1,00)				
Funding by Angel					-,017	(0,99)		
PE Angel					-,026	(0,95)		
Funding by Accelerator							-18,151	(1,00)
PE Accelerator							,430	(0,27)
Year dummies	Yes		Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes		Yes	
Estate dummies	Yes		Yes		Yes		Yes	
Observations	694		82		466		474	
Pseudo-R square	0,37		1,00		0,54		0,66	

This table reports the results of PSM logistic regression models for Successful exit by M&A. P-values are reported in parentheses. *** and ** indicate significance at the 1% and 5%, respectively.

Table 21 shows the results of the PSM logistic regression analysis for different investors' effects on ventures' successfully achieving subsequent funding over the $1 million mark. Different from our original analysis, IVCs were found to exert a positive significant effect for this measure, supporting hypothesis 1b. CVCs remained insignificant, not supporting hypothesis 2b. Angels were also not significant, failing to support hypothesis 3b, and Accelerators presented a positive influence, opposite from what we expected in hypothesis 4b.

Table 21 – Propensity Score Matching - Successfully achieved subsequent funding over $ 1 million

	PSM IVC		PSM CVC		PSM AG		PSM AC	
Constant	-63,299	(1,00)	-22,250	(1,00)	-52,895	(1,00)	-44,747	(1,00)
Funding by IVC	1,411***	(0,00)						
PE IVC	0,141**	(0,04)						
Funding by CVC			,367	(1,00)				
PE CVC			-6,588	(1,00)				
Funding by Angel					,071	(0,84)		
PE Angel					-,163	(0,38)		

Funding by Accelerator				1,276** (0,04)
PE Accelerator				-,127 (0,19)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Estate dummies	Yes	Yes	Yes	Yes
Observations	694	82	466	474
Pseudo-R square	0,49	0,97	0,41	0,39

This table reports the results of PSM logistic regression models for Successfully achieved subsequent funding over $ 1 million. P-values are reported in parentheses. *** and ** indicate significance at the 1% and 5%, respectively.

Lastly, Table 22 presents the results of the PSM OLS regression analysis for different investors' effects on ventures' total subsequent funding, conditional on having achieved a subsequent round of any amount. IVCs have shown significant positive influence, once again supporting hypothesis 1b. The observed outperformance from highly experienced IVCs in our original analysis was not present with this method, which is more encouraging for IVCs in general. CVCs showed no significance, probably impacted by the reduced sample size. Also, Angels and Accelerators displayed no significant coefficients. The results failed to support hypotheses 2b, 3b, and 4b. Note that the number of cases was further reduced here due to the condition of having achieved a subsequent round of any amount.

Table 22 – Propensity Score Matching - Total subsequent funding

	PSM IVC	PSM CVC	PSM AG	PSM AC
Constant	13,245 (0,00)	12,860 (1,00)	14,273 (0,00)	13,432 (0,00)
Funding by IVC	1,337*** (0,00)			
PE IVC	,114 (0,15)			
Funding by CVC		4,552 (1,00)		
PE CVC		-1,197 (1,00)		
Funding by Angel			,488 (0,35)	
PE Angel			-,391 (0,12)	

Funding by Accelerator				,763 (0,33)
PE Accelerator				-,090 (0,44)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Estate dummies	Yes	Yes	Yes	Yes
Observations	244	19	145	110
Adjusted-R square	0,38	-	0,12	0,19

This table reports the results of PSM logistic regression models for Total subsequent funding. P-values are reported in parentheses. *** and ** indicate significance at the 1% and 5%, respectively.

4.7. Discussion

Our analysis of the seed-stage VC market in Brazil yielded some results that are remarkably different from what we expected according to the literature based on the United States. Firstly, IVCs did not outperformed the other investor types like in the US. What we observed, however, is a consolidated leading role of experienced IVCs in all three success measures. This agrees with previous studies that indicated that the overall good performance attributed to IVCs is due to a large share of success from the highest experienced ones (Chemmanur et al., 2011; Fitza et al., 2009; Nahata, 2008; Sorensen, 2007). Although not as leading as in the US, the IVC model still held promising results, and some of the difference may be due to smaller presence of this investor type in the seed-stage segment of the market in Brazil. We can only expect, then, that the role of the IVC investor will remain an important differentiator for ventures, as this type of investor increases its presence at seed-stage VC in Brazil and accumulate more experience. The results from our robustness tests corroborate this trend.

The results for CVCs were ambiguous. On the one hand, this type of investor benefited ventures getting to an M&A deal, but on the other, they weren't relevant for further investments. These are better results than what we observed in the US market, where CVC was linked to less subsequent funding (Silva et al., 2022). The M&A results may be influenced by the propensity of corporations to acquire their

own portfolio companies, in line with previous findings that incumbents may use invested ventures as extended R&D departments and try to incorporate their intellectual property (Katila et al., 2008; Kim et al., 2019; Uzuegbunam et al., 2019). This hypothesis needs further investigation, though. Likewise, a lack of incentives for ventures to search for further investments may be a way for CVCs to diminish competition for their products. This would be also consistent with a view of CVCs as a drag for ventures on market-related outcomes, such as trademarks and product launches (Uzuegbunam et al., 2019). We note, however, that these results should be taken with caution, as they are based on still a small presence of CVCs in this segment of the market.

Our analysis results for Angel investors were the ones that differed the most from what is reported in previous literature, which is mostly from developed countries. Previously reported as disorganized, unresourceful, and biased, Angel investors in Brazil were most effective in helping ventures secure additional funding. We speculate that this is due to profile differences from Angels in the United States. Some of the market characteristics seen in developing markets must influence the profile of VC investors in ways that differ from the developed world. For instance, a less developed capital market is also a result of fewer individual investors and a culture prone to be more risk-averse (Ribeiro and Carvalho, 2008). With a reduced number of individual investors in the capital markets, there should be a further reduced number of angel investors in a region, since VC investments are riskier than investing in publicly traded companies (Kerr et al., 2014). As presented before, Brazil shows a relatively small number of angels, only around 0,04% of the population, compared to around 1% of the US. As a result, it is possible that the average profile of an Angel investor in Brazil, when compared to the United States, is of relatively higher net worth, better connected with other investors, and with more industry and venturing experience. This profile should help angels deliver better services to ventures, leading to higher performance. This proposition needs further investigation, though.

Lastly, we found little difference in outcomes from Accelerators as to what was expected from the literature. This was the worst-performing investor type for seed ventures, especially considering the important goal of obtaining more funding at this stage. There was, however, a silver lightning as highly-experienced Accelerators perform better. This is in line with what has been observed in the US

(Silva et al., 2022). Also, previous studies have hinted towards the difference in performance among Accelerators, with results varying according to the types of contexts they operate and services they provide to ventures (Choi and Kim, 2018; Crisan et al., 2019; Gonzalez-Uribe and Leatherbee, 2018).

4.8. Conclusions

This is the first study, as far as our knowledge goes, to broadly state the comparative performance of different investor types in the Brazilian seed stage Venture Capital market, while taking the view from the invested ventures. Our results indicate that there are significant differences in performance when comparing developing market investors from what is reported by the literature in the United States. These differences are probably due to environmental and market peculiarities of developing nations (like underdeveloped capital markets, high bureaucracy, corruption costs, higher cost of capital, etc.) that affect the profiles of investors or their ability to operate in the same model as in rich countries. The main difference we encountered is the outperformance of Angels investors in the Brazilian market, which we attribute to profile differences between this kind of investor in that country and the one in the United States. Also, there was no clear predominance of the IVC model, like is reported in the United States, for instance. We show, however, a clear distinction between regular IVCs and highly experienced IVCs, which outperformed every goal. The results for CVCs were ambiguous, with good results for M&As but not in specific seed stage goals. This may be due to fewer cases from these investors, as they have begun to grow just recently in the country. Lastly, Accelerators performed in proximity to what was expected from previous literature and confirmed poor perspectives for ventures that relied on them, at least in the baseline scenario.

Our study contributes to expanding the knowledge of diverse VC investor types in settings different from where they are usually pictured. By demonstrating the distinctions in performance from each investor in a developing country, we improve the understanding of how the problems and challenges concerning these markets will affect the development and impact of the VC industry. For practitioners, we contribute to delivering a clearer picture of the state of the VC industry in Brazil. Entrepreneurs can also find our results useful when reflecting on

which type of funding to seek, and investors can compare their performance to the average in the industry. CVCs, for example, may want to consider the ways they can improve how their portfolio companies get more funding from other investors and continue to grow.

Nonetheless, our analysis comes with some limitations. For one, we were unable to include exits by IPOs as a performance measure, due to the lack of cases with all the data needed. This is a shortcoming, due to the importance of this goal in the VC industry. But we have indicated that this importance is reduced in the seed stage (since these ventures are seeking shorter-term goals) and in developing countries (where investors have been found to procure other means to get a return on their investments). Finally, we note that our analysis doesn't consider nuances in the investor-venture dyad, like level of involvement, specific services, or resources allocated that should interfere with ventures' achievements. Likewise, we make no distinction between investors of the same type (like different Accelerators models), beyond the previous experience controls. We haven't done so to avoid overreaching in a study that already includes four different investor types, but these are factors that have been proven relevant previously and should be considered in future research. Further studies can also explore issues raised in this study, like if CVCs' parent companies have a propensity for acquiring their portfolio ventures, leading to higher M&A deals for those ventures, and if the average profile of the Brazilian angel investor significantly differs from the one in developed countries, like de United States. Such investigations would help understand the Brazilian VC industry more clearly.

5 Conclusions

5.1. Summary

This research has tried to answer what are the effects that different Venture Capital investors have had on early-stage ventures' performance, in the United States and Brazil. It indicates that at the earliest stages of a venture's life alternative investors, such as Corporate Venture Capital (CVC), Angels, and Accelerators join Independent Venture Capital (IVC) to create an environment with more options for entrepreneurs who are seeking funding. These investors have different backgrounds, incentives, and behaviors that influence the way they relate to their portfolio ventures and how they impact them in achieving different goals. For instance, previous literature has found IVCs to push their invested ventures towards market growth, until they can exit their investment with a sizeable return, while CVCs have been related to directing their ventures toward R&D-related goals (Uzuegbunam et al., 2019). Our results show that IVCs have also been the best choice for early-stage ventures that try to secure further funding in the United States. This directly contradicts the 'finance escalator' paradigm that favors Angels and Accelerators as milestone investments for ventures to be able to secure subsequent VC funding. In the US, where the VC industry is most developed, it seems that IVCs have already populated the early-stage segment of the market, rendering ventures a better position to aim for those investors and benefit from specialized counseling and resources.

In developing markets, however, the conditions are far from the same observed in the US. More challenging business environments, with smaller capital markets, labor market rigidity, high bureaucracy, legal inefficiencies, and other issues, can lead to different investor profiles and adaptations to the VC model. The performances observed in this research for the Brazilian market, which differed in some respects from the US case, may be a result of these adaptations. The most relevant is the outstanding performance of Angels, which took the lead in having their ventures secure further funding, something that only high-reputable IVCs were

also able to positively influence in the country. This may be, at least in part, due to the difference in average profiles of Angel investors in Brazil, where they are much reduced in absolute number and as a proportion of the population when compared to the US. The results also point to a better performance for CVCs in Brazil, where they positively influenced ventures' into getting to a M&A deal and were not prejudicial for subsequent funding as in the United States. We find this consistent with indications that CVCs would not have particular interest in growing ventures´ operations, but benefit from their innovation capabilities (Katila et al., 2008; Kim et al., 2019; Uzuegbunam et al., 2019). Lastly, Accelerators in both markets performed similarly, undermining ventures' results. But also, in both markets the most experienced ones achieved better outcomes. This difference reaffirms the presence of subdivisions among these investors which impact performance (Choi and Kim, 2018; Crisan et al., 2019).

The overall result of this thesis points to a Brazilian venture capital industry that has not yet achieved the development of the United States, with more sophisticated investors like IVCs and CVCs still not at the same level of involvement in the early-stage scenario as their American peers, while Angels and Accelerators still holding their ground. It is possible to imagine, though, that if continuing to grow at the same pace as recent years, the Brazilian market may be heading towards the same market structure as their peers in the US.

5.2. Comparative analysis: United States x Brazil

The venture capital industry in Brazil has some significant differences from the United States. The first is the size. In the US the industry raised over $ 100 billion in 2021 and invested in more than 14.000 ventures, while in Brazil it raised about $9,4 billion and invested in 363 (NVCA, 2022; ABVCAP, 2022). This is not surprising, since VC as we understand it today originated in the US and is where it most developed. In Brazil, the industry took off only in the 2010s and has gained more scale since 2020. The two countries are also at distinct levels when it comes to capital market development. For instance, in the US it is common to see several VC-backed companies among the group of IPOs each year. In 2021 the country witnessed 181 VC-backed IPOs, which accounted for nearly 20% of the total (NVCA, 2022). While significant to the economy, the Brazilian capital market is

still in the development phase. It observed only 46 IPOs in total in 2021. The total number of IPOs each year in a market has been previously linked to VC attractiveness in raising capital (Dias and Macedo, 2016; Jeng and Wells, 2000). This impact was relativized in emerging markets, but the difference is still relevant (Groh and Wallmeroth, 2016).

There is also a great difference in capital markets participation and the number of investors that are involved in VC in both countries. In the US, VC investments were conducted by 2.889 IVC firms with over 5.000 funds in 2021, whereas in Brazil we identified 163 Brazilian IVCs that had made at least one investment since 2000 (NVCA, 2022). Most of the deals made in the country, though, involve foreign IVCs, which are mainly from the US. When it comes to 'alternative' VC investors, the discrepancies persist. CVC participation has been increasing in the US, and reached 2.982 deals in 2021, with more than $ 142 billion in aggregate size, representing 19% of the total deal count that year (NVCA, 2022). In Brazil, the participation of CVC in the industry is still incipient, with only around 5% of investment rounds in 2021 involving this investor type. A recent survey received confirmation from 41 firms operating CVC arms in the country (ABVCAP, 2023). Angel investing is also greatly more distributed in the US than in Brazil. While the amount of Angel investment reached R$ 1 billion in 2021 and almost 8.000 angels in the Latin American country, in the US it surpasses 300 thousand (Anjos do Brasil, 2022; BID, 2020). When it comes to Accelerators, recently 57 actively operating units were identified in Brazil, while there are reportedly more than 200 in the US (ABVCAP, 2023; ANPROTEC, 2019).

The two countries have also different economic development levels and business environments. While the US is the richest nation on the planet and ranked 6th on the Ease of Doing Business Index, Brazil is still a developing country with many problems to face before improving its 124th position (Doing Business, 2020). Some of the issues that affect the development of the VC industry in the country have been highlighted before, such as the labor market rigidities, high bureaucracy, corruption, high tax burden and complexity, an inefficient and unpredictable legal system, insufficient infrastructure, and relatively small capital markets (Ribeiro and Carvalho, 2008). We also noted the limitation of qualified labor resulting from a flawed educational system and high wealth and income inequality, which reduces the pool of potential investors. These issues not only impact the size of the venture

capital market in Brazil but also its evolution. Investors have had to adapt the US-created venture capital model to the Brazilian environment to remain competitive in the country (Ribeiro and Carvalho, 2008).

We can reasonably expect that the difference in market environments, which affects the way venture capitalists operate in the US and Brazil, will also impact how various investor types engage with the ventures they invest in, and ultimately influence those ventures' outcomes. In this research, we found several differences in investor effects between the two countries, which we highlight here. Firstly, our results from article 2 point to a clear distinction between IVCs and alternative investors (i.e., CVCs, Angel Groups, and Accelerators). IVC-backed ventures performed better them the ones invested by other investor types in every goal analyzed, from exit-related ones (i.e., IPOs and M&As) to the ones specifically important to the early stage (i.e., Securing subsequent funding). These results, together with the observation that IVCs were present in the majority (77%) of early-stage investment rounds, lead us to the conclusion that it is unlikely that a venture seeking capital at this stage would be better served by the other types of investors. Furthermore, we discover that actors that are specialized in the earliest stages, like Angel Groups and Accelerators, which have been considered to play the role of intermediate investors, have negatively impacted ventures into securing further funding. Together, these results refute the 'financial escalator' paradigm in the US market.

The same results were not present for the Brazilian market, which we examined in article 3. We did not find a generally positive impact from IVCs in ventures for the goals analyzed (i.e., M&As and Subsequent funding). This positive impact was observed only for more experienced IVCs. At the same time, Angel investors held the best performance when considering Subsequent funding. We can conclude, then, that IVCs have not yet achieved the same level of dominance in the Brazilian market as they demonstrated in the US. This is further indicated by the presence of IVCs in only 35% of the investment rounds, a long way to reaching the US level (77%). For Angels, these are interesting results, which demonstrate that they have a lot to offer to younger ventures in the Brazilian market. We suggest that this difference may come from a profile distinction of Angels investors in both countries. Given the significantly lower number of angel investors in Brazil compared to the US (close to 1% in the US and around 0.04% in Brazil), we believe

that those who invest in Brazil are likely to be wealthier, better connected to the industry and other investors, and possess more industry and venture experience than the average population (note that this is different from the previous experience controls applied in the study, which is related to previous investments made). This is, of course only one possible explanation, and requires further investigation to verify.

When it comes to the impact of CVCs, the ones operating in Brazil displayed a marginally better result than their peers from the US. While the Americans did not significantly influence exit-related goals, they negatively influenced ventures' objectives of getting further funding. The Brazilians, on the other hand, presented a positive impact in M&A deals and no relevance for the early-stage goal. We find this consistent with allegations that corporations may not always seek ventures' interest when it comes to scaling their operations, which is done through subsequent investment rounds in the VC model (Katila et al., 2008; Kim et al., 2019; Uzuegbunam et al., 2019). Still, we take the Brazilian results with caution, since the presence of CVCs in early-stage investments is the smallest among investors in that market, with only around 3% of the sample used, whereas in the US it accounted for 7%, surpassing Angels and Accelerators.

The results that came mostly in line with the US case in the analysis of the Brazilian market was the one for Accelerators. Unfortunately, this is not a motive for celebration in the category. In both markets this investor type performed poorly, being associated with less subsequent funding for the ventures they invest in. This is a haunting result for an actor that is positioned to service mostly early-stage startups. The good news is that previously experienced Accelerators performed better and mitigated the overall results. The results confirm that the category should be examined carefully, with possible sub-divisions that operate in distinct ways and are influenced by different backgrounds as has been indicated by other studies (Choi and Kim, 2018; Crisan et al., 2019).

The impression we take from this comparative analysis is that in a way it seems that the Brazilian market is taking the same path as the one in the United States. The presence of IVC investors in the early-stage segment is not pervasive yet, and Angels and Accelerators still hold relevant positions. But it is not hard to imagine that if the industry continues to grow at the same pace as in recent years, soon the two markets may start to resemble. The same can be true for CVC since

the interest in the practice seems to have only grown in the country. These market modifications represent a major opportunity for young startups that look for investment partners to build their businesses. The most prominent ones stand to benefit not only from the inflow of capital but from the value-added services that come with it.

5.3. Research Contributions

This thesis contributes to the academic knowledge of the state and evolution of the Venture Capital industry in the United States and Brazil, and how they compare to each other. While the literature on venture capital has grown to a large body in the United States, the bulk of it is limited to IVCs, with little consideration for alternative types of investors, such as CVCs, Angels, and Accelerators (Crisan et al., 2019; Drover et al., 2017). At the same time, there is little investigation on the VC industry outside of the US, especially in developing countries like Brazil. By conducting a comparative analysis, we can observe the different market structures that affect how these investors influence the ventures they invest in. The results from the US indicate that IVCs have not only entered the early-stage market but have become dominant among other investor types. This contradicts the 'financial escalator' paradigm that they would wait on intermediate investors, like Angels and Accelerators, to approach ventures in a later stage. The discussion on this topic is ongoing and we present a relevant contribution to it. The results from Brazil indicate that the VC market is much more incipient here, although growing rapidly. The presence and influence of IVCs are not dominant and less sophisticated investors, especially Angels, still play an important role. Nonetheless, there is an indication that the Brazilian market may increasingly become more like the US.

The three research articles that compose this thesis also address significant gaps identified in the literature. Firstly, through a systematic review of the previous literature on CVC, the main type of 'alternative' VC investor, we achieved a comprehensive understanding of the various factors that affect the relationship between investors and ventures, while also examining the different profiles and incentives that distinguish various types of VC investors and how they impact ventures. Specifically for the subject of CVC investment, the study resulted in a Conceptual Framework that should help ventures and corporations to navigate their

interactions, understanding the factors that affect that relationship. In a general sense, our first article provided trends and gaps to guide future research and inspired our following studies.

The second article responded to several calls for improvement in the venture capital literature. To the best of our knowledge, this is the first empirical study to analyze multiple VC investors' effects on ventures' performance. Most of the previous literature was aimed only at IVCs. We provide a more realistic and contemporary view of the multi-faced scenario encountered by startups. Additionally, by focusing on the early stage we shed light on a segment of the market that is hardly scrutinized by scholars (Rosenbusch et al., 2013). We discuss the nuances involved in researching this area, from the performance goals that better-fit ventures at this stage, to available databases and search parameters. Our results contribute to the discussion on the 'financial escalator' notion and the role of Angels and Accelerators as intermediate investors.

Our third article brings venture capital research to a developing country scenario, with the challenges that come with it. The Brazilian case is an interesting choice for comparison to the US, for it reflects both the limitations of a developing market while embodying western values and a significant capital market. There is sufficient evidence that investor effects vary between the two countries, which may be explained by the market environment and stage of development. Our study adds to the effort of understanding the Brazilian market through international comparison.

5.4. Practical implications

This research brings important implications for the people and companies involved in the venture capital industry both in the United States and Brazil. Firstly, we present evidence that the early-stage VC market has become more competitive in the US, with investors that have historically been well positioned to service startups at this stage, like Angels and Accelerators, losing space to an overwhelming flow of capital from investors that previously populated only later stages of investment (i.e., IVC and CVC). The large presence of IVC investors in this segment and their history of higher performance is a huge implication for younger ventures that may as well try to skip the 'intermediary' and aim directly for funding

from these sophisticated actors. In Brazil, however, the scenario is different. The presence of IVCs is not as pervasive as in the US and there is still a significant role that mainly Angels have been able to fulfill here: Getting their invested ventures to a subsequent round of funding. These are significant results that can impact the strategies startups develop when deciding to enter the VC market for funding.

Particularly for CVC managers, the Conceptual Framework of the CVC literature can help them to structure their business more consciously. It also points to relevant topics that all stakeholders involved in this type of investment can turn to better navigate their interactions. Ultimately, this research offers insights into the funding paths that early-stage ventures can take and the expected outcomes. At the same time, investors can also assess their performance by comparing it to the industry average for their category in both countries, allowing them to stay competitive in the current VC market. For policymakers the implications of this study are significant. We discuss here several issues that stand in the way of developing the Brazilian venture capital market closer to the level of sophistication seen in the United States. Reducing bureaucracy, and the cost of capital, improving the level of education, and allowing for the development of the capital market will better position the country toward this goal.

5.5. Research Limitations

This research contains several limitations regarding methodology and the research itself. Firstly, the analyses conducted here don't consider nuances in the investor-venture relationship, like level of involvement, specific services, or resources allocated that may interfere with ventures' achievements. Likewise, we make no distinction between investors of the same type (like different Accelerators models), beyond the previous experience controls. Our independent variable of interest is the presence of an investor type in the pool of funding for a venture. As a result, all other nuances are considered intrinsic to the investor type. This is not to say, though, that these factors are not relevant. In fact, we encourage them to be considered in future research.

Another issue is that when considering Angel investors in the United States, we included only Angel Groups, while in Brazil the category was taken as a general (including groups and persons). This was due to the more reliable information for

AGs in that country. Previous studies have discussed the difficulties in identifying reliable information for Angel investing in the US (Bonini et al., 2019; Cavallo et al., 2019). This is a consequence of a more widespread investment culture in the country, that resulted in more than 300.000 angel investors reported (BID, 2020). In Brazil, this number is much reduced, which facilitates data collection for our sources. It is not clear that this profile difference has impacted our conclusions in any way, though. We would expect AGs to outperform general Angels, but the results were different, with the Brazilian Angels doing better than the American AGs. It is reasonable to expect, then, that if general Angels were used in the American case, the results would have been even worse.

Thirdly, there are always estimation concerns when dealing with cause-and-effect relationships in the investor-venture dyad. These are due to endogeneity as mentioned before. To address this issue, we employed two different methods in our analysis, one based on instrumental variables and the other on propensity score matching. But the PSM method has the limitation of significantly reducing the sample size. This is not a problem for our analysis of the US market, since the sample is large enough to handle the reduction, but it substantially affects our analysis of the Brazilian market. The problem is visible in our robustness test including CVCs in Brazil, where the models couldn't return proper results. There is hardly anything we can do to fix this, but employ different methods as was done. Still, there weren't fundamentally different results that could alter our conclusions because of this.

Finally, there is a valid consideration to be made concerning the lack of a time lag in our analysis. In any investment or relationship, the outcomes take time to mature and in the venture capital industry this could be several years. The average time a venture takes from the first VC round to exit has been around 6-8 years for IPOs and 5-6 years for M&As in the United States (NVCA, 2022). So, the most prudent approach would be to assess the impact of an investment on these objectives only after a reasonable period. This approach was considered in the process of building our study, but the alternative would result in a significant loss of data that meant diminishing the power of our analysis of the US market and completely precluding the analysis of the Brazilian one. Nonetheless, preliminary results of an analysis of the US market with a limited sample that considered these concerns have reached results that are consistent with our conclusions here.

5.6. Recommendations for future studies

This research contributes as a pioneer in studying several dimensions of the venture capital industry that represented gaps in the literature. But it has only begun to address those gaps and many other research opportunities emerge consequently. For one, we have shown that IVCs have dominated the early-stage scenario in the US and seem on the way to doing so in Brazil. But this represents a substantial difference in profile for an investor that originated from late-stage investing. The VC industry in the US has become so large that it seems more accurate to consider sub-industries at each stage, as we have tried here. This begs the question of how differently these IVC investors are operating in early-stage as they did in their original space, and how may their profile (managers' background, fund size, investment practices, even the profile of the investors they raise money from, etc.) have changed.

We have shown in this study how the results for ventures that received funding from CVC investors have varied depending on the context (specifically, our results presented different performances from the US and the Brazilian market). In a way, this seems to corroborate the mixed feelings toward CVCs that have been presented in the literature. Although several studies have pointed to an unmistakable positive influence on innovation and R&D outcomes, there are also worries concerning the impact of CVCs on ventures' growth and competitiveness in the long run (Katila et al., 2008; Kim et al., 2019; Uzuegbunam et al., 2019). One of the loose strings in our analysis is the outperformance of CVCs in M&As in Brazil (which also appeared in the robustness test in the US). We suggested that it could be linked to the propensity of incumbent firms to acquire their own portfolio companies to incorporate their knowledge. Despite being reasonable, this is a bold statement that deserves to be investigated.

One of the most significant results from this study is the surprisingly good performance of Brazilian Angels considering what we expected from the previous literature and from what we observed in the United States. This is a remarkable distinction, especially considering that in the US study, only Angel Groups were considered, which were supposed to increase the investment and monitoring capabilities of Angels while limiting their personal biases. We proposed that this performance could be a consequence of a different average profile of Angels in

Brazil due to the substantially fewer number of personal investors here. But this is of course only a proposition, for which verification surpassed the purpose of our research. It can be interesting for subsequent studies to analyze how different the profiles and investment practices of Angels in both countries are and what are the factors that distinguish their performance.

As we have discussed before, the results of our analysis of the US and Brazilian markets were most similar regarding Accelerator investors. In both cases though, there were significant differences within this investor type (in terms of previous experience, which is what we controlled for). This outcome is consistent with other studies that presented Accelerators as a figure that comes in multiple profiles, which vary in background, incentives, practices, and probably in performance (Choi and Kim, 2018; Crisan et al., 2019). A promising path for research is to investigate how are Accelerators in the US and Brazil organized, the distinct models they present themselves in both countries and if are there differences among them. Also, how do these distinctions affect their investment performance and the ventures they invest in.

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