Are Ventures Better Off with a CVC Lead Investor? Evidence from IPOs of VC-Backed Startups

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Abstract

The importance of the Venture Capital industry has been growing exponentially due to its impact on the economy, leading to trillions in revenues and millions in jobs created. Although its relevancy, the influence of the two main types of VCs on their backed startups has been understudied. This dissertation focuses on the value added by CVCs to the firms present on their portfolio, by comparing its IPO valuation with its IVC peers. In order to come up with significant results for this analysis, a sample of 719 VC-backed ventures, where 66 were CVC-backed, was extracted from Thomson Reuters. The empirical analysis focuses on the Propensity Score Matching approach, pairing ventures based on their probability of being funded by a corporate investor, and consequently, interpret the results derived from the valuation multiple ratios between the "nearest neighbors". The results obtained showed that, startups which have an established corporation as their lead investor are able to achieve higher valuations at their IPO vis-à-vis its IVC-backed competitors. Moreover, it has been proven that the CVC-backed ventures outperformance is mainly driven by startups which hold a strategic fit with their investor, with higher strategic overlaps being translated into more significant valuations. This thesis contributes to the enrichment of the Industry's literacy while also easing entrepreneurs' decisions when choosing a funding partner.

Keywords: Venture Capital, Corporate Venture Capital, Independent Venture Capital, IPO Valuation, Strategic Fit

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Abstrato

A importância da indústria do Capital de Risco tem vindo a crescer devido ao seu impacto na economia. Apesar da sua relevância, a influência das principais sociedades de capital de risco (SCR) nas startups que estes financiam tem sido pouco estudada. Esta dissertação foca-se no valor acrescentado pelas SCRs associadas a grandes corporações nas empresas do seu portfólio, comparando a sua avaliação na Oferta Pública Inicial (OPI) com startups financiadas por fundos de capital de risco especializados na área. De forma a estudar a temática, uma amostra de 719 startups financiadas por SCRs foi extraída da Thomson Reuters. A análise empírica foca-se no emparelhando das empresas tendo em consideração a sua probabilidade de serem financiadas por uma corporação e, consequentemente, interpretar os resultados derivados do rácio do múltiplo da avaliação entre os "vizinhos mais próximos". Os resultados obtidos mostram que as startups que têm uma corporação como investidor principal são capazes de alcançar avaliações superiores na sua OPI comparando com os seus competidores maioritariamente financiados por SCR especializadas. Além disso, foi provado que o superior desempenho destas empresas é principalmente atribuído às firmas que têm uma relação estratégica com o seu investidor, sendo que quanto mais profunda esta relação, melhor serão os resultados obtidos. Esta tese contribui para a literatura da indústria, para além de facilitar a decisão dos empreendedores aquando da escolha do seu parceiro de financiamento.

Palavras-Chave: Capital de Risco, Fundos de Capital de Risco, Avaliação, Oferta Pública Inicial, Relação Estratégica

Título: Há vantagens em ter uma Corporação como Principal Investidor? Evidências de OPIs de empresas emergentes financiadas por Sociedades de Capital de Risco

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Glossary

CRSP	Center for Research in Security Prices
CVC	Corporate Venture Capital
EBITDA	Earnings Before Interest Taxes Depreciations and Amortizations
FDA	Food and Drug Administration
IPO	Initial Public Offering
IV	Instrumental Variables
IVC	Independent Venture Capital
NVCA	National Venture Capital Association
SCR	Sociedade de Capital de Risco
SIC	Standard Industrial Classification
SPSS	Statistical Product and Service Solutions
VC	Venture Capital
VEIC	Venture Economics Industry Codes
WRDS	Wharton Research Data Services

1. Introduction

Venture Capital Investments have been growing rapidly. For every measure that is analyzed, there is a common trend: fund-raising ventures and investments have been increasing exponentially over the past two decades (Megginson, 2004, p.89). So, what is Venture Capital?

The first aspect that should be understood is that, nowadays, there are two main types of Venture Capital Investors: Independent Venture Capitalists (IVC) and Corporate Venture Capitalists (CVC) (Gompers & Lerner, 1998). Traditionally speaking, Venture Capital (VC) can be defined as a "professionally managed pool of money raised for the sole purpose of making intermediate term, actively managed, direct equity investments in rapidly growing private companies, with a well-defined exit strategy - preferably through an initial public offering." (Megginson, 2004, p.89).

Throughout the years, the academic research on VC Investments has been increasing. The main reason for this fact is the importance of the industry on the overall economy. These investors have been financing and advising small and intermediate ventures for the last 50 years, contributing for the skyrocketing innovation we have access to (Gompers & Lerner, 2001). In order to better understand the impact of such industry, from 1970 to 2000, American venture capitalists have provided their backed ventures with $273.3 billion, creating 7.6 million jobs and generating $1.3 trillion in revenues. Moreover, it was proved that 1 job is created for every $36.000 spent on VC investment (Megginson, 2004, p.89).

Looking now at CVCs- equity investments in entrepreneurial ventures by incumbent firms not made solely for financial gain (Gompers & Lerner, 2001) - they also perform an important role in this industry. As it is commonly understood, corporations are viewed as important sources of innovation (Schumpeter, 1942). Although this belief is still true, and corporations still develop some of its products through in-house research, sometimes it is impossible for established firms to access the desired knowledge with the assets they have in hands (Cohen & Levinthal, 1990). The current literature has been studying the relationship between internal R&D and the incorporation of external innovation harvested through investments in startups (Anokhin, 2006). Researchers have reached the conclusion that these two forms of gathering knowledge complement each other and are beneficial for the company's innovativeness rates. As presented by AcS & Audretsch (1988) new ventures are a crucial innovation engine which provide not only a valuable and meaningful "window on technology" but also contribute for

scale efficiency gains (Ernst & Young, 2002). In order to gain access to this type of knowledge, established corporations create branches inside their companies to identify and incorporate this external know-how. Following this line of reasoning, it comes as no surprise that CVCs have been getting a lot of traction lately. According to Global Corporate Venturing (2016), 1501 CVC programs invested nearly US$65 billion (KPMG, 2017) in new ventures. Moreover, it is worth mentioning that CVC funds are becoming a trend among the top companies in the U.S, such that half of the Fortune 100 companies and 20% of the Fortune 500 companies are currently developing or have already implemented their own CVC programs (Global Corporate Venturing, 2015).

Although the existing literature on VC Investments is rather extensive and has been able to provide meaningful results throughout the years, research topics such as Exit Strategies, IPO Valuations and Acquisitions premiums are relatively unexplored when compared to the available papers. According to Bayar & Chemmanur (2006), the decision to take a startup public is one of the most important decisions of the venture's life for a number of reasons. Firstly, it is the first opportunity for the new company to access public capital markets, which is often translated into large sums of capital being raised by the company at once. Secondly, it is the first substantial opportunity that either the founders or the venture capitalist that backed the startup have to close totally or partially their positions and, consequently, cash in (this point is more relevant for the IVCs whose only goal are the financial gains) (Bayar & Chemmanur, 2006). Taking this into consideration, it is of the upmost importance to study this topic and extract meaningful conclusions.

When diving deeper into the available research concerning exit strategies, the majority of the conclusions extracted are relevant in terms of coming up with models for the going-public decision, which take into consideration venture's size, age and industry differences (Chemmanur & Fulghieri, 1999; Maksimovic & Pichler, 2001), direct costs and loss of control (Pagano & Röell, 1998) and corporate governance policies (Boot et al., 2006). Even though all these papers complement each other and are able to enrich the existing literature regarding the entrepreneurs' decision to take his/her venture public or remain private, by presenting the pros and cons of such decisions, most papers do not take into consideration the Venture Capitalists' role when it comes to the IPO. These papers fail to understand the relevance of the two main types of VC investors (IVCs and CVCs) on the venture's IPO valuation and how the

complementary assets typically provided by the latter influence the premium these new companies get.

Although the available literature recognized the benefits of having a CVC partner, a few questions are also raised in terms of the conflicts of interest that may surge. On the one hand, corporate investors provide the type of complementary assets, such as access to laboratories, openness to new markets and sales and marketing support which might be difficult for independent investors to replicate (Dushnitsky, 2012). This type of close relationship between the CVC branch and the established corporation not only opens a lot of doors in terms of Industry know-how, product development and positioning but also lends a lot of credibility to the incumbent firm. These assets are of the upmost importance for a startup which wishes to grow and, consequently, go public (Santhanakrishnan, 2002). On the other hand, problems may emerge when these partnerships are formed. One of the most pertinent issues raised by researchers are the conflicts of interest between the established corporation and the venture, which might undermine the startup by extracting its knowledge and then launching a competing product (Hellmann, 2002). Moreover, the incentive schemes, typically associated with IVCs, work as a stimulus for the best CVC employees to leave the fund for a better paid-job at the IVC sector, constraining the CVC's branch ability to provide the best assistance to its portfolio companies (Gompers & Lerner, 2000). Finally, the extended experience shown by IVC employees and superior network connection might play an important role in the ventures' success and growth (Gompers & Lerner, 1996). For these reasons, it is important to study the relationships between these types of investors and the startups, and how this influences the IPO valuations of their portfolio companies.

Bayar & Loutskina (2006) have studied this subject but missed some important aspects which are relevant to extract meaningful conclusions of the importance of the two main type of investors on the ventures' IPO valuations. Firstly, when considering if a venture was either CVC-backed or IVC-backed, they failed to look for the company's IPO prospectus to understand which funds were investing in the company at that time and who was the lead investor. Instead, they considered that a startup was CVC-backed if they had ever received funding from such investor. This is clearly misleading since a CVC fund is unlikely to have a significant impact on an IPO valuation if they are not an active investor at that point in time (Ivanov & Xie, 2010). Secondly, Bayar & Loutskina (2006) also fail to study the strategic fit between the venture and its corporate investor. This analysis is relevant in order to understand

whether a complementary relationship between ventures and investors significantly affect the new company's valuation at IPO vis-à-vis a non-complementary connection. Furthermore, it is also important to study the venture-investor relationship inside the Strategic Fit branch. As it is commonly known, each company is identified by a SIC Code which includes 4 digits. If the 4 digits are the same for the CVC and new company (ex. 1234) then there is a 100% strategic fit. Whereas, if only 3 of the digits are equal (ex. 1234 and 1235), there is only a 75% strategic fit. It is interesting to understand if there is a significant IPO valuation variation between these 4 strategic fit groups (25%, 50%, 75% and 100% fit) (Achleitner, Braun, Lutz & Reiner, 2014; Shuwaikh & Dubocage, 2018).

Having this in mind, I suggest the following Research Questions for my dissertation:

1. *Does the type of investor (IVC or CVC) significantly affect startups' IPO valuation?*
2. *Are Strategic CVC-backed ventures able to get higher IPO valuations comparing to its IVC counterparts?*
3. *Does the level of strategic fit affect the startups' valuation at IPO?*

Taking into consideration the lack of existing literature concerning the subject, I propose to study the relationship between the ventures' IPO valuation and the type of investor that backs them. Specifically, I will analyze the last 22 years of data regarding American venture's IPOs on the Healthcare, Biotechnology, Technology and Non-Technological sector, which had as a lead investor either a Corporate Venture Capitalist or an Independent Venture Capitalist. After searching for the companies' IPO prospectus and identifying the major investor, I will have access to two clearly distinguishable groups: CVC-backed and IVC-backed ventures. Looking deeper at the available resources, I will also be able to extract the ventures' IPO valuations and, on the CVC-backed side, separate between the Strategic and Non-Strategic backed startups. Still on this subject, after extracting the SIC Codes for the ventures and established companies, I will have access to 4 different groups of CVC-backed startups, separated by the strategic fit level. In order to address the endogeneity concerns when it comes to CVC financing, I will use a method of propensity score matching so that it will be possible to compare similar IVC and CVC-backed ventures, in terms of probability of being funded by a corporate investor. For this purpose, I extracted accounting data, such as Sales, Total Assets and Cash to match, as much as possible, equivalent ventures and compare their IPO valuations. All the data collected for the elaboration of this research was taken from renowned databases such as Thomson Reuters, Wharton Research Data Services (WRDS), The Center for Research in Security Prices (CRSP),

Compustat – Capital IQ and Crunchbase. The final data set consist of 719 American ventures from the industries previously selected which were funded either by IVC or CVC investors and went public between 1998 and 2020. The models used to prove my hypothesizes were estimated using Microsoft Excel, Statistical Product and Service Solutions (SPSS) and Stata.

My thesis makes important contributions to the existing literature. Firstly, as the subject concerning ventures' type of investors and its effect on the startups' IPO valuations has been understudied, I propose to demonstrate significant results regarding this topic. Specifically, understand if CVC-backed startups are able to constantly and significantly get higher valuations at their IPOs than their IVC-backed peers. Secondly, I plan to study the effects of a strategic partnership between corporation and entrepreneurs and, consequently, understand if the specific complementary assets provided by the firm have a significant impact on the IPO premiums. Lastly, looking closer at the ventures funded by corporate investors, I aim to study how the strategic fit affect the startups' IPO valuations. This part of the research will shed some light on the benefits of being backed by a complementary corporation and if there are significant differences regarding valuations when the strategic fit level differs, in terms of SIC Code correspondence. I have no doubts that my dissertation will benefit not only the existing research but also contribute for the Venture Capital Industry literacy and, specially, help current and future entrepreneurs choose their partnerships and investors more wisely.

The rest of my dissertation is structured as follows: Section 2 contains my Literature Review, where I present the most important papers in which I based my research as well as some key insights on the Venture Capital industry and the Hypothesis I propose to prove. Moreover, on Section 3 – Data & Methodology – I not only introduce my database and all the filters used to derive it but I also show the regressions and models that I will use in order to prove the assumptions previously stated. On Section 4, I will present my results according to the empirical analysis and interpret these results. I will start by presenting my Descriptive Statistics, followed by my Propensity Score Matching model and the identification of a few valuation trends based on that results. Still on this section, I will address the Value-Added vs Projection Selection concerns with a pair of simultaneous regressions and ending with a Robustness Test. Section 5 will be reserved to the discussion of my main results, followed by Section 6 where the limitations found during my research and a few remarks of future improvements to my thesis will be presented. Lastly, I will conclude with Section 7 where I will present the main

conclusions of my work and how it will contribute to the existing literature and literacy of future entrepreneurs.

2. Literature Review

On this section, I will start by looking at the main definitions surrounding Venture Capital, followed by an analysis of the most relevant literature regarding this topic. Furthermore, I will present the existing research on the valued added by Corporate Investors on startups and, specially, its effects on the ventures' valuation at IPO. I will conclude by presenting my hypothesis and how I will complement the existing research.

Nowadays, most researchers and practitioners agree there are two main types of Venture Capital investors: Corporate Venture Capitalists (CVCs) and Independent Venture Capitalists (IVCs). Gompers and Lerner (1998) are among the first to dive into this topic and identify the main differences between the two funds. While IVCs are limited partnership corporations designed specifically with the sole purpose of investing in new ventures, CVCs work as a subsidiary for an already established corporation. Secondly, on the one hand, IVCs are more interested in the financial returns, working hard to increase the startups' market value in order to collect the most returns possible at a successful exit. On the other hand, CVCs are more focused on strategic goals rather than financial. A corporate investor will try to collect as much innovation as possible from the incumbent firm, which will then be used in the parent corporation's operations. Finally, Gompers and Lerner (2000) found out that while IVCs work on an incentive-based scheme, typical for financial returns-oriented corporations, CVCs will have much lower incentives focusing mainly on the available "window on technology". One of the best examples to illustrate the close cooperation between CVCs and ventures is the story of the first commercial biotechnology startup, Genentech. In 1973-74, Stanley Norman Cohen and Professor Boyer developed, for the first time in history, human insulin by using DNA-recombining technology. Although the drug was developed by these scientists, they were helped by a pharmaceutical corporation, Eli Lilly, which provided valuable resources, such as laboratories and access to FDA approval and sales experts. This cooperation was vital for the final approval of the drug and its mass distribution (Hughes, 2001).

As the importance of startups increase in a global economy and they become the main drivers of innovation, so does the interest for this industry. Apart from the usual Independent Venture Capitalists, different players and established corporations have joined this sector. Corporations

from all types of core businesses, such as Microsoft, Reuters and UPS have created their own venture capital branches, having as their main goal extracting new innovations and efficiency tools capable of being adapted to their businesses (Hellmann, 2002). Following this increased interest on the industry, a lot of researchers have turned their attention, time and resources to this area (Megginson, 2004, p.89).

From the investor's perspective, researchers have focused their attention at trying to identify the key variables which have proven to affect CVC's performance (Yang, 2006) and understand if corporate investors are not only able to incorporate the new technologies and innovative processes harvested from the new firms but also if these new learnings are successfully translated into innovative output (Lenox, 2002). Moreover, the study of complex relationships between R&D and CVCs investments (Anokhin, 2006), the discovery that previously CVC-backed ventures are more inclined to start their own fund and are better in incorporating external knowledge (Anokhin, 2006) all have contributed, in their own way, for the proliferation of literature and knowledge, helping the industry's literacy.

Looking now at the ventures' side, the available literature tend to suggest that CVC-backed startups have higher innovation outputs when comparing to their IVC-backed peers (Park & Steensma, 2013). As previously stated, this consequence can be attributed to the fact that while corporate investors are mainly interested in strategic objectives, such as innovative products and efficiency tools, capable of increasing the parent corporation market value, IVCs' main focus are on the financial gains, translated into a successful exit (Hellmann, 2002). Moreover, several studies have shown that corporate investors are able to provide strategic complementary assets which are vital for the enterprise's higher innovative output rate vis-à-vis ventures backed by independent investors (Alvarez-Garrido & Dushnitsky, 2016; Gompers and Lerner, 2008). These assets can range from laboratory access to run trials, networking with persons of interest, IT and marketing support to being an open door for new and bigger markets (Dushnitsky, 2012). A Wall Street Journal in a December 28, 1999 article stresses these corporate gains perfectly:

"For start-ups, a corporate venture partner can be especially attractive because a large company can provide resources potentially more valuable than money – research, marketing, and connections."

Although the benefits of a CVC partnership are clearly shown above, a few concerns regarding these arrangements should also be taken into consideration. An example of a failed cooperation

can be seen in the GO-IBM conflict. After IBM backed GO, a pen-computing venture, and helping with marketing and distribution channels, the established corporation launched their own line of these products, jeopardizing the startups' subsistence (Kaplan, 1995). Taking this example into consideration, Hellmann (2002) came up with a model to study these complex relationships between venture and cooperation and understand who is the optimal strategic partner for the entrepreneurs. During his study, he concluded that if startups have a complementary relationship with the investor, then they will be better off with funding from a CVC. Moreover, if the incumbent firm is a mild substitute, the optimal choice for the entrepreneurs would be an IVC. Finally, if there is a case of a strong substitute venture, the best choice would be a syndication, where the independent investors take the lead, and the corporate venture works as a passive co-investor.

Furthermore, to complement Hellmann's (2002) work, Santhanakrishnan (2002) and Park & Steensma (2012) have shown that when there is a strategic fit between investor and startups, the likelihood of conflicts of interest are lower and the probability of a successful exit is higher. This will benefit not only the investor, who will have access to a lot of innovative ideas but also for the entrepreneurs who are able to take advantage of better resources and strategic guidance, leading to successful exits. Still on this subject, Guo, Lou and Pérez-Castrillo (2015) have studied the optimal invested amounts and investment duration of venture capitalists on new companies and its correlation with the exit strategy. According to their paper, CVC-backed startups have the most successful exits, as well as longer investment periods and bigger investment levels.

Even though, the existing literature clearly points out the benefits of having a strategic partner as investor, not only in terms of access to complementary assets, but also in terms of successful exits, most of these studies fail to quantify how prosperous these partnerships really are in terms of exit strategies. Several researchers focused on the entrepreneur's trade-off between going public or remaining private. On the one hand, the problems arising not only from the inevitable asymmetry of information (Chemmanur & Fulghieri, 1999) but also from the implications this might have in the future, such as loss of autonomy and control (Helwege & Packer., 2003) and corporate governance policies (Boot, Gopalan & Thakor, 2006) constrain founders' ability to take decisions. On the other hand, going public is a great opportunity to raise large sums of capital (Hellmann, 2002). Other practitioners, while also analyzing this trade-off theory, complemented the analysis by studying the entrepreneur's decision between being over

monitored, consequence of keeping the company private and having a small number of investors, and the direct costs and loss of ownership associated with an IPO listing (*Pagano & Röell*, 1998). Furthermore, several studies try to come up with a reliable model which can help both researchers and entrepreneurs better comprehend why companies go public. Most of these studies find significant variables which can be used to justify the venture's decision to go through an IPO. While studying the Italian market, Pagano, Panetta & Zingales (1998) found that the Stock Market valuation of companies in the same industry and the firm's size influence the probability of an IPO listing, which is corroborated by Chemmanur & Fulghieri (1999) and complemented in the sense that researchers found significant differences between industries and markets (European and American) regarding startups' age when going public.

Finally, to the best of my knowledge, Bayar & Loutskina (2006) have created the first theoretical model to address the firm's choice between going public or being acquired. During their study, the researchers identified 5 key ingredients which prompt the entrepreneur's decision between an IPO or Acquisition: *Success Probability in Product Market Competition*, that varies according to the venture´s stage (early or late) which influences the startups capability to defend against competitors; *Information Asymmetry,* insiders have the upper-hand when they go for an IPO listing, but this advantage is likely to be reduced in case of an Acquisition; *Synergies*, if a company goes public they will have to fight by themselves on the product market competition, this could be eased if a venture is acquire; *Valuation*, according to the researchers, if the company goes for the IPO option, the venture´s equity is more likely to have a higher valuation, while acquirers will try to reduce the premium as much as possible; *Conflict of Interests*, as explained by previous practitioners, while founders like to keep control of their enterprise, IVCs will only care about the financial gains. This is an important paper, since this was the first time the venture's IPO valuation was addressed taking into consideration the type of investor that was backing the venture. Although their valuable contributions, Bayar & Loutskina (2006) failed to identify the startups' lead investor based on the IPO prospectus, focusing only on the fact that the venture had at a certain point in time, received corporate funding. What is more, the model is not as robust as it was expected since it fails to address endogeneity concerns, meaning, the correlation between the explanatory variables and the error term.

To address this void, Ivanov & Xie (2010) studied the ventures' valuation at IPO comparing CVC and IVC backed startups, while taking into consideration the lead investors at the time of

the IPO listing and endogeneity problems. Later, the paper also looks at acquisition premiums and their significance when backed by the two different types of investors. During their study, the researchers presented most of the benefits attributed to a CVC partnership which have already been discussed above and more, such as credibility points to startup companies for being connected and backed by such a renowned enterprise. This advantage point grants the venture better access to markets and additional resources. While also noting the potential disruptions and conflicts of interests that can occur in these types of corporate partnerships, making it seem that an independent capitalist would be the best option, Ivanov & Xie (2010) put these theories to the test and try to understand which one will have the upper-hand when it comes to IPO valuations and acquisition premiums. After extracting the necessary data regarding VC-backed companies from 1981 to 2000, the researchers were able to conclude that CVCs add substantial value to their portfolio companies, which is than translated into significantly higher valuations at the IPOs when compared to its IVC peers, even when controlling for the endogeneity of CVC funding. As explained by the practitioners, the complementary assets provided by the established corporation play a big role on the value added and are able to supplement the conflicting costs of such cooperation. Further into their research, Ivanov & Xie (2010) opt to separate the CVC-backed ventures into the ones where a strategic fit is observed (Strategic CVC-backed) and the rest (Non-strategic CVC-backed). Also, in this part, the conclusion not only follows the same reasoning, but also, Strategic CVC-backed ventures have even higher valuations vis-à-vis IVC-backed startups. This conclusion suggests that a complementary alliance is better in IPO valuation terms than a general one. Furthermore, researchers also studied the takeover premiums for startups backed by these two investor types and conclusions followed the same pattern. CVC-backed firms were able to significantly earn higher takeover premiums than its IVC counterparts, being the premium higher when a strategic alliance was present.

Based on the above discussion regarding successful exit strategies, IPO valuations and acquisition premiums, I propose the following hypothesis to be tested using my own data.

Hypothesis I: CVC-backed companies are able to have higher IPO valuations vis-à-vis its IVC-backed peers.

According to the literature presented before (Hellmann (2002); Ivanov & Xie (2010); Park & Steensma (2013)), startups funded by corporate investors are able to have superior output rates, better chances of successful exits and higher valuations. With my dissertation I expect to further

complement the existing research by analyzing with my own database the effect of the type of investor on the ventures' IPO valuations.

Hypothesis II: CVC-backed companies will have a greater IPO valuation when a strategic fit is present between the startup and the established corporation.

As presented by Ivanov & Xie (2010) it is expected that ventures which have a complementary relation with the corporate venture will have a greater comparative advantage when comparing to its IVCs counterparts since the resources that can be provided by the corporate partner, such as access to laboratories or in-house developed technologies is more suited for the startup, hence, creating more value. It is then expected that these firms will have higher valuations at their IPOs.

Hypothesis III: Higher strategic fit levels will be translated into higher valuations

Using the data extracted, I intend to further complement the existing research by comparing the strategic fit levels and IPO valuations. As explained by Ensign (2001), this fit can be defined as an internal consistency or aligment. Inside the strategic fit branch, I intend to separate the CVC-backed ventures into 4 different groups according to their SIC Code and how it matches to the one from its corporate investor. The groups can go from 25% to a 100% match. It is expected that higher strategic fit levels will lead to significantly higher valuations (Achleitner, Braun, Lutz & Reiner, 2014; Shuwaikh & Dubocage, 2018).

3. Data and Methodology

3.1. Data

On this section, I will present my database as well as the different methods and filters I used to retrieve my data. The sample used to derive my results was extracted from well-known and reliable platforms, such as Thomson Reuters, Wharton Research Data Services (WRDS), Compustat – Capital IQ and Crunchbase. The sample collected consisted of 1698 Venture Capital-backed American startups from the Healthcare, Biotech, Technology and Non-Technology industries according to Venture Economics Industry Codes (VEIC), which went public between 1998 and 2020. When I first started looking for data using Thomson Reuters database, I used various filters to be able to access the information I needed, such as *Year Range*, *Industries' SIC Codes* and the *Company's "Went Public" Current Status*. I found out that even

though I was filtering for a specific year range and I demanded for the firms to be public, some companies either did not have an IPO date or had gone public before the required data range. These companies were immediately excluded from my sample. The next step was to filter for the *Type of Investor*. Although the current literature recognizes IVCs and CVCs as the two main type of investors, the Thomson Reuters platform considers a wide range of options. During my research, I was able to understand that the type of investors I was looking for were the Independent Private Partnership and Corporate or PE/Venture Fund, which corresponded to the IVCs and CVCs, respectively. After excluding the ventures which were neither funded by independent nor corporate investors, the sample was reduced to 1436 startups.

The next requirement I used to strengthen my research was for ventures to provide the Financial Statement data for the year prior to the offering. After gathering the Exchange Tickers for all the ventures present in my dataset from Thomson Reuters and using WRDS, specifically, Capital-IQ, I was able to collect data regarding *Sales*, *Earnings Before Interest Taxes Depreciations and Amortizations (EBITDA)*, *Total Assets*, *Cash* and *Earnings Before Extraordinary Assets*. This task proved to be more difficult than expected since not only some firms from the Healthcare sector were missing part of the necessary information but also, some of the ventures only disclosed the information after being public. As previously done, startups which did not comply with this prerequisite were excluded from my sample, leaving 1148 firms to work with.

In order to separate between CVC and IVC-backed startups, I also required firms to have available, through the Thomson Reuters database, information regarding the type and identity of their current and previous investors. This data was then matched to the investor with the largest pre-IPO ownership, the lead investor, according to the startups' IPO prospectus. This way, I was able to separate the ventures into two smaller groups considering the type of their main investor, IVC or CVC. For the purpose of my dissertation, I only considered a company CVC-backed, if this type of investor was the lead investor at the time of the IPO, since a corporate investor which is no longer an active shareholder in the venture is unlikely to have any effect at the IPO listing (Ivanov & Xie, 2010). Due to the lack of a filter able to identify the company's pre-IPO lead investor, I had to look at each prospectus individually. Even though, most of the information was available, I had to reduce part of my sample, since I was not able to identify a few firm's lead investors.

After controlling for the filters and variables presented above, I was able to come up with a final sample of 719 VC-backed ventures, of which 653 are IVC-backed and 66 are CVC-backed.

The next step was to identify the strategic fit between the startup and its Corporate Venture Investor. For this task, I used the WRDS platform to have access to the SIC Codes from both firm and investor. After extracting the 4-digit codes, I was able to divide the CVC-backed group into two smaller groups: Strategic CVC-backed IPOs and Non-Strategic CVC-backed IPOs. Moreover, when the SIC Codes were identified, the CVC-backed ventures were also divided into 4 groups, taking into consideration the strategic overlap with their corporate investor, ranging from a 100% fit, were the two firms' codes were a perfect match (ex. 1234 and 1234), to a 25% fit (ex. 1234 and 1567). This further division will be useful deeper into the research since it will enable me to extract significant results regarding the startups' IPO valuations and their strategic fit with the investors. Of the 66 CVC-backed ventures, 35 have a strategic fit with their corporate investor, while the remaining 31 do not have a strategic relationship.

3.2. Methodology

On this segment, and in order to come up with significant results to prove that CVC-backed ventures are, in fact, able to significantly achieve higher valuations than its IVC-backed peers at IPO, I designed a few models which will guide me throughout my research. Firstly, to begin my analysis, I calculated one of the most used valuation multiples for every venture present on my database (P/S), based on the information previously extracted.

$$\left(\frac{P}{S}\right) = \frac{IPO\ Valuation}{Prior\ Fiscal\ Year\ Sales}$$

Adding to this, I used a price-to-fair value ratio, following a method previously used by Purnanandam (2004). In my research, the price-to-fair value (P/V), consists of the ratio between the IPO valuation multiple (P/S) of a CVC-backed startup and the same multiple from a thoroughly chosen IVC-backed venture. According to the researchers who firstly studied this model, if the correspondent result from this ratio is close to one, we should assume the variable studied has only a marginal effect, meaning it is not significant. Nevertheless, if the ratio exceeds one, and has a *p*-value lower than the significance level threshold, we should consider the variable as significant. In this particular case, as I am studying the effect of CVC-backing

on the ventures' IPO valuation, if the resulting value is higher than one and its *p*-value fits the designated requirements, we should consider that CVCs indeed add value to their investees.

One of the biggest problems that has to be addressed when evaluating funding from investors and the value it adds are the endogeneity concerns. As it has been explained by Ivanov & Xie (2010) being funded by a established corporation is a decision that many founders are confronted during their ventures' life cycle and this choice is most likely not random. Adding to this, incumbent firms might decide only to fund ventures from certain industries, closing their investments from other promising startups. These scenarios may lead to different IPO valuations which cannot be fully attributed to the valued added by the lead investor.

3.2.1. Propensity Score Matching Procedure

Taking these problems into consideration, I conducted a Propensity Score Matching procedure firstly proposed by Dehejia & Wahba (1998) where its biggest advantage is being able to control for a wide range of observable attributes. In my thesis, the propensity score can be translated into the probability of a venture being backed by a corporate investor, taking into consideration a variety of independent variables. In order to come up with a reliable model, there are a few steps that should be taken previously, which I will explain in detail.

Firstly, I designed a Probit Regression, which in theory could help explain the chance of a venture being funded by a CVC. I decided to apply this model since I had a dummy as my dependent variable (binary response) and assumed a standard normal distribution (Wooldridge, 2012). In this model, I used a *CVC backing* dummy as my dependent variable, which would take the value of 1 if the firm's lead investor is an established firm, and 0 otherwise. Moreover, I also used the following independent variables: *Location*, *Early Stage*, *Log(Sales), Market-to-Book* ratio, *Profitability*, *CVC Activity* and *Tech*. As presented by Lerner (1995) the probability of closing an investment round with an incumbent firm depends on the firm's location. To address this issue, I created a *Location* dummy variable, which takes the value of 1 if the venture is located either in California or Massachusetts, and 0 otherwise. What is more, to control for the life cycle phase of each venture, and assuming firms might have an inclination for ventures on a certain stage, I created an *Early Stage* dummy variable, which takes the value 1 if the startup is in this stage, and 0 otherwise. Furthermore, it is also important to consider firm's accounting data, to have an idea on the investors' preferences when it comes to size, growth potential and profitability. For the first variable, I used the logarithmic transformation of the

venture's sales, *Log(Sales),* during the year prior to its IPO. Then to take the startups' growth potential into the equation, I considered the average of the *Market-to-book* ratio of the industry it was inserted, as a proxy for its growth. Finally, to control for the latter variable, *Profitability*, I used the firm's ratio between EBITDA and Sales, at the financial year before its IPO. Moreover, to control for the accessibility to CVC funds, I created the *CVC Activity* variable which considers the percentage of corporate funds invested versus the total VC funds available during the year each venture received its first investment round. The information regarding this last variable was extracted from the National Venture Capital Association (NVCA) 2019 Yearbook. Lastly, I used a *Tech* dummy variable, which would take the value 1 if, according to the VEIC, the venture belonged to the Technology sector, and 0 otherwise. After running the Probit regression, I calculated the Propensity Score for each venture based on the coefficient estimates for each variable. Moreover, and following the next step of this approach, I matched the CVC-backed ventures with its IVC peers according to the available scores, a method often called "nearest neighborhood" (Cover, 1968). The only requirement I applied to this system was that, at least, the SIC Code's first digit from both companies would have to be the same, per example, 1234 for the CVC-backed venture and 1376 for the IVC-backed startup. The last task of this model was to compute the P/V ratios between the designated neighbors, where the CVC-backed venture was the numerator and the IVC peer was the denominator. Consequently, the derived results might be analyzed taking into consideration the obtained ratios and its *p*-values.

3.2.2. Value Added vs Project Selection

To further complement my research and in line with what has been studied by Ivanov & Xie (2010), it is important to better understand the results previously extracted from the Propensity Score Matching Analysis and prove these are not completely driven from corporate investors' superior project selection abilities, as it will be explained. A few researchers and practitioners believe that one possible reason why CVC-backed ventures are able to obtain higher valuations is related to the incumbent firm's superior ability when choosing startups (Baum and Silverman, 2004; Brander, Amit, and Antweiler, 2002). As these established firms have multiple resources available, it is reasonable to assume that they are able to screen more deals and their due diligence processes are more detailed and extensively analyzed. Moreover, this scenario will give them the upper hand when selecting the most promising projects, most likely, the ones which will not only reach the IPO phase but will also get a higher valuation at this exit strategy.

To assure that my analysis and conclusions are not merely based on corporate investors higher project selection skills, and to tackle possible simultaneity problems, I ran a system of equations, where the dependent variables, *CVC* dummy and *IPO Valuation* ratio are endogenously computed. For the first variable, a Probit Regression was run while for the latter dependent variable, I used an OLS regression. Having this purpose in mind, I used several Instrumental Variables (IV), which are commonly used when endogenous variables are present in the proposed model, and control for unobserved sources of variability. Moreover, these variables are assumed to not have any direct effect on the outcome (P.D. Mehta, 2001, p.2727-2730). As usual, when IVs are used to address endogeneity, a two-stage least squares approach is taken by regressing the endogenous variable on all the exogenous variables in order to isolate the "good" variation on a first stage and then proceed to use the instrumented versions of such variable on the second stage, where the results will be free of endogeneity.

Firstly, for the CVC dummy, I chose two IVs based on my previous Propensity Score Analysis: *Location* and *Early Stage.* Considering that both these variables were proven to be significant in my previous model and, consequently, impact the probability of the venture being backed by a corporate investor, they can be used as IVs. Furthermore, to be considered an IV, these variables also have to comply with the exclusion restriction, meaning they cannot directly impact the startups' IPO valuation. Looking at the two chosen variables, it is fair to assume that they follow this requirement. On the one hand, it is unreasonable to assume a scenario where the location of a venture has a significant impact on its valuation. The fact that a venture is, per example, located in California will not influence the offering price of a certain firm. Variables such as Sales or Growth potential are much more likely to have this kind of impact. On the other hand, looking at the *Early Stage* variable, it is also unlikely that it will have a significant impact on the IPO valuation. Since I am strictly focusing on companies which will go public in the future, if the company is funded at an early stage, most probably, it will go through additional rounds of funding and will pass multiple life cycle phases before going public. Hence, any differences that might exist between early and late stage ventures will be mitigated by these different procedures, leading to a neutral impact on their IPO valuation.

For the IPO valuation, I used *Above Range* as my Instrumental Variable. This dummy variable takes the value of 1 if the offering price at the IPO is above the expected initial price range, and 0 otherwise. This variable obeys the two requirements presented before, since it is illogical to assume this variable will impact the venture's probability of being CVC-backed, complying

with the exclusion requirement and, finally, it is obviously related to the venture's IPO valuation, checking the other requirement as well. For the second stage of this model, I used the instrumented version of the CVC dummy and IPO Valuation variables which were previously regressed on the first stage. Furthermore, for the OLS regression concerning the valuation multiple, *Log (Price/Sales)*, I also added other independent variables, such as the *Startups' Age at IPO, Profitability, Log(Sales), Industry MTB,* to measure the venture's industry growth potential and *Tech,* a dummy which takes the value of 1 if the venture is related to the Technology industry, and 0 otherwise.

4. Empirical Analysis of IPO Valuations

On this section of my thesis, I am aiming to show the results from the regressions and models presented at the Methodology section, as well as proving that my hypothesizes are backed by my dataset. To begin my analysis, I will firstly show some Descriptive Statistics which will help shed some light on how my sample is distributed and the significant mean differences between CVC and IVC-backed ventures, plus the distinction between sub-groups regarding the Strategic overlap.

4.1. Results

Table I shows the descriptive statistics for my dataset. At a first glance, when comparing IVC-backed ventures with the full sample of CVC-backed ventures, it is easy to understand that ventures funded by established corporations not only turn out to be significantly larger, with higher revenues, but they also tend to go public at a younger age and significantly have higher valuations at IPO. Nevertheless, these startups are usually significantly less profitable than its IVC-peers on the year prior to its IPO. Looking at Table II, when dividing the CVC-backed sample based on the strategic overlap between investor and startup, and contrary to what has been proven by Ivanov & Xie (2010), the significant differences presented in the full sample seem to be prompted by the Nonstrategic CVC-backed ventures rather than the strategic peers. Startups with no strategic overlap with its corporate investors are significantly bigger, have significantly higher valuations at IPO, their revenues are substantially higher and are less profitable than its IVCs counterparts. According to my database, it seems the only significant differences between a Strategic-backed venture and IVC-backed firms are in terms of profitability where it follows the trend presented before. However, when separating Strategic-backed ventures regarding their percentage strategic fit with the corporate investor, I found a

few interesting results. Specifically, when comparing IVC-backed ventures and startups with a 75% strategic overlap, I found out that not only is the latter group significantly smaller and with lower revenues but also that these ventures take less time to go public. These results contrast with the first results presented, which showed that CVC-backed ventures are usually bigger and with higher revenues. The results presented above for the IPO valuations of the different groups did not take into consideration any endogeneity concerns nor did it control for any variables. The results previously shown served as an introduction for the in-depth analysis that follows.

Table I. Descriptive Statistics of Venture Capitalists (VC)-Backed IPOs

The sample contains 719 VC-backed ventures which went public from 1998 to 2020. From this dataset, 653 startups have as their lead investor an Independent Venture Capitalist (IVC), while the remaining 66 venture are funded by Corporate Venture Capitalists (CVC). Considering the CVC-backed firms, 35 are Strategic CVC-Backed and 31 are Nonstrategic CVC-Backed. Panel A shows the distribution of the sample by IPO year. Panel B presents the descriptive statistics of the companies present in the dataset, with the figure in each cell being the mean. IVC-backed IPOs and all CVC-backed IPOs form one comparison group with the significance symbols being attached to the larger means. Moreover, Strategic and Nonstrategic CVC-backed IPOs form another comparison group with the same happening for the 100% and 75% Strategic CVC-Backed groups. This analysis does not incorporate the 25% and 50% groups due to the lack of representativity.

	IVC-Backed	**CVC-Backed**	**Strategic CVC-Backed**	**Nonstrategic CVC-Backed**	**100% Strategic CVC-Backed**	**75% Strategic CVC-Backed**
Panel A. Distribution by IPO Year						
1998-2004	190	21	8	13	5	0
2005-2010	93	7	4	3	3	0
2011-2015	217	15	8	7	4	4
2016-2020	153	23	15	8	5	9
Panel B. Descriptive Statistics: Mean						
Total Assets ($ mil)	292.6	643.8*	225.1	1116.4	267.6	126.9
Sales ($ mil)	163.9	293.5	74.2	541.1	84.3	65.0
Profitability (%)	-2.2***	-9.2	-11.6	-6.5	-19.7	-3.1
Startup Age	10.2	8.1	7.5	8.8	7.7	7.2
IPO Valuation ($ mil)	1091.6	2867.4**	1551.6	4353.1	2377.4	854.9

***Significance for the t-test for differences in means at the 1% level

**Significance for the t-test for differences in means at the 5% level

* Significance for the t-test for differences in means at the 10% level

Table II. Descriptive Statistics and Comparison between CVC and IVC-Backed Ventures

The sample contains 719 VC-backed ventures which went public from 1998 to 2020. From this dataset, 653 startups have as their lead investor an Independent Venture Capitalist (IVC), while the remaining 66 venture are funded by Corporate Venture Capitalists (CVC). Considering the CVC-backed firms, 35 are Strategic CVC-Backed and 31 are Nonstrategic CVC-Backed. This table presents the descriptive statistics of the companies present in the dataset, with the figure in each cell being the mean. The significance symbols are attached to the larger means. The dataset is divided into 4 comparison groups, where the different CVC-backed samples are benchmarked against the IVC- backed ventures.

	Total Assets ($ mil)	**Sales ($ mil)**	**Profitability (%)**	**Startup Age**	**IPO Valuation ($ mil)**
IVC-Backed	292.6	163.9	-2.2***	10.2	1091.6
Strategic CVC-Backed	225.1	74.2	-11.6	7.5	1551.6
IVC-Backed	292.6	163.9	-2.2**	10.2	1091.6
Nonstrategic CVC-Backed	1116.4**	541.1**	-6.5	8.8	4353.1***
IVC-Backed	292.6	163.9	-2.2***	10.2	1091.6
100% Strategic CVC-Backed	267.6	84.3	-19.7	7.7	2377.4
IVC-Backed	292.6*	163.9*	-2.2	10.2*	1091.6
75% Strategic CVC-Backed	126.9	65.0	-3.1	7.2	854.9

***Significance for the t-test for differences in means at the 1% level
** Significance for the t-test for differences in means at the 5% level
* Significance for the t-test for differences in means at the 10% level

After presenting the Descriptive Statistics for my sample, I will now analyze the results from my Propensity Score Approach. As it was presented at the previous section, this Probit Model was conducted based on a few independent variables that could help explain the probability of a venture being CVC-backed, which was my dependent variable. After storing the Propensity Score of each startup, CVC and IVC-backed firms were matched taking into consideration their closest neighbor and the SIC Code requirement, followed by the computation of the valuation multiple ratio of the pair. Looking at Table III, it is possible to better understand the derived results. Panel A shows the estimated coefficients for the variables as well as their *p*-values. Based on this outcome, and in line with what has been proven by Ivanov & Xie (2010), I am able to conclude that ventures which were financed in an earlier stage, have their headquarters either in California or Massachusetts, have less revenues and are from the Technology sector are statistically more likely to be funded by corporate investors, for, at least, a 10% significance level. More importantly, on Panel B, I was able to clearly highlight the results from the

valuation multiple ratios of the CVC-backed ventures vis-à-vis its carefully picked IVC competitors. When comparing for the Full Sample, with 66 CVC-backed ventures, I got a median P/V ratio of 1.56, which not only is greater than 1 but it is also significant for an 1% significance level. This leads to the conclusion that startups backed by corporate investors have higher valuations, supporting my Hypothesis I, regarding the value added by corporate investors vis-à-vis its IVC counterparts. Furthermore, when the Strategic fit between investors and investees is taken into account, the results remain interesting. When comparing CVC ventures with no strategic fit with the full sample of strategically backed startups, without discriminating based on the level of overlap, although both ratios are higher than one when comparing to ventures which are funded by independent investors, it is clear how the startups with a strategic fit with their investors are able to outperform the ones which do not have this bond. While non-strategic ventures are only able to sustain a 1.16 ratio over its IVC neighbors, which it is not significant for a reasonable significance level, the CVC-backed firms with a strategic fit hold a clearly superior 2.02 ratio over its IVC competitors, while being statistically significant for an 1% significance level. The results presented seem to provide solid evidence to my Hypothesis II, since strategically backed ventures are able to have significantly higher valuations than its non-strategically backed CVC peers when compared to IVC-backed startups. Lastly, I divided the CVC-backed ventures based on their strategic overlap to test if higher strategic fits would be translated into higher valuation multiple ratios and prove my Hypothesis III. On the one hand, when there is a 100% Strategic Fit between the established corporation and the new firm, this ratio increases to 2.39, which is significantly higher than 1, leading to solid higher valuations at IPO, significant at a 99% confidence level. On the other hand, based on my results, although the valuation multiple ratio median is also substantially greater than 1, when there is a 75% strategic fit between the two parties, with a value of 1.69, this result is not statistically significant for a reasonable significance level. Finally, looking at my Hypothesis III, it seems that this assumption also holds. Even though both the 100% and 75% strategic-fit groups are able to sustain higher valuations, the computations show the 100% group has a clear advantage in terms of both IPO valuations and significance levels, in line with my rationale. Unfortunately, due to fact that I was only able to collect information about 2 and 3 startups with a strategic overlap of 25% and 50%, respectively, I decided not to conduct this analysis for these sub-groups, as the available sample was too small.

Table III. Tests for Differences in Valuations of CVC-Backed and IVC-Backed IPOs – P/V Ratios Based on Valuation Multiple

The sample contains 719 VC-backed ventures which went public from 1998 to 2020. From this dataset, 653 startups have as their lead investor an Independent Venture Capitalist (IVC), while the remaining 66 ventures are funded by Corporate Venture Capitalists (CVC). Considering the CVC-backed firms, 35 are Strategic CVC-Backed and 31 are Nonstrategic CVC-Backed. Panel A shows the regression results of the Probit Model in which the dependent variable, CVC Dummy equals to 1 if the startup is backed by a corporate investor, and 0 otherwise. In parenthesis in Panel A are two-sided *p*-values. Panel B and C present the median P/V ratios for the five types of IPOs over the full sample period. In parenthesis in Panel B and C are two-sided *p*-values from the Wilcoxon signed-rank tests.

Panel A. Probit Model Regressions

Independent Variables	**Coefficient Estimates (P-Values)**
Intercept	2.04 (0.32)
Early Stage	0.46 (0.03)
Location	0.25 (0.09)
CVC Activity	0.57 (0.27)
Log (Sales)	-0.23 (0.02)
Industry MTB	-0.93 (0.08)
Profitability	-0.005 (0.27)
Tech	1.27 (0.04)
Pseudo R^2	0.1
Prob > chi-squared	0.00
Number of observations	719

Panel B. Full Sample

Multiple	CVC IPOs		Strategic CVC IPOs		Nonstrategic CVC IPOs	
	No. of Issues	Median P/V Ratio (P-Value)	No. of Issues	Median P/V Ratio (P-Value)	No. of Issues	Median P/V Ratio (P-Value)
Price/Sales	66	1.56 (0.00)	35	2.02 (0.00)	31	1.16 (0.17)

Panel C. Strategic Overlap

Multiple	100% Strategic CVC IPOs		75% Strategic CVC IPOs	
	No. of Issues	Median P/V Ratio (P-Value)	No. of Issues	Median P/V Ratio (P-Value)
Price/Sales	17	2.39 (0.01)	13	1.69 (0.13)

Moreover, following my successful previous results, I will now present the outcome of the second model shown at the Methodology section. Since the coefficients and *p*-values found on the first model clearly showed the positive effects of being CVC-backed, both when analyzing the full sample and when only comparing Strategic CVC-backed ventures, I decided to ran the proposed model for these two separate samples. While the first sample consisted of the 719 ventures presented, from which 66 are CVC-backed, the second sample excluded the 31 startups which did not comply with the Strategic overlap requirement. As it was explained, this model was conducted using two simultaneous regressions. The main goal of this model is to prove that the results extracted from the Propensity Score model, specially, the ones proving that CVC-backed firms are able to have significantly higher IPO valuation than its IVC peers, are not entirely a result of corporate investor project selection ability and that, instead, the value added by these investors also play an important role. The most relevant results, derived from the second-stage regressions, are presented on Table IV. Firstly, when using my full sample and by looking at the Probit Model regression, on Panel A, contrary to what has been found by Ivanov & Xie (2010), the valuation multiple is not significant for a reasonable confidence level and has a negative coefficient of -0.85. This result indicates that the superior project selection defended by some practitioners cannot be proven, according to my sample. Nevertheless, if we look at the OLS regression results, for the same sample, it is clearly observed the positive and

significant influence of the CVC-backing variable on the valuation multiple, meaning that the higher valuations that were previously presented on Table III can be attributed to the value added by established corporations on its ventures. Even though it is not reasonable to assume that the CVC-backed ventures' higher valuations can be fully explained by the complementary assets provided by incumbent firms, it is clear that part of CVC-backed startups success when going public is due to the valued added by the corporate investors. Additionally, after running the regression for the second sample, on Panel B, which only included CVC strategically backed ventures and IVC-backed ventures, although the results regarding the CVC-backing variable were very similar to the ones previously computed in terms of significance, the derived results for the valuation multiple have a different interpretation. While the coefficient for such variable is still negative, the extracted *p*-value is significant for a 5% significance level. This suggests that not only the superior project selection theory does not hold, but also that, when only focusing on Strategic CVC-backed ventures, the valuation multiple has negative impact on the probability of an IPO being CVC funded.

Table IV. CVCs Value Added vs Superior Project Selection – System of Simultaneous Equations

The sample contains 719 VC-backed ventures which went public from 1998 to 2020. From this dataset, 653 startups have as their lead investor an Independent Venture Capitalist (IVC), while the remaining 66 venture are funded by Corporate Venture Capitalists (CVC). Considering the CVC-backed firms, 35 are Strategic CVC-Backed and 31 are Nonstrategic CVC-Backed. For the Full Sample, Panel A shows the two columns of coefficient estimates corresponding to the values obtained after running the system of regressions which have as their dependent variables CVC dummy and logarithmic transformation of Price/Sales valuation multiple. For Strategic CVC-backed ventures only, with a sample of 688 ventures, Panel B follows the same logic as Panel A, with the dependent variables being Strategic CVC dummy and the logarithmic transformation of Price/Sales valuation multiple. In parenthesis are two-sided *p*-value. CVC*, Strategic CVC* and Log (Price/Sales)* are the instrumented versions of such variables.

Panel A. Full Sample

Independent Variables	**Coefficient Estimates (P-Values)**	
	OLS: Log (Price/Sales)	**Probit: CVC Dummy**
Intercept	1.63 (0.00)	-0.71 (0.65)
CVC*	0.79 (0.02)	
Log (Price/Sales)*		-0.85 (0.55)
Early Stage		0.48 (0.00)
Location		0.28 (0.05)
Startup Age	-0.01 (0.57)	
Log (Sales)	-0.65 (0.00)	
Industry MTB	0.08 (0.48)	
Profitability	-0.004 (0.00)	
Tech	0.07 (0.57)	
Above Range	0.27 (0.00)	
Adjusted R^2or Pseudo R^2	0.64	0.1
Prob > chi-squared	0.00	0.00
Number of observations	719	719

Panel B. Strategic CVC-Backed IPOs		
Independent Variables	**Coefficient Estimates (P-Values)**	
	OLS: Log (Price/Sales)	**Probit: Strategic CVC**
Intercept	1.85 (0.00)	4.37 (0.14)
Strategic CVC*	1.36 (0.01)	
Log (Price/Sales)*		-5.79 (0.03)
Early Stage		0.41 (0.02)
Location		0.36 (0.04)
Startup Age	-0.01 (0.01)	
Log (Sales)	-0.67 (0.00)	
Industry MTB	0.03 (0.80)	
Profitability	-0.004 (0.01)	
Tech	0.12 (0.33)	
Above Range	0.26 (0.00)	
Adjusted R^2 or Pseudo R^2	0.64	0.15
Prob > chi-squared	0.00	0.00
Number of observations	688	688

4.2. Robustness Test

In order to understand the robustness of my analysis and prove that CVC-backed ventures are able to get higher valuations at their IPO, I applied a different method to address the endogeneity concerns. This approach, was firstly used by Comment & Schwert (1995) on their study of poison pills and their effect on takeover premiums. Following this approach, I used the Probit regression estimated for the Propensity Matching Procedure to compute each venture's probability of being CVC-backed. After this procedure, I divided the CVC dummy into two separate variables: the *Predicted Component* and the *Surprise Component.* The first variable is merely the score of each venture taking into consideration the coefficients derived from the Probit model. The latter variable is computed as the difference between the CVC dummy for each firm (0 or 1) and the Predicted Component, previously calculated. After storing these two new variables, I ran an OLS regression, where the dependent variable was my Price Multiple, *Log (Price/Sales)*, and my independent variables included the two most recent variables of my

model, the *Predicted* and *Surprise Components*. The results of my regression can be observed at Table V, where it is understandable the positivity and significance, at a 10% level, of the Surprise Component, proving, once again, that the results extracted from the previous regressions are not driven by the endogeneity of the CVC dummy. This finding is also in line with what has been proven by Ivanov & Xie (2010), although their results are even more significant than the ones shown here.

Table V. Robustness Test

The sample contains 719 VC-backed ventures which went public from 1998 to 2020. From this dataset, 653 startups have as their lead investor an Independent Venture Capitalist (IVC), while the remaining 66 venture are funded by Corporate Venture Capitalists (CVC). Considering the CVC-backed firms, 35 are Strategic CVC-Backed and 31 are Nonstrategic CVC-Backed. The table below presents the column of coefficient estimates corresponding to the values obtained after running the robustness test which have as their dependent variable Log (Price/Sales). In parenthesis are two-sided *p*-values.

Independent Variables	**Coefficient Estimates (P-Values)**
Intercept	0.64 (0.00)
Predicted	5.08 (0.00)
Surprise	0.14 (0.09)
Adjusted R^2	0.2
Prob > chi-squared	0.00
Number of observations	719

5. Main Results

Finally, after running the suggested models and showing the relevant tables and results, I believe it is important to summarize the most important findings that can be extracted from these previous regressions. Firstly, focusing on the Propensity Score Approach, I proved, by comparing ventures with similar probability of being CVC-backed, that the ones which were, in fact, funded by a corporate investor were able to significantly outperform their IVC-counterparts in terms of higher IPO valuations. This finding is clearly in line with my Hypothesis I, which was here undoubtedly proven. This fact is not only true for the full sample of 719 ventures, where 66 are CVC-backed, but it also holds when I divide the sample into sub-groups according to their strategic fit. When looking at the Strategic and Non-Strategic CVC-backed groups, I was able to reach a valuation multiple higher than 1 in both cases, although

on the latter group the derived *p*-value was not significant for a reasonable significance level. As a result of this particular finding, I was once again able to prove my hypothesis II, which stated that ventures which had a strategic overlap with their investors were able to have higher valuations than its Non-strategic CVC partners. Finally, when comparing startups which have a 100% strategic fit with their investor, meaning both their SIC Codes match perfectly, with their IVC's propensity score nearest neighbor, I found out that the valuation multiple ratio was even greater than the one previously computed, which was translated into an even higher significancy in terms of IPO valuation. Furthermore, even though startups with a 75% strategic fit are able to sustain a ratio over one vis-à-vis its IVC-competitors, this result is not significant when applying the Wilcoxon signed-rank tests. This realization clearly supports my hypothesis III, which stated that higher strategic fit percentages would be translated into more significant IPO valuations vis-à-vis its IVC counterparts.

Looking now at the second model presented, it is also clear its significant results and its contributions for my research. By using a system of two simultaneous regressions and several instrumental variables, I ensured that my dependent variables, CVC dummy and IPO valuation are endogenously computed. The regressions designed dissipated part of the existing doubts regarding the true value added by corporate investors to its ventures. When analyzing the results, it is possible to understand that the ventures' success at IPO has to be credited to the valued added by this type of investors. This finding gives extra support to my results previously found and brings to the spotlight the true value that having a corporate investor and having access to their complementary assets can have in boosting a firm's valuation when it is time to go public.

Finally, the significant and positive results derived from the robustness test shows, once again, with the help of new independent variables that the results presented before are not driven by the endogeneity of the CVC dummy variable.

6. Limitations

As it should come as no surprise, every analysis and consequent results are highly dependent on the quality of the available database and the variables included. Having this in mind, on this next section, I will present some of the limitation points of my thesis, as well as some suggestions for future research.

Firstly, as it has been presented before on the Data section, I found a few barriers when extracting my data from the different platforms. To begin with, I used Thomson Reuters as my main platform, where I collected some of the most important features regarding the ventures, such as *Company Founded Data*, *Company IPO date* and *Industry*, after filtering for startups which were public. While I was able to access most of this information easily, part of the ventures were either missing their IPO date or had their Foundation Date after their IPO, which forced me to immediately reduce my sample. Adding to this, the platform was not only unable to provide the startups' lead investor at IPO but was also unable to filter for firms which had only been funded by one type of investor, presenting instead all the firms where at least one of these investors was present. This proved to be my main struggle during my research. Since I was not able to have access to this information on Thomson Reuters, I had to look at every firm's final IPO prospectus, individually, and find its main investors at their exit. Apart from being an extremely time-consuming process, it had the additional problem of some prospectus not having the information I was aiming for. Once again, these constraints forced me to reduce my sample. Moving on to the WRDS platform, where I mainly used Compustat–IQ to extract useful accounting data, such as Revenues, EBITDA and Cash, I found similar problems. When using the Exchange Tickers, previously found at the Thomson Reuters platform, to obtain the required variables, I understood that this platform either did not recognize the inserted ticker or did not had the required information for the year I was looking for, leading to the removal of extra ventures from my sample. In conclusion, all the constraints presented above serve to explain why my final sample only includes 719 ventures for the years between 1998 and 2020. I believe the problems faced can be partly attributed to the lack of transparency present on the Venture Capital industry which chooses to keep part of their information a secret. Moreover, we should not forget the lack of quality of the platforms in which we were supposed to base our work. I strongly believe that the time lost on looking for information which should be available on these platforms, could have been used to complement my research. Further research on this topic should have these problems into consideration and try to gather a larger sample, either by

gathering information for an amplified number of years or having access to different platforms, which ideally, will fill most of the gaps I had concerning multiple variables.

Secondly, when looking at the sample itself, I found a few problems with the CVC-backed ventures and its Strategic Fit. For starters, and in line with previous research works, the amount of CVC lead investors (66) accounts for less than 10% of my sample, which can lead to biased results and conclusions when comparing with a much larger sample – 653 IVC-backed ventures. This may indicate that CVC investors are much more comfortable into co-investing with an IVC partner and keeping a "tourist" approach instead of a pro-active and leading one. The reduced number of CVC-backed ventures obviously constrained my ability to divide these startups into sub-groups and, consequently, extract meaningful and unbiased results. Since my sub-groups contained 17, 13, 2 and 3 for the 100%, 75%, 50% and 25% groups, respectively, I decided to apply my models and regressions only to the two first classes. Taking this into consideration, it is important to take my results as a reflection of the available data and the constraints associated with it. As a suggestion for future research, in order to achieve a higher percentage of CVC-backed ventures, it might be useful to consider as funded by corporate investors all the firms which have at least one CVC fund at the time of IPO. This way, practitioners will not only have access to more CVC-backed firms, but they will also be able to separate this group into CVC (Lead Investor) and CVC (No Lead Investor) and compare the IPO valuations of the firms. It should be interesting to understand if ventures are only able to outperform their IVC competitors when the corporate investor is the lead or if this trend remains even when CVCs are not lead investors.

Thirdly, when searching for data to complement my research with one more valuation multiple, apart from the one I used (Price/Sales), I also came across a few barriers. Specially, when trying to compute the Enterprise Value, for each venture, I was not able to extract the necessary data regarding Debt for most of the ventures. For this reason, I decided to drop this approach and continue my dissertation with the valuation multiple I was previously able to calculate. Having this in consideration, future research, can look for different valuation multiples in order to complement the analysis and be able to compare between different ratios.

Finally, for future research, and keeping in line with what has been previously said, it would be interesting to complement the existing analysis with a more robust and larger sample and access to data from different platforms, such as VentureXpert. Moreover, my dissertation was only

focused on one exit strategy, the Initial Public Offering. Further research could analyze the effect of the value added by corporate investors, considering different exits such as Acquisition or Secondary Sales. On the Acquisition analysis, researchers would be able to extract the ventures' valuation at exit and compare the two main groups, CVC and IVC-backed, in terms of acquisition premiums. The main constraints of this research would be the information gathering, since most of the acquired companies never go public and the disclosure of important data is not mandatory. Nevertheless, this would be an interesting topic to explore. My second recommendation regarding Secondary Sales analysis would focus on the ventures' valuations at the time of the stock selling by investors and would compare these valuations to understand the valued added by CVCs. Having this in mind, researchers might face the same problems of the previous recommendation, as the information needed to complement the analysis might not be available.

7. Conclusion

As previously stated, the main goal of my dissertation is to study the effects of the value added by corporate investors to their portfolio by comparing CVC-backed ventures with its IVC-backed peers in terms of IPO valuation. Surprisingly, to the best of my knowledge, this has been an understudied subject by researchers and practitioners, which highly contributed to my interest in the topic.

Throughout my research, I came across different points of view regarding the value added by corporate investors and their true intentions when funding a venture. On the one hand, researchers pointed out the complementary asset provided by CVCs which would, ideally, help startups develop their products and services, while also adapting this new "window on technology" to the incumbent firm's core business. This access to different types of assets would not only help the venture grow but also increase their value. On the other hand, some practitioners followed another line of reasoning, stating that conflicts of interest may arise between the two parties and the established corporation may take advantage of the new knowledge extracted from the startup and develop a competing product, which would then jeopardize the new firm's survival. To test these two theories, I developed a series of models in order to compare the valuations at IPO of CVC-backed ventures vis-à-vis its IVC counterparts.

Looking at the results presented in the previous sections of this thesis, it is clear the value added by corporate investors. When matching ventures based on their lead investor and their propensity score, it becomes clear the significance of the results shown and the veracity of the three hypothesizes proposed. Firstly, focusing on the ratios displayed on Table III, it is easy to understand that my Hypothesis I holds, as the median P/V ratio for CVC IPOs is higher than 1 and the associated *p*-value is significant for an 1% level, translated into higher IPO valuations for CVC-backed ventures. Furthermore, on the same table, and looking at the median ratios obtained for the Strategic CVC IPOs and Non-Strategic CVC IPOs, the results are also in line with my Hypothesis II. In fact, the *p*-values extracted prove that when there is a strategic overlap between investor and investee the IPO valuation is significantly greater than its IVC peers, for an 1% level, which does not happen with Non-strategic CVC-backed ventures, where the null hypothesis, of equal valuations, cannot be rejected. Finally, my computations focused on the existing strategic overlap seem to also be in line with my Hypothesis III. For the 100% Strategic Fit ventures, the median ratio obtained is clearly greater than 1 with a significant *p*-value at an 1% significance level. However, when calculating the same ratio for the 75% Strategic Fit ventures, I concluded these ventures were not able to significantly obtain higher valuations than its IVC competitors.

To strengthen my research, I also proved that my results were not solely based on corporate investors superior project selection skills. By running a system of simultaneous regressions, with multiple Instrumental Variables, where the dependent variables were CVC Dummy and Log(Sales/Price), respectively, I proved that the higher valuations obtained by CVC-backed ventures were not only explained by corporate investors project selection abilities but also by the value added by these during their investment period.

To conclude, I believe my work brings important contributions to the existing literature and the Venture Capital industry literacy. On the one hand, it will shed additional light on the benefits that corporate investors can provide to the ventures they fund and, consequently, support the claims of how important these types of investors really are for the industry. On the other hand, I strongly feel that my research will help future entrepreneurs when considering external funding to grow their business. As previously stated, this is a difficult decision that some founders face during their startup's life cycle, which can be eased by some of the conclusions demonstrated during my research. As an example, if entrepreneurs are looking to cash in in the future, they might consider a corporate partner which will be able to provide not only the

necessary complementary assets to expand their venture but also boost their valuation at a possible IPO. Lastly, I believe my thesis will contribute to the transparency of an often-characterized closed industry where the lack of available and reliable data is frustrating.

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9. Appendixes

Appendix 1. Articles in the Literature Review

Authors	Sample	Dependent Variable	Independent Variable	Finding
Elisa Alvarez-Garrido and Gary Dushnitsky	545 U.S. biotechnology startups founded between 1990 and 2003	New ventures' innovation output (patents and publications)	CVC Dummy (1 if CVC-backed, 0 otherwise), FDA Approval requirement, geographical proximity (investor and startup)	As expected, innovation outcome is higher on CVC-backed startups, with the output being greater when FDA Approval is required, and investor and venture are geographically close to each other
Mukunthan Santhanakrishnan (2002)	242 U.S. startups which received venture investments from CVCs from 1995 to 1997	Startups' successful exit (1 if venture has gone public or acquired, 0 otherwise)	Weak and Strong Complementary between investor and venture, industry dummies, startup's age	Complementary companies are more likely to have successful exits than non-complementary companies; CVCs have higher incentives to give support to complementary ventures; product market alliances increase the likelihood of private companies having successful exits and hence are valuable to the entrepreneurs;
Gary Dushnitsky and Michael J. Lenox (2002)	2289 U.S firms investing in CVC or patented from 1969 to 1999	Count of patent citations for patents applied	CVC investments, Annual firm research expenditures, Firm Size	The increase in patenting and citations output is positively related to the level of prior CVC investment; firm

		for by a firm in a given year		innovativeness is stronger in weak intellectual property protection industries.
Paul A. Gompers and Josh Lerner	32,364 investments made by VCs in the U.S. during 1983-1994	Probability of IPO, default, favorable acquisition	CVC-backing, strategic fit	When it comes to the likelihood of a successful IPO, there are no significant differences between CVCs and IVCs; a successful IPO is more likely when a business overlap is present
Vladimir I. Ivanov and Fei Xie	1510 VC-backed IPOs from 1981 to 2000	CVC dummy (1 if IPO was backed by CVC, 0 otherwise), Strategic CVC dummy.	Early Stage, Location, CVC Activity, Firm Age, Sales, VC Age, Profitability, Industry Dummies	CVC-backed startups are able to get higher IPO valuations at IPO; the relationship is stronger when a strategic fit is present; Acquisitions premiums are also higher for CVC- backed ventures
Sergey Anokhin	163 corporations which engaged in CVC investments from 1998 to 2003	Rates of Corporate Innovation, CVParent dummy (1 if CVC, 0 otherwise)	Internal R&D Intensity, CVC Intensity, Organizational Slack, Risk, Industrial Dummy, Firm Size, CVChild (1 if corporation with prior experience in receiving CVC investment, 0 otherwise; CVBoard	R&D activity is positively related to corporate innovation; corporation take more time to assimilate exterior knowledge (from startups); Corporations which previously received CVC funding are more likely to start their own venture fund and are better in incorporating exterior know-how
Yi Yang (2006)	Over 9000 CVC investment observations from 1990 to 2004	Technological Diversification, Corporate Investor's Growth Value	Autonomy, Syndication Activities, Capital Expenditure, leverage ratio, sales growth, R&D Expenditure	Identification of key characteristics of a CVC program which have the biggest impact on the fund's performance: Lifespan, Stability, Incentive Scheme, Autonomy, Investment Syndication, Board Representation
William L. Megginson	N.A	N.A	N.A	A Global Venture Capital market is not likely to rise in the near future. VC investments are rising substantially but in national segment markets. Main constraint are the different legal systems.
Sally Smith Hughes	N.A	N.A	N.A	The first biotech drug was developed in a partnership between a Startup and an established corporation. This was one of the first CVC-backed

				startups which proved to be very successful.
Bing Guo; Yun Lou; David Pérez-Castrilho	4311 U.S Startups with their first investment between 1980 to 2004	Investment Amount, Duration, Exit Route, Syndicate Size, VC Fund Size, Industry Dummy	CVC Dummy (1 if CVC-backed, 0 otherwise), CVC Investment Percentage	CVC-backed startups benefit from larger investment levels and have longer durations before exiting (IPO or Acquisition). This leads to a higher rate of a successful exit.
Haemin Dennis Park and H. Kevin Steensma	508 U.S Startups which received their first investment between 1990 to 2003	Pre-funding innovative capabilities, Post Funding rates innovation,	CVC funded dummy (1 if CVC-backed, 0 otherwise), Reputation of Corporate Investors	Corporate Investors prefer ventures which are focused in innovation and have higher pre-funding innovative capabilities. Furthermore, using CVCs complementary assets, new ventures will have higher post funding rates of innovation vis-à-vis its IV counterparts. Innovation rates are higher when investors have a high reputation.
Thomas Hellmann	N.A	N.A	N.A	If the startup has a strategic fit with the investor, then CVC funding is more likely. If the new venture is a mild substitute, IVC funding is more likely. Finally, if incumbent firm poses a great treat to the CVC, a syndicated investment is the best option.
Thomas Hellmann and Manju Puri	173 Startups located in California Silicon Valley	Recruit(SA), Recruit(AM), Recruit(SM) – (these dummy variables take the value 1 if business and professional contacts were used to recruit personnel, HR policy.	VC dummy (1 if the venture has received VC funding, 0 otherwise); LnAge; Industry Dummies	Startups which received VC-funding are more likely to adopt a more professional approach to its business, by creating HR policies or hiring a VP for Sales or Marketing; the research also found VC-backed ventures are more likely and quicker to replace its founder for external CEO
Paul Gompers and Josh Lerner				Venture funding has a strong impact on innovation. A dollar of venture investing is 3 to 4 times more potent is terms of patenting than R&D
Haemin Dennis Park and H. Kevin Steensma	198 wireless connections, 111 computer hardware, 199 semiconductor	IPO (1 if venture went public, 0 otherwise); Failure (1 if	CVC Funding (1 if funded by CVC, 0 otherwise); Specialized complementary asset	In terms of going public, CVC-backed ventures which require specialized complementary assets are more successful vis-à-vis

	startups which had their first investment between 1990 and 2003	venture went bankrupted or failed); Industry Size; Number of funding rounds; Number of investors; Total Funding	requirement (SCAR); Environmental uncertainty	startups that only require generic assets; CVC funding and the consequent complementary assets are more beneficial when startups operate in uncertain environments
Emily Cox Pahnke, Riitta Katila and Kathleen M. Eisenhardt	198 MIS device firms from 1986 to 2007	VC Partner (CVC, IVC or NIH); After Treatment; Firm Age; Funding Amount	Venture capital funding relationship; High status VC-partner; Corporate Venture funding relationship	VCs are highly effective in working with ventures in order to stimulate innovation. According to this study, CVC are less effective.
Yael V. Hochberg, Alexander. Ljungqvist and Yang Lu	3469 U.S. VC funds between 1980 and 1999	Fund's exit rate (percentage of successful exits from investor's portfolio); Survival (1 of company survived from Round N to N+1, 0 otherwise)	Fund Size; VC inflows; Book/Market Ratio; Fund's industry of interest; Industry dummies	VC funds whose parents are highly connected firms, have a better performance when comparing the Exit success rate; Also, Startups funded by well-connected investors are more successful in terms of exits strategies.
Arnoud W.A. Boot, Radhakrishnan Gopalan and Anjan V. Thakor	N.A	N.A	N.A	The entrepreneur has to tradeoff between the greater autonomy he has with private ownership and lower cost of capital and investor liquidity associated with going public; rigid and strict corporate governances associated with public firms, which restring founder's autonomy, encourage ventures to remain private
Marco Pagano, Fabio Panetta and Luigi Zingales	2181 Italian ventures with more than 5Bn lire on shareholders' equity from 1982 to 1992	IPO dummy (0 if the company is not listed, 1 on the listing year.	Sales; Growth; ROA; Leverage; Total Assets; Industry Dummies;	IPO probability is affected by public peers market valuation; Firm's size affects firm's IPO listing; Italian ventures are 8 times as large and 6 times as old as a typical Italian startup
Thomas J. Chemmanur and Paolo Fulghieri	N.A	N.A	N.A	Public firms are larger and have higher valuations than its private peers; Substantial differences among firms regarding firm's age when going public; European ventures will go public later in their life cycle than American ones
Marco Pagano and Ailsa Röell	N.A	N.A	N.A	Going public is an increasing function which depends on the amount of

				money being raised, the monitoring inefficiency and the private benefits of remaining private
Jean Helwege and Frank Packer	178 nonfinancial firms which were public as of December 31, 1996	Public dummy (1 if firm is public, 0 otherwise).	Sales; Profitability; Leverage; Sales Growth; Capital Expenditures/Assets; Industry Dummy	Private firms are larger and more leveraged vis-à-vis its public counterparts; Main reason for keeping the company private is the desire to maintain control; venture which have large stakes of equity held by outsiders are more likely to go private
Onur Bayar and Thomas J. Chemmanur	N.A	N.A	N.A	Success in Product Market Competition differ on the firms' stage and the testing of its product; Information Asymmetry is larger in IPOs than Acquisitions; Acquired companies have more help facing their competition on the market; if a venture goes public, valuations are likely to be higher, since Acquirers have access to a lot of information and have a higher bargaining power; Conflict of interest may arise between entrepreneur (wish for control) and investor (wish for financial gains)
Wesley M. Cohen and Daniel A. Levinthal	1,719 business units, representing 318 firms in 151 lines of. business	R&D intensity	Appropriability, Equipment Suppliers, Material Suppliers, Demand Growth, Industry Dummies	Corporations are sensitive to the learning environment to which they belong. The funds allocated to innovative activity will depend on firm's absorptive capacity
Amiyatosh K. Purnanandam and Bhaskaran Swaminathan	+2000 IPOs from 1980 to 1997	IPO valuation, First day returns	Ln(P/V), Ln(BM), Growth, Sales, EBITDA Margin.	IPOs are significantly overvalued, valuations tend to go up after market and revert to fair value in the long run
Markus Fitza, Sharon F. Matusik and Elaine Mosakowski	3,756 portfolio companies, 6,490 inter-round periods and 1,418 venture firms	Venture's percentual increase (or decrease) in valuation between funding rounds	Stage, Industry, VC reputation	VC significantly impact the performance of the ventures they invest in, not only in terms of the resources they bring but also in terms of expertise and "positive pressure" on the startups' employees.

David H. Hsu	149 early-stage ventures	Funding through direct VC tie; Pre-money valuation	Number of startups founded; High Network recruiting; MBA degree; PhD degree; Industry dummies	Human capital accumulation leads to ventures' social capital; ventures' valuation is positively related to human and social capital; founders with pre-successful ventures are more likely to get VC funding at higher valuations
Ann-Kristin Achleitner, Reiner Braun, Eva Lutz and Uwe Reiner	716 venture capital-backed trade sales exit between 1982 and 2008	Deal level IRR performance	Lateral Trade Sale; Synergetic Trade Sale; Early Stage; VC Experience; Boom Market Phase	Still not active lateral acquirer leads to higher returns than synergetic acquirers; Information Asymmetry leads to different valuations between lateral and synergetic acquirers
Richard Carter and Steven Manaster	501 firm commitment IPO issues between 1979 and 1983	Underwriter's reputation	Insider Shares; Offering Size; Venture's Age	Low dispersion firms will select prestigious underwriters in order to reveal their low-risk characteristics. On the other hand, prestigious underwriters will only select low risk ventures, signaling confidence to the market
Zoltan J. Acs, and David B. Audretsch	247 U.S ventures	Number of large firm innovations, number of small firms' innovations, Small-firm's innovation share	Total R&D; Company R&D; Capital/Output; Concentration; Unionization; Advertising	Number of innovations increase with increased industry R&D expenditures but at a decreasing rate; Industry innovation decreases when concentration increases
Fatima Shuwaikh and Emanuelle Dubocage	1279 U.S. companies with first investment year 1998	Knowledge Transfer	Strategic Fit; Geographic proximity; Annual CVC investment; Absorptive capacity; Company's financial value;	The mechanism consisting of Strategic Fit and geographic proximity increases the levels of knowledge transfer between investors and investees. The transfer of knowledge between parties also increases the venture's valuation
Paul Gompers and Josh Lerner	140 venture partnership agreements	Number of covenant classes included in the partnership agreement	Early Stage; Sensitivity of Pay to Profits; Size of Venture Fund; Venture Pool Growth; Age of Venture	Contractual covenants are significantly associated to: differences in need of oversight and in supply and demand conditions for venture capital services
Josh Lerner	653 financing rounds of 271 biotechnology firms between 1978 and 1989	Number of Venture Capitalists as New Board Members; Number of	CEO Turnover: Change in dollars invested; Number of departing board members	Representation of VC members increase at CEO turnover; Geographic proximity is significant when it comes to board representation;

		Outsiders as New Board Members		
David H. Hsu	148 financing offers made to 51 early-stage high-tech startups	VC offer accepted; Pre-money valuation; Relative valuation offer	High Industry Deal Experience; High Network resources rating; Relative valuation offered; Angel Investor; CVC	Founders are willing accept a discount in order to close investing rounds with reputable VCs
Joel A. C. Baum and Brian S. Silverman	852 startups from 1991 to 2000	Financing; Performance;	Alliance Capital; Intellectual Capital; Human Capital	VCs contribute to the higher performance of their venture by passing on their expertise;
James A. Brander, Raphael Amit and Werner Antweiler	Divestiture of VCs from 1992 to 1997	Annual Percentage Annual Rate of Return	Syndication; Computer Industry; Tax Status; Venture's. Age; Employment	Syndicated projects have higher rates of return than standalone projects