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# **Investment Strategies of Venture Capital Funds: Tracking US and UK Investment Activities**

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## **Abstract**

The advantages of Corporate Venture Capital (CVC) and Independent Venture Capital (IVC) on successful and profitable exit strategies have increasingly gained interest in VC literature during recent times and literature has found a CVC superiority relative to IVC. This study aims to do an international comparative analysis of the effects of CVC funding on fundraising, duration of investment, and exit strategies across the US and the UK. Through a set of 6562 US and UK formerly VC-backed ventures with first investment date between 1999 and 2014, strong evidence of a positive impact of CVC relative to fully IVC one is found. Results show that CVC-backed ventures receive larger funding amounts and the positive impact of CVC financing on funding is stronger for the UK, when compared to US. US CVC-backed firms host shorter durations before exit, whereas UK CVC-backed start-ups lean towards longer durations than IVC-backed ones. Additionally, CVC-funding decreases duration in US ventures. In addition, funding amount is positively correlated with the likelihood of an IPO exit, yet the impact of duration is ambiguous, in line with the conflicting existing literature. The positive effect of CVC-financing on the probability of an IPO exit is stronger in the UK, when compared to the US. Lastly, results suggest that the English and American VC markets are yet to be perfectly integrated and that theoretical models are more likely to hold in the US, rather than in the UK.

**Keywords:** Corporate Venture Capital, Independent Venture Capital, Funding, Duration, Exit Strategies

**JEL classification:** G24, G32, G34

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## **Abstrato**

As vantagens de financiamento de fundos de Capital de Risco Corporativo (CRC) e de Capital de Risco Independente (CRI) em estratégias de desinvestimento lucrativas e bem-sucedidas têm ganho interesse na literatura inerente a Capital de Risco, existindo superioridade do CRC em relação ao CRI. Este estudo objetiva uma análise comparativa internacional dos efeitos do financiamento de CRC na captação de recursos, duração do investimento e estratégias de desinvestimento nos Estados Unidos (EUA) e Reino Unido (RU). Através de uma amostra de 6562 start-ups financiadas com capital de risco, com primeiro investimento entre 1999 e 2014, são encontradas fortes evidências de um impacto positivo do CRC em relação ao CRI. Resultados mostram que empresas financiadas por CRC recebem maior financiamento e o impacto positivo do CRC no financiamento é mais forte no RU, quando comparado aos EUA. Empresas americanas financiadas por CRC revelam durações de investimento mais curtas, enquanto start-ups inglesas financiadas por CRC ostentam investimentos mais longos que aquelas financiadas por CRI. O financiamento do CRC diminui a duração do investimento nos EUA. Resultados mostram que o financiamento está positivamente correlacionado com a probabilidade de saída através de OPI, embora o impacto da duração seja ambíguo, em linha com a conflitante literatura existente. O efeito positivo do financiamento CRC na probabilidade de saída por OPI é mais forte no RU. Por fim, os resultados sugerem que os mercados de capital de risco inglês e americano não estão perfeitamente integrados e modelos teóricos se sustentam melhor nos EUA.

**Palavras-chave:** Capital de Risco Corporativo, Capital de Risco Independente, Financiamento, Duração, Estratégias de Desinvestimento

**Classificações JEL:** G24, G32, G34

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Leave something to remember, so they won't forget.

April 2021,  
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### **III. List of Abbreviations**

<b>CVC</b>	Corporate Venture Capital
<b>GP</b>	General Partner
<b>IPO</b>	Initial Public Offering
<b>IVC</b>	Independent Venture Capital
<b>LP</b>	Limited Partner
<b>PMC</b>	Projected Marginal Cost
<b>PMVA</b>	Projected Marginal Value Added
<b>MSCI</b>	Morgan Stanley Capital International
<b>NVCA</b>	National Venture Capital Association
<b>OLS</b>	Ordinary Least Squares
<b>SIC</b>	Standard Industrial Classification
<b>UK</b>	United Kingdom
<b>US</b>	United States of America
<b>USA</b>	United States of America
<b>VC</b>	Venture Capital
<b>WRDS</b>	Wharton Research Data Services

## 1. Introduction

Venture Capital (VC) funds are skilled value-adding active investors who provide financial, strategic, market and administrative advice to entrepreneurial ventures in the hopes of achieving financial and strategic gains (D. Cumming & Johan, 2010; Hege et al., 2009; Lindström, 2006). The last decade has been characterised by an increased VC investment, driven by new investment opportunities as well as by greater capital availability for this asset class (Lerner & Nanda, 2020). After the dot.com bubble, the value of American VC investments<sup>1</sup> peaked in 2018, totalling over 118 billion dollars whereas European VC deal value<sup>2</sup> grew from 7 to 43 billion euros in the last ten years, reaching a new all-time high in 2020 notwithstanding the covid-19 induced macroeconomic volatility.

### 1.1 Venture Capital Investment Activity

VC investors provide entrepreneurial firms with financial and non-financial aid and VC activity has the purpose of stimulating innovation and economic growth (Kortum & Lerner, 2000; Dushnitsky & Lenox, 2005; Chemmzanur et al., 2014; Alvarez-Garrido & Dushnitsky, 2016; Wadhwa et al., 2016) by backing these companies and filling an access to capital gap (P. Gompers & Lerner, 2001).

Entrepreneurial firms are a pivotal source of disruptive processes and products. Take the example of e-commerce logistics platform Shopify, valued at around \$180 billion in February 2021, which started out as a platform to help entrepreneurs design e-commerce websites without hiring professional developers. The firm has since evolved, allowing merchants to sell products on its website and across multiple marketplaces and social media. Additionally, Shopify started offering tools for merchants to scale, such as payment and logistic solutions, a chat function and even a credit service. Thus, investors' capital allowed Shopify to evolve from an e-commerce platform into the world's first retail operating system.

As they are generally young, ventures often do not present proven business models nor positive cash-flows and revenues, preventing them from paying dividends. As a consequence, their uncertain payoffs and lack of historically profitable financial statements do not allow for a proof of creditworthiness and banks are not able to incur on such high risk of venture failure. This, in

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<sup>1</sup> VC investment in the United States between 2000 and 2019 can be found on Table 6 of Appendix A.

<sup>2</sup> Values of VC investment in Europe between 2010 and 2020 are portrayed in Table 7 in Appendix B.

turn, creates a hurdle to accessing capital, a critical resource for ventures to grow and consolidate themselves within a market. Factors such as inconstant and skewed returns, asymmetric information, and absence of collateral (as assets are firm-specific or intangible) have been shown to lead technology-intensive entrepreneurial firms to face strong adversities when trying to raise capital from conventional financing institutions (Amit et al., 1998). Therefore, VC activity presents an important chasm-closing mechanism for entrepreneurial firms to obtain external monetary resources, as VCs have a record of trustworthiness. VCs raise capital through funds which stem from a pool of institutional investors and wealthy individuals (Da Rin et al., 2013).

The role of VC activity in economic growth is incontestable. Existing literature has revealed a positive influence of VC funding on ventures' performance regarding innovation (Bertoni et al., 2015; D. Cumming & Johan, 2010; Kortum & Lerner, 2000), growth (Puri & Zarutskie, 2012; Bertoni et al., 2010), general economic performance (Croce et al., 2013; Chemmanur et al., 2011), and the likelihood of going public (Puri & Zarutskie, 2012; Chemmanur et al., 2010; Giot & Schwienbacher, 2007). Seven out of the ten most valuable firms in 2018<sup>3</sup>, including Apple, Amazon and Microsoft, were funded by VC investors, and VC-backed public firms in the United States (US) accounted for one-fifth of its total market capitalisation. VC-backed IPOs have been shown to outperform non-VC-backed ones in the long run (P. Gompers & Lerner, 1998) and 38% of the American working population is hired by VC-backed firms.

## **1.2 CVC vs IVC as Investors**

VCS provide their portfolio companies with monitoring and mentoring services, aiming to add value through shared knowledge and helping ventures succeed by lessening information asymmetries, agency costs, and moral hazard problems (Sahlman, 1990; D. J. Cumming & MacIntosh, 2000; P. Gompers & Lerner, 2001). Their expertise relates to strategic and value added services such as intellectual property advisory, legal, accounting, technology or marketing services, investors and potential acquirers sourcing, among others (D. Cumming & Johan, 2010). Still, VC firms are noticeably diverse in the way they are organised, namely in the type of ownership and governance they host (Dimov & Gedajlovic, 2009; P. Gompers et

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<sup>3</sup> The list of the 10 most valuable firms in 2018 by Market Capitalisation is available on Table 8 on Appendix C.

al., 2009; Da Rin et al., 2013; Bertoni et al., 2015). An entrepreneurial firm can be funded by an Independent Venture Capital (IVC) or by a Corporate Venture Capital (CVC).

IVCs invest their funds with the sole goal of achieving financial returns. On a traditional structure, IVCs take part in a limited liability partnership where the IVC acts as a General Partner (GP), raising capital from institutional investors and wealthy individuals who behave as Limited Partners (LPs). A period frame is contractually imposed, usually around 10 years, after which the fund is dissolved, and profits are distributed amongst LPs. The GPs manage the fund and act as financial intermediaries between outside investors and entrepreneurs, taking on unlimited liability (Sahlman, 1990) whilst LPs' security is restricted to the contractible variables and they do not intervene with the fund's operations (Da Rin et al., 2013). As a consequence, compensation schemes in IVCs are solely reliant on the fund's performance (D. Cumming & Johan, 2010).

CVCs, on the other hand, are organised as subsidiaries of corporations and undertake minority equity investments on ventures. CVCs derive their capital from a portion of a non-financial parent company's assets and revenues. Besides pursuing financial returns, CVCs also seek out strategic benefits on their value chain (Dushnitsky & Lenox, 2005; Hellmann et al., 2008), which can include access to new markets, clients, infrastructure, or technology. CVCs tend to then have lengthier investment horizons than IVCs and portrait an active management role, supporting ventures with R&D and different corporate matters. The presence of a parent company allows CVCs to host deeper industry and technology expertise, leveraging access to human resources and complementary assets to support the venture's progress (Sapienza et al., 1996; Keil et al., 2008; Dushnitsky, 2012). Compensation structures in CVCs imply a fixed wage and corporate bonuses which are directly linked to the parent company's performance (D. Cumming & Johan, 2010) rather than to the fund's profits.

### **1.3 Exit Vehicles**

As portfolio ventures generally do not host significant profitable results, a VC fund materialises its financial gains from investment when exiting the company. The entrepreneurial firm can be acquired by another market player via an M&A operation (trade sale) or it can go public through an Initial Public Offering (IPO). When the prospect of recovering invested funds is deemed negligible by investors, a write-off (liquidation) will take place and VCs will halt their efforts to bring the firm to fruition, essentially removing themselves from the investment (D. J. Cumming & MacIntosh, 2000).

When an acquisition takes place, investors get a return by selling their shares whilst on an IPO, the venture raises capital from public investors by issuing and listing stock on the primary market, offering current private investors the possibility to realise their shares and profit by selling them.

For the Entrepreneur, an IPO exit mechanism embodies a call option over control. To this extent, going public implies that the Entrepreneur has exercised his call option over control whilst, under an acquisition exit, the control is shifted to the acquiring company. This is based on the fact that, by publicly listing the firm, the Entrepreneur is also able to refinance at a lower cost, finding the necessary liquidity to buy out the VC, reducing its extensive monitoring. Overall, going public entails an implicit contract between the Entrepreneur and the VC which is not replicable in an acquisition scenario (Schwienbacher, 2005).

#### **1.4 Study Scope**

Given the fact that over sixty percent of start-ups fail during the first five years of activity and that seventy five percent of VC-backed entrepreneurial firms go bankrupt (Nobel, 2011), the successful venture exits need to be profitable enough to cover all other losses incurred. Hence, it is of the utmost importance to examine the driving mechanisms of VC-inherent matters.

To the best of my knowledge, there has yet to be an international comparative study focused on how strong the effects of CVC funding are. As a result, in an effort to fruitfully contribute to the existing literature, this research aims to assess how the impact of CVC and IVC on funding, duration and exit strategy decisions varies between the US and the United Kingdom (UK).

European VC activity, starting off in the 70s, has seen a significant boost in investment throughout the last 30 years. Furthermore, VC activity in the UK, when paired with that of Germany, accounts for more than half of VC investments in Europe (Mayer et al., 2005) and investment decisions within Europe have been shown to remain stable over time and similar across different countries, including the UK (Bertoni et al., 2015). British GDP accounts for roughly two-thirds of Germany's, nevertheless, VC investment is almost 5 times greater in the UK (Black & Gilson, 1996), which portrays the country as the indisputable leader of VC activity in Europe. Still, as a result of its dimension (in volume and substance) and availability of data, most empirical studies on VC activity are conducted on data inherent to the US. Recently, identifying whether the European market has evolved resembling that of the US has gained some attention and a performance gap between American and foreign firms has been

found (Schwienbacher, 2005; Lindström, 2006; Schwienbacher, 2008; Hege et al., 2009; Bertoni et al., 2015). Still, the influence of funding nature (CVC or IVC) on topics such as funding amounts, duration before exit, and exit strategies is relatively unexplored by academia. Existing literature has comparatively analysed the influence of CVC and IVC on ventures' performance regarding innovation (Alvarez-Garrido & Dushnitsky, 2016; Chemmanur et al., 2014; Park & Steensma, 2013), growth (Bertoni et al., 2013), and the likelihood of going public (Guo et al., 2015; Ivanov & Xie, 2010; P. Gompers & Lerner, 1998).

Taking the aforesaid information, this research aims to answer the following research questions:

1. Does the nature of funding (CVC or IVC) impact the chosen exit strategy?
2. Does the amount of CVC investment influence the chosen exit strategy?
3. Does the relative positive impact of CVC monitoring and mentoring vary between the US and the UK?

In sum, this study seeks to examine different patterns within funding amounts and duration before exit amongst CVC and IVC-backed firms across the US and the UK as well as to analyse the consequent impact on exit strategy decisions undertaken by the correspondent investors. As a result, I study a set of 5851 American and 338 English VC-backed ventures from their first investment to exit dates, with first investment date between 1999 and 2014.

This investigation contributes to knowledge on the economy and VC activity as a whole, which is significant to grasp the drivers and mechanisms that better stimulate entrepreneurial innovative activity. By evaluating the effects of investments, this study captures the consequences of different organisational structures on exit performance, helping to align incentives between fund investors, VCs, and entrepreneurs and enabling players to choose the optimal set of investment characteristics and organisations to reach their correspondent ultimate goals. A mindful outlook on historical VC decisions and on its advantages and contingencies for both VCs and entrepreneurial firms will likewise support a conscious decision-making process regarding harvesting and divesting. Moreover, this paper complements the existing literature on CVC by analysing whether the common view that CVC-backed firms are superior to IVC-backed ones within financial markets is sustained.

The ensuing research is structured as follows. A literature review contemplating past findings in section 2 is followed by the data retrieval and methodology in section 3. The results and its

discussion are presented in section 4 and a comprehensive conclusion is made in section 5. Lastly, limitations and further research suggestions on this study are approached in section 6.

## 2. Literature Review

The growing availability of both private and public databases has contributed to the improvement of research on VC activity. Nature of funding, as well as decisions regarding investment and duration taken on by VCs, have been shown to have a direct impact on exit strategy choices and on the growth and value of ventures (Guo et al., 2015; D. Cumming & Johan, 2010; Lindström, 2006; D. J. Cumming & MacIntosh, 2001). These factors ought to be optimised to effectively accomplish a desired goal, depending on the nature of the venture and of the VC. As a consequence, the proposed model states that exit strategies are directly impacted by funding amounts and by investment duration which, in turn, are affected by the investor type (CVC or IVC). The ultimate goal of this research is to assess how the impact of CVC and IVC on funding, duration and exit strategy decisions varies between the US and the UK.

### 2.1 Funding Amount

According to the principal-agent framework, when choosing whether or not to invest in a venture, VCs will consider the investment's inherent risk-taking discount rate (Sahlman, 1990). Moreover, compensation schemes have been shown to drive investment practises (Dushnitsky & Shapira, 2010). As CVCs' funding stems from a parent company's revenues and profits, they are not as worried with attaining immediate financial returns to send positive signals to outside investors (Chemmanur et al., 2014; D. Cumming & Johan, 2010; Dushnitsky & Shapira, 2010) by showcasing profitable exits as IVCs are. Consequently, and given CVCs' focus on strategic gains, CVCs have been found to target later stage ventures (Dushnitsky & Shapira, 2010). Later stages of investment imply lower discount rates as firms should show greater signs of market traction and even profitability relatively to earlier staged ventures which imply a larger risk exposure. In turn, lower discount rates have been linked to higher investment levels (Guo et al., 2015) so it is postulated that CVC-backed ventures are expected to host greater levels of funding between their first and last investment.

***Hypothesis 1:** CVC-backed ventures will obtain larger funding amounts, when compared to their IVC-backed counterparts.*

Discrepancies in countries' VC activities are correlated with access to the stock market (Black & Gilson, 1996). Bank-centred capital markets like the UK have a more conservative and sceptic approach to lending and investing which, in turn, results in financial incentives that do not stimulate entrepreneurial activity. Thus, the US's dynamic stock-market-centred capital market presents a direct stimulus to VC activity. In comparison to Europe, the US host a much more liquid and larger market, both in terms of human resources deployed, but also in terms of deal flows for exit markets (Lindström, 2006; Schwienbacher, 2005; D. J. Cumming & MacIntosh, 2000) and the US's market size and maturity imply that American ventures have easier access to funding (Schwienbacher, 2005).

## **2.2 Duration before Exit**

A VC will stay invested in a venture for as long as the projected marginal value added (PMVA) provided by VCs exceeds the VCs' projected marginal cost (PMC) form maintain the investment itself (D. Cumming & Johan, 2010; Giot & Schwienbacher, 2007; D. J. Cumming & MacIntosh, 2001). Successful exits, especially IPOs, have been shown to send positive signals to fund investors, delivering reputational benefits to the VC which will, thereupon, increase fund returns and financing (Lindström, 2006; Schwienbacher, 2005). As IVCs do not financially depend on a parent company, its additional monetary resources from investors are directly reliant on the signals they transmit to the outside market. This creates a stimulus for IVCs to showcase successful exits (Dushnitsky & Shapira, 2010), which can inadvertently result in IVCs exiting their entrepreneurial firms ahead of the optimal time, incurring in higher discount rates and shorter investment durations (Guo et al., 2015).

On the other hand, IVCs operate independently whilst CVCs are reliant on its parent company's decisions and motivations. To avoid agency problems, IVCs set out a contractually imposed fixed period frame, after which the fund is diluted and profits are delivered to LPs. Besides a fixed fee, IVC managers' compensation heavily relies on fund's performance (around 20% of fund profits), generating incentives to successfully exit ventures at the optimal time, independent of the chosen exit strategy (D. Cumming & Johan, 2010). CVCs' marginal strategic gains are expected to decrease with duration and CVCs have been shown to not have incentives to acquire its ventures (Benson & Ziedonis, 2009). Moreover, CVCs' compensation schemes are not reliant on exits' financial profitability, implying an incentive to exit as soon as strategic gains are deemed to be lower than investment costs (D. Cumming & Johan, 2010). Given the conflicting literature, it is postulated that IVC-backed ventures remain in the investment for a

shorter period before exiting the venture, given their reliance on reputational incentives to showcase successful exits.

***Hypothesis 2:*** *CVC-backed ventures will host longer investment durations before exit, when compared to IVC-backed firms.*

US VC activity is linked to larger syndicates, to a greater presence of CVCs, and to a deeper degree of specialisation (Hege et al., 2009). American CVCs' use of contingent control rights such as convertibles, decisions to replace the entrepreneur more frequently, and their expertise allows for better venture screening capabilities (Hege et al., 2009) which contributes to ventures' success at earlier stages of business. Further, US VCs have been shown to portrait a much more active role when monitoring their ventures (Schwienbacher, 2008; Lindström, 2006; Schwienbacher, 2005) and are indicated to have a higher performance regarding return on investment (Hege et al., 2009; Lindström, 2006).

### **2.3 Exit Strategy**

D. Cumming & Johan, (2010) contend that investment duration is shorter for larger funding amounts, arguing that PMC (larger for larger investments due to fixed costs) exceeds PMVA (lower for larger investments as ventures require less monitoring and value-added by each VC is less pronounced). A model proposed by Guo et al., (2015) reasons that a longer duration leads to a lower probability of an IPO whilst larger investments positively correlate with the likelihood of going public, justified with the fact that longer durations imply the market has more precise information on the probability of the venture's success and that this increased availability of information reflects a higher likelihood of an acquisition exit. Notwithstanding, as formerly stated, IPOs have been shown to require more nurturing before going public, leading to larger investments and longer duration before exit. Given the conflicting literature, it is postulated that funding and duration should be positively correlated with the likelihood of a public exit.

***Hypothesis 3a:*** *Funding amounts and duration before exit increase the likelihood of an IPO.*

Past literature concerning the impact of CVC financing on exit strategies has shown conflicting results. CVCs have been suggested to be more likely to exit through an M&A operation due to strategic gains, aiming to avoid competition whilst IVCs were more likely to pursue an IPO, given that they are not associated with a parent company (Maxin, 2018). Furthermore, and as previously stated, IVCs host a sharp focus on financial and reputational gains, leading to a

preference for an IPO exit. Nevertheless, CVCs have been shown to have a stronger tendency to exit through an IPO given that the marginal effect from ventures' innovation productivity decreases throughout investment time (Chemmanur et al., 2014; P. Gompers & Lerner, 1998). Given the conflicting literature, it is hypothesised that CVC-backed firms are more likely to exit through an IPO.

***Hypothesis 3b: CVC-backed firms have a higher probability of an IPO exit.***

Bank-centred capital markets like the UK have a more conservative and sceptic approach to lending and investing which, in turn, results in financial incentives that do not stimulate entrepreneurial activity (Black & Gilson, 1996). Given the maturity, liquidity, and size of the stock market-centred American capital market, US ventures should have easier access to the public market. Likewise, literature has shown that American ventures are significantly more successful at accomplishing IPOs by virtue of differences in institutional factors (D. Cumming & Johan, 2010).

### **3. Data and Methodology**

#### **3.1 Data**

##### **3.1.1 Data Retrieval and Treatment**

The study dataset comprises 6562 US and UK formerly VC-backed firms with first investment date between the 1st of January 1999 and the 31st of December 2014. The correspondent data collection was divided into four main steps.

Firstly, data regarding VC activity was retrieved from Thomson Reuters Screener - Private Equity Investments and Exits databases. This database encompasses firm, investors, and funds' characteristics inherent to each start-up. It considers a range of investor types but, in line with previous literature, only CVC and IVC investors were filtered for the purpose of this research. Data was retrieved for formerly VC-backed firms (headquartered in the USA or UK) which have exited through an IPO, Merger, or Write-Off and whose first investment date lies between the 1<sup>st</sup> of January 1999 and the 31<sup>st</sup> of December 2014. This data frame was chosen to take into account the effects of the dot.com bubble and financial crisis on investment and exit decisions.

The raw dataset included over 16,000 ventures, however, it was found that some companies appeared in only one of the databases. Inaccuracies such as firms with exit date prior to first investment or first investment prior to founding year were also found within the retrieved data. Deals that presented irregularities like aforementioned were removed from the sample.

Secondly, as company names appeared differently across databases, Tickers and Standard Industrial Classification (SIC) codes were manually extracted from Compustat-Capital IQ. As common in VC literature, financial firms (SIC codes between 6000 and 6999) were excluded from the sample in order to avoid biases (Bayar & Chemmanur, 2012).

Thirdly, financial data was retrieved from Compustat-Capital IQ. Unfortunately, this database only contains information on publicly traded firms inferring the inability to use venture-specific financials on this study. Overall industry data was used instead and figures denominated in pounds Sterling were converted to US dollars by computing the average exchange rate of the correspondent year, extracted from Refinitiv Datastream.

Lastly, historical industry and stock market information was respectively retrieved from Damodaran Online and from the Morgan Stanley Capital International (MSCI) database.

After merging and clearing data from different sources, the final dataset consisted of a cross sectional data sample at start-up level of 6562 American and English VC-backed firms with first investment date between 1999 and 2014<sup>4</sup>.

### 3.1.2 Dependent Variable

As a combination of existing literature, this study will analyse three dependent variables focused on funding amount, investment duration and chosen exit strategy (Guo et al., 2015; Schwienbacher, 2005; D. J. Cumming & MacIntosh, 2000), retrieved from Thomson Reuters Screener - Private Equity Investments and Exits databases.

*Funding Amount*: portrays the total amount, in millions of US dollars, raised by the company, pondered by the number of rounds it has raised.

*Duration (m)*: difference, in months, between the date of first investment in the venture and the date of the exit process conclusion.

*IPO*: dummy variable taking the value of 1 when the start-up exits through an IPO, and 0 otherwise.

### 3.1.3 Independent Variables

In order to understand the power of financing nature on the aforementioned dependent variables, three variations of CVC financing variables were constructed and independently studied on each model.

*CVC*: baseline dummy variable taking the value of 1 if there is at least one CVC investor backing the company, and 0 if the start-up is fully IVC-backed.

*CVC\_1st*: dummy variable taking the value of 1 when the first round raised by the venture contains a CVC investor, and 0 otherwise. As we hypothesise that CVCs provide a quality certification to ventures, this variable is constructed aiming to assess if having early-on CVC funding magnifies results.

*CVC\_Leader*: dummy variable taking on the value of 1 when over 50% of funding amount stems from CVC investors, and 0 otherwise. Following the same logic, this variable was

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<sup>4</sup> All full description of all variables used in this research is available on Appendix F.

constructed as a proxy for CVC participation in investment , aiming to provide further support for CVC funding consequences.

### 3.1.4 Control Variables

Based on preceding literature, this study controls for an array of variables that might explain funding amount, duration, and exit strategies undertaken by ventures.

The variable *#Funds* translates the total number of funds invested in the venture as syndication may raise the potential value provided to a venture but lessen the individual effort provided by VCs, impacting funding and duration (D. Cumming & Johan, 2010; Dushnitsky & Shapira, 2010; Lindström, 2006; D. J. Cumming, 2006; Schwienbacher, 2005). *Fund Size* comprises the average size, in millions of US dollars, of the funds invested in a venture and *#Rounds* translates the number of funding rounds the venture has raised.

Older funds are linked to a higher degree of expertise and reputation, as well as to richer resources which can affect funding amount, duration and undertaken exit strategies (Bertoni et al., 2015; Schwienbacher, 2005, 2008). Thus, as a proxy for experience and expertise, *VC Age* captures the average age at date of investment, in years, across a venture's invested funds. The dummy variable *Early\_1stInv* equals 1 if the venture's first investment was performed at seed or early stage (Guo et al., 2015; D. Cumming & Johan, 2010).<sup>5</sup>

As 40% of the sampled ventures belong to the Business Services Industry (SIC=73), the dummy variable *Business Services* equals 1 when the venture belongs to this industry, and 0 otherwise, in an effort to avoid industry-driven results. Likewise, the dummy variable *High Tech*, combining methodologies of Saxenian & Societies, (1996) and Markusen, (1994), equals 1 if the venture's SIC code starts by 28, 357, 481, or 737, and 0 otherwise.

Following Guo et al., (2015) and D. Cumming & Johan, (2010), the variable *MSCI Index* controls for the stock market performance of each studied country, 3 months before the venture's exit, as potential exit valuations might be driven by market conditions.

Following the rationale that investment is driven by industries' liquidity and extra cash (Guo et al., 2015), *5-Year\_Avg\_WC* measures the average working capital available in the venture's

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<sup>5</sup> A description of the stages of VC funding is available on Appendix D.

industry 5 years before first investment date, as a representation of accounting liquidity. Similarly, *5-Year\_Avg\_NETCF* captures the average net cash-flow in an industry, as a proxy for extra available cash in a specific industry.

Overall investment amounts sharply decline after the year 2000. Following D. Cumming & Johan, (2010), the dummy variable *Bubble\_1stInv* is constructed to control for companies whose first investment occurred during the dot.com tech bubble. The dummy takes on the value of 1 if first investment happened either in 1999 or 2000, and 0 otherwise. Following the same logic, two dummy variables (*FCrisis\_1stInv*, and *FCrisis\_Exit*) are introduced, aiming to control for the Financial Crisis distressed times (years 2008 and 2009).

Ideally, we would control for ventures' quality prior to first investment, however, data availability restrictions prevented the study from assessing this effect. Further research could be done by controlling for innovation (i.e., applied patents or patent citations) prior first funding received. Similarly, since financial data access was restricted to public firms, studying venture-specific financial metrics was unviable.

*Table 1 – Descriptive Statistics*

	Full Sample					
	N	Mean	Median	Std. Dev.	Min	Max
USA	6189	0.95	1	0.23	0	1
CVC	6189	0.13	0	0.33	0	1
CVC_1st	6189	0.04	0	0.20	0	1
CVC_Leader	6189	0.05	0	0.23	0	1
Funding Amount	6189	11.06	6.57	37.67	0	2295
Duration (months)	6189	68.38	61	42.25	0	246
IPO	6189	0.12	0	0.32	0	1
Merger	6189	0.81	1	0.39	0	1
# Rounds	6189	3.95	3	2.96	1	31
# Funds	6189	6.06	5	4.65	1	35
Fund Size	6189	415.72	246.67	905.02	0	22887
VC Age	6189	3.58	3.13	2.67	0	49
IVC Age	6189	3.39	3	2.49	0	49
Early 1st Inv.	6189	0.45	0	0.50	0	1
Bubble 1st Inv.	6189	0.34	0	0.47	0	1
Fin. Crisis 1st Inv.	6189	0.06	0	0.24	0	1
Fin. Crisis Exit	6189	0.12	0	0.33	0	1
Business Serv.	6189	0.41	0	0.49	0	1
High Tech	6189	0.55	1	0.50	0	1

This table contains the main descriptive statistics for the full sample of both CVC and IVC-backed ventures in the US and the UK with first investment date between 1999 and 2014. 95% of the sample corresponds to American ventures whilst 13% of all ventures host CVC financing. Source: Thomson Reuters Screener - Private Equity Investments and Exits databases.

## 3.2 Methodology

In an effort to analyse the impact CVC financing across the US and the UK, this study examines CVCs' influence on funding amount, duration and on subsequent exit strategies. Three models are constructed to test different specifications of CVC financing intensity which are run on the full sample, as well as on each country's sub-sample. Eliminating write-off exits from the regressed samples and controlling for year fixed effects did not modify the qualitative interpretations of the empirical analysis.

### 3.2.1 Funding Amount Model Specification

The aim of this section is to assess the impact of investor type (CVC vs IVC) on funding amount received by each venture on a multivariate framework (*Hypothesis 1*). This is studied through an Ordinary Least Squares (OLS) model where the dependent variable *Funding Amount* considers the total investment received by the venture, pondered by the number of rounds it has raised. The main dependent variable *CVC* describes whether the venture has received CVC financing:

$$\text{Ln} (\text{Funding Amount}) = \alpha_0 + \alpha_1 \text{CVC}_i + \sum_{k=1}^{11} \alpha_k Z_{ki} + e_i \quad (1)$$

On a second instance, the dependent variable is reformulated into *CVC\_1st* and *CVC\_Leader* aiming to assess whether having a CVC providing the first investment of the round, as in certifying quality to potential outside investors, or having CVCs providing the majority of capital influences findings. After gauging the study on the full sample, these three models are regressed on each country individually (Models 2 and 3) aiming to assess how the impact of CVC financing on funding received varies across the US and the UK.

In line with previous literature, interest rates variables were not included in this study given their collinearity with total funding raised by ventures. As P. Gompers & Lerner, (1998) demonstrated, interest rates are a determinant of VC fundraising.

### 3.2.2 Duration before Exit Model Specification

This section reports the framework for studying *Hypothesis 2* which aims to understand whether CVC-backed ventures have longer durations before exit relatively to IVC-backed ones. Given the fact that the dependent variable epitomises the period between first investment and exit dates, a duration model is used. Following past literature, a Weibull distribution of residual

values was selected to parametrically estimate the duration model, given its reliability and validity for studying lifetime analysis (Guo et al., 2015; D. J. Cumming & MacIntosh, 2001). As a consequence, the hazard rate  $h(t)$  and the survivor function  $S(t)$  for the Weibull distribution are stated as the following:

$$h(t) = pt^{p-1} e^{\alpha x} \quad S(t) = e^{-e^{\alpha x} t^p} \quad (2)$$

In the aforementioned equation,  $t$  denotes the number of months between the date of first investment and the date of exit, as in the variable *Duration (months)*,  $e$  concerns the exponential transformation whilst  $p$  represents the shape parameter. The independent variables and their coefficients are symbolised by vectors  $x$  and  $\alpha$ . In this survival model, a *Failure* is defined as having exited before  $t$ . Since the dataset is uncensored, all ventures will have exited through an IPO, a Merger or a Write-Off before  $t$ . This implies that every single sampled venture will be treated as a *Failure* case in the presented model. The duration variable  $t$  will therefore capture how long it takes for each firm to exit, implying that a hazard rate larger than 1 will indicate a higher *Failure* likelihood meaning that ventures will host a shorter duration before exit. Contrarily, a hazard rate inferior to 1 will suggest a slower exiting process. The hazard rates for the normal survival estimation are portrayed in Table 4.

Model 1 presents the hazard ratios for the estimation on the full sample whilst Models 2 and 3 show the same regression individually ran on the US and the UK, respectively. The set of fund and industry control variables used in the estimation is similar to that of section 3.2.1.

### 3.2.3 Exit Strategy Model Specification

In order to study *Hypotheses 3*, this estimation aims to assess the effects that CVC funding, funding amount and duration before exit directly have on the exit strategy undertaken by the venture. Following existing literature, a binary logistic regression is utilised to model the likelihood of exiting through an IPO. An OLS model is additionally run to shed a light on the magnitude of these effects following the subsequent equation:

$$IPO = \alpha_0 + \alpha_1 CVC_i + \alpha_2 \ln(Funding\ Amount)_i + \alpha_3 \ln(Duration\ (months))_i + \sum_{k=1}^{11} \alpha_k Z_{ki} + e_i \quad (3)$$

The model's experimental variable *IPO* is a dummy variable which will take the value of 1 if a venture has exited through an IPO, and 0 otherwise. The main independent variables consist of an indicator variable correspondent to CVC funding (*CVC*), total funding amount received by the venture (*Funding Amount*) as well as the investment duration (*Duration*). An additional model was developed to test the non-linear effect of investment duration on exit strategies through the simultaneous introduction of the variables *Duration (m)* and *Duration*<sup>2</sup>.

Resembling the two previously mentioned models, a set of venture, industry, fund and market control variables are employed in the model. Control variables regarding the year of first investment and exit year (*Bubble\_1stInv*, *FCrisis\_1stInv*, and *FCrisis\_Exit*) were automatically removed from some of the logit regressions due to lack of sufficient observations.

### 3.2.4 Treatment Effects

In an effort to mitigate the identification concern of VCs investing in better quality firms, the treatment-effects regression model is employed across the three previously mentioned models. This model accommodates a comprehensive version of the two-step Heckman selection model which contemplates the effect of omitted variables that simultaneously influence investor type, funding amount, duration before exit, and exit strategies (Guo et al., 2015). The first stage regression, with the dummy *CVC* as the independent variable, aims to understand the determinants of CVC financing based on the rationale that CVCs will invest in industries with more liquidity and extra cash. The results for the first-stage treatment effects model are presented in Table 10 in Appendix H. By controlling for the inverse Mills ratio estimated on the first stage, the second stage estimation captures the unobservable effect of the match between ventures and investor type. The results for the second-stage treatment effects model on Funding Amount, Duration before Exit, and Exit Strategies are correspondently presented in Tables 11, 12, and 13.

## 4. Discussion of Results

The main goal of this research is to understand how investor type (CVC vs IVC) affects funding amount, investment duration and, consequently, exit strategies chosen by investors in the US and the UK. Three models are developed and tested for each sub-sample in order to isolate and grasp the effect of different intensities of CVC financing, aiming for stronger hypotheses support. Control variables remain the same throughout each section in an effort to isolate the effect of CVC financing.

### 4.1 Univariate Analysis

Panel A of Table 2 showcases disparities induced by CVC financing, whilst Panel B portrays differences between both sampled countries.

In line with most literature and suggesting early support for *Hypothesis 1*, CVC-backed ventures show higher funding levels than IVCs which receive, on average, \$ 2.9 million less investment. Nevertheless, CVCs are significantly faster at exiting the investment taking, on average, 7.6 months less to do so and sampled CVC-backed ventures host a higher IPO rate than IVCs, hinting initial support for *Hypothesis 3b*. IVC-backed ventures tend to be backed by younger inexperienced funds and CVCs host a larger number of rounds and of invested funds which tend to have smaller sizes than those of fully IVC-backed ventures.

The number of sampled US ventures exceeds that of the UK by 17 times and differences between CVC funding intensity across countries, portrayed in Panel B of Table 2, are not significant. CVC funding is more representative in the US where 13% ventures had at least one CVC as an investor whilst only 8% of English start-ups did. Nevertheless, the UK had a larger proportion of deals with CVCs both as first and as lead investors, relative to the US. Investors are faster at exiting US ventures, taking on average 14.4 months less to do so than UK investors and, as expected, the US reports a larger share of VC-backed IPOs, enhancing a US market which stimulates entrepreneurial activity and allows for an easier public exit (Lindström, 2006; Schwienbacher, 2005; D. J. Cumming & MacIntosh, 2000).

US firms have more rounds and funds participating in on the investments. Such could be driven by the fact that UK ventures tend to receive their first funding at a later stage than American ones. 47% of US ventures obtained their first investment during early stages of development

Table 2 - Univariate Analysis

<b>Panel A. Analysis by Investor Type</b>				
	CVC-Backed	IVC-Backed	Difference	t-stat
USA	0.954	0.944	-0.01	(-1.199)
IPO	0.192	0.105	-0.087***	(-5.891)
Merger	0.723	0.82	0.097***	-5.737
Funding Amount	13.623	10.69	-2.932***	(-3.395)
Duration (m)	74.986	67.426	-7.560***	(-4.379)
# Rounds	4.849	3.821	-1.028***	(-8.674)
# Funds	9.38	5.58	-3.800***	(-16.995)
Fund Size	324.051	428.955	104.904***	-4.638
VC Age	4.524	3.443	-1.081***	(-8.488)
IVC Age	3.018	3.443	0.425***	-4.71
Early 1stInv	0.411	0.451	0.040*	-2.129
Bubble_1stInv	0.493	0.32	-0.173***	(-9.112)
FCrisis_1stInv	0.04	0.066	0.026***	-3.367
FCrisis_Exit	0.109	0.122	0.013	-1.1
Business Services	0.365	0.422	0.056**	-3.037
High Tech	0.522	0.553	0.031	-1.623
N	5408	781		

This table reports a comparison between sampled CVC and IVC-backed firms. CVC-backed ventures portrair higher funding amounts, longer durations before exit, and a higher percentage of IPO exits. \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

<b>Panel B. Analysis by Country</b>				
	USA	UK	Difference	t-stat
CVC	0.127	0.107	-0.021	(-1.199)
CVC_1st	0.043	0.053	0.01	-0.827
CVC_Leader	0.053	0.077	0.024	-1.593
Funding Amount	11.025	11.664	0.638	-0.63
Duration (m)	67.594	81.985	14.391***	-6.413
IPO	0.118	0.086	-0.032*	(-2.041)
Merger	0.803	0.893	0.091***	-5.148
# Rounds	4.05	2.228	-1.822***	(-17.436)
# Funds	6.167	4.207	-1.960***	(-9.701)
Fund Size	377.26	1081.436	704.176***	-4.609
VC Age	3.537	4.314	0.777***	-4.246
IVC Age	3.344	4.173	0.829***	-4.598
Early 1stInv	0.466	0.101	-0.365***	(-20.724)
Bubble_1stInv	0.343	0.325	-0.017	(-0.656)
FCrisis_1stInv	0.062	0.065	0.003	-0.196
FCrisis_Exit	0.119	0.151	0.032	-1.618
Business Services	0.421	0.288	-0.134***	(-5.062)
High Tech	0.558	0.411	-0.146***	(-5.304)
N	5851	338		

This table details a comparison between sampled US and UK-backed ventures. US firms host longer durations, a higher percentages of IPO exits, a larger number or rounds and invested funds, which tend to be younger than that of UK ventures. \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

whilst only 10% of the UK did. Average fund size is considerably smaller for American ventures and funds investing in US Ventures tend to be younger. Lastly, we understand that over 30% of ventures had their first investment during the dot.com bubble whilst less than 7% of financing was performed during the Financial Crisis, supporting the intuition that VC fundraising is reliant on inherent market conditions.

The Pearson Pairwise correlation between the variables *CVC* and *Funding Amount* equals 0.03 whilst between *CVC* and *Duration* totals 0.06. Moreover, the correlation between *Funding Amount* and *Duration* totals -0.02. The fact that the main studied variables have a low degree of correlation mitigates the possible multicollinearity concern inherent to the multivariate analysis of exit strategies <sup>6</sup>.

## 4.2 Funding Amount Strategy

This section analyses the impact of CVC financing on the funding amount a venture receives throughout its lifetime before exit, as described in section 3.5. Table 3 presents the results of the OLS estimation on the full sample, as well as in the US and UK sub-samples.

Through Model 1.1 we find that the *CVC* coefficient is statistically significant at a 1% level implying that CVC-backed ventures tend to receive larger funding amounts than IVC-backed ones. The comparison between Models 2.1 and 3.1 allows to comprehend that this effect remains significant across both countries' sub-samples and, since the *CVC* variable coefficient is significantly larger for the UK, we can infer that the positive effect of CVC financing on funding amount is stronger for English ventures. These findings complement research of D. Cumming et al., (2005) who find that more capital is allocated to VCs providing strategic and managerial advice to ventures and results suggest that the maturity, size, capital availability and liquidity inherent to the US capital market weaken the comparative advantages of CVC financing.

Model 2.2 shows that having a CVC on the venture's first round of financing increases the total funding amount. This interpretation is emphasised on Model 2.3 by stating that having CVC funds as funding leaders strongly increases the likelihood of ventures receiving a larger investment volume. Overall, these results support previous literature enhancing CVCs' ability

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<sup>6</sup> The Pearson Pairwise correlation matrix can be found on Table 9 in Appendix G.

to certify firm quality and to provide confidence to outsider investors (Alvarez-Garrido & Dushnitsky, 2016), thus increasing ventures' funding amounts.

As expected, it is found that a greater number of investment funds, as well as larger fund sizes, is positively correlated with funding amounts, in line with existing literature (Guo et al., 2015; D. J. Cumming, 2006). Moreover, US ventures with first investment during the dot.com bubble receive larger investment amounts. Intuitively, ventures inserted in an industry with higher working capital and net cash flow tend to have larger funding amounts (Guo et al., 2015).

The statistically significant inverse Mills ratios throughout the treatment-effects estimations, portrayed on Table 11<sup>7</sup>, confirm an identification problem within the estimation of investment strategies in US sampled ventures. Still, after controlling for the inverse Mills ratio, we continue to find that American CVC-backed ventures host higher levels of funding, when compared to fully IVC-backed ones.

In sum, results firmly support the intuition that CVC-backed ventures receive larger funding amounts (*Hypothesis 1*) and the findings allow to understand that the positive impact of CVC financing on funding raised is stronger for the UK, when compared to US.

### **4.3 Duration before Exit Strategy**

This section analyses the influence of CVC financing on duration before exit based on the premise that a VC will stay invested in a venture as long as its provided PMVA exceeds the VCs' PMC from maintain the investment (D. Cumming & Johan, 2010; Giot & Schwienbacher, 2007; D. J. Cumming & MacIntosh, 2001) and that information asymmetries lengthen investment duration (D. Cumming & Johan, 2010; D. J. Cumming & MacIntosh, 2001). The hazard rates for the normal survival estimations are portrayed in Table 4. As mentioned in section 3.6, a hazard rate larger than 1 indicates a shorter duration before exit whilst values below 1 hint a slower exiting process.

Models 2.1 and 3.1 present opposite results for the effects of CVC financing on duration in the US and the UK. We find that CVC-backed ventures in the US tend to have shorter durations, relatively to their IVC-backed counterparts. In the UK, however, we find that CVC-funded

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<sup>7</sup> Available on Appendix I.

Table 3 – OLS estimation of Funding Amount

Panel A. OLS Estimations							
D.V: ln (Funding Amount)	Model	Model	Model	Model	Model	Model	Model
	1.1	2.1	2.2	2.3	3.1	3.2	3.3
	Full-Sample	USA	USA	USA	UK	UK	UK
CVC	0.186*** (0.039)	0.173*** (0.039)			0.602** (0.260)		
CVC_1st			0.179*** (0.061)			0.556 (0.351)	
CVC_Leader				0.352*** (0.056)			0.406 (0.294)
# Funds	0.063*** (0.003)	0.060*** (0.003)	0.063*** (0.003)	0.062*** (0.003)	0.094*** (0.025)	0.103*** (0.024)	0.103*** (0.024)
Ln (Fund Size)	0.346*** (0.010)	0.380*** (0.010)	0.380*** (0.011)	0.382*** (0.010)	0.156*** (0.038)	0.157*** (0.038)	0.155*** (0.038)
VC Age	-0.001 (0.005)	0.003 (0.005)	0.004 (0.005)	0.001 (0.005)	-0.017 (0.025)	-0.014 (0.025)	-0.015 (0.025)
High-Tech	-0.073** (0.033)	-0.041 (0.033)	-0.045 (0.034)	-0.040 (0.033)	-0.537*** (0.195)	-0.526*** (0.196)	-0.519*** (0.196)
Business Services	-0.116*** (0.034)	-0.152*** (0.034)	-0.152*** (0.034)	-0.150*** (0.034)	0.496** (0.216)	0.468** (0.216)	0.451** (0.216)
Bubble_1stInv	0.213*** (0.029)	0.230*** (0.029)	0.238*** (0.029)	0.227*** (0.029)	0.081 (0.181)	0.096 (0.181)	0.098 (0.181)
FCrisis_1stInv	-0.084 (0.053)	-0.091* (0.052)	-0.095* (0.052)	-0.095* (0.052)	-0.108 (0.333)	-0.070 (0.335)	-0.090 (0.335)
FCrisis_Exit	-0.123*** (0.039)	-0.142*** (0.039)	-0.141*** (0.039)	-0.136*** (0.039)	0.277 (0.227)	0.315 (0.227)	0.292 (0.228)
5-Year Avg WC	0.006*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.027*** (0.010)	0.027*** (0.010)	0.026** (0.010)
5-Year Avg NETCF	0.000** (0.000)	0.000* (0.000)	0.000* (0.000)	0.000* (0.000)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Early 1stInv	-0.059** (0.025)	-0.068*** (0.025)	-0.069*** (0.025)	-0.072*** (0.025)	-0.145 (0.286)	-0.156 (0.288)	-0.148 (0.288)
N	6,164	5,851	5,851	5,851	313	313	313
R-squared	0.281	0.301	0.300	0.303	0.206	0.199	0.197

This table presents the OLS regression results aiming to understand whether CVC-backed ventures receive larger funding amounts relative to fully IVC-backed ones. The dependent variable for all regressions is *ln (Funding Amount)* measured by total disclosed equity amount received before exit. The main independent variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. Dummy *CVC\_1st* equals 1 when the first investment round contains, at least, one CVC investor and 0 otherwise. Dummy *CVC\_Leader* equals 1 when over 50% of funding amount stems from CVC funding, and 0 otherwise. Lastly, N represents the sampled number of observations. Standard errors are reported in parentheses and \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

ventures stay in the investment for a longer period of time, compared to IVC-funded ones. Similarly, from Models 2.3 and 3.3 we apprehend that the interpretation of these effects significantly remains the same when the dependent variable is changed to grasp the majority of capital being provided by CVCs (*CVC\_Leader*). As a result, the claim that CVC-backed ventures should have shorter investment durations is only supported for the US sub-sample. Results in previous literature are likewise conflicting. Using a sample of Canadian and American ventures, D. Cumming & Johan, (2010) find that CVCs have shorter investment durations given the differences between fund structure, compensation schemes, and the type of sought gains from the investment. Oppositely, Guo et al., (2015) find that US CVC-backed firms stay significantly longer before exiting the investment on the premise that CVC funds are related to a lower risk-taking discount rate as they are less compelled to obtain a fast investment recovery. Lastly, US ventures whose first investment round contains a CVC fund (*CVC\_1st*) tend to exit faster than others, emphasizing CVC investment as a certification of quality and innovation (Chemmanur et al., 2014).

US CVC-backed ventures have 19.2% less duration than IVC-backed ones (Model 2.1). On the other side, the coefficient from Model 3.1 demonstrates that English CVC-backed ventures have 32.3% longer duration than their IVC-backed equivalents. This qualitative interpretation remains stable across Models 2 and 3 and illustrates the fact that CVC-funding decreases duration in US deals, suggesting that the maturity, size and liquidity, as well as better screening and monitoring skills (Schwienbacher, 2008; Lindström, 2006; Schwienbacher, 2005) of the American market allow for a faster exit .

We find that ventures which have raised a higher number of rounds and with more invested funds have slower exits, however, fund size does not seem to play a significant role on investment duration. This model additionally complements previous literature findings which state that older VCs (*VC Age*) tend to have longer durations before exit as younger VCs seek to establish a track record, directly linked to shorter durations (P. A. Gompers, 1996) and premature exits (D. J. Cumming & MacIntosh, 2001; P. Gompers & Lerner, 1998).

Relative to other industries, we find that high-tech firms tend to have slower exiting processes implying that the information asymmetry effect offsets the latter one. Technology firms are characterised by a high degree of information asymmetry (given their strong link with intangible assets which are specifically hard to evaluate in early business stages) leading to lengthier investment durations and are also characterised by greater complementarities to

technologies owned by strategic acquirors which attract potential new owners and accelerates exit processes (D. Cumming & Johan, 2010; D. J. Cumming & MacIntosh, 2001).

Information asymmetry is larger at earlier stages of business, enhancing the potential of misvalued investments which will be exited faster. Moreover, information asymmetry between VCs and entrepreneurs dissipates faster at early stages of development, leading to a quicker exit when the investment is not deemed cost-effective (D. J. Cumming & MacIntosh, 2001). Consequently, we find that American ventures whose first VC investment was made during early stages of development are associated with a shorter average duration.

The second stage treatment-effects estimation portrayed on Table 12<sup>8</sup> indicates the presence of selection bias across both sup-samples. Nevertheless, the main dependent variable *CVC* remains significant across all estimations indicating that CVC financing impacts duration before exit.

Altogether, we find partial support for *Hypothesis 2* as US CVC-backed companies tend to have shorter durations whilst UK CVC-backed firms gravitate towards longer durations than IVC-backed ones. Furthermore, we find that CVC-funding decreases duration in US ventures.

#### 4.4 Exit Strategy

This section aims to analyse the direct impact of CVC financing, as well as its indirect impact through funding amounts and investment duration, on exit strategies undertaken in the US and the UK. Table 5 presents the logistic and OLS regression results, as described in section 3.6.

The positive coefficients of the variable *ln (Funding Amount)* entail that higher levels of funding increase the likelihood of an IPO exit. Still, these findings are only statistically significant for the American dataset. IPOs tend to be viewed as the premium exit strategy and are associated with greater resource employment by VCs (Schwienbacher, 2005). The most promising ventures, as in the ones with a greater expected value, host a higher likelihood of attempting to go public, whilst those with a lower expected value tend to favour an acquisition (Schwienbacher, 2008, 2005). Thus, ventures exiting through an IPO receive higher funding amounts as investors deem the prospect of a more profitable exit vehicle.

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<sup>8</sup> Available on Appendix J.

Table 4 – Survival estimation of Duration before Exit

Panel A. Survival Estimations							
D.V. Duration (m)	Model 1.1	Model 2.1	Model 2.2	Model 2.3	Model 3.1	Model 3.2	Model 3.3
	Full Sample	USA	USA	USA	UK	UK	UK
CVC	1.141*** (0.046)	1.192*** (0.049)			0.677** (0.128)		
CVC_1st			1.236*** (0.081)			0.663 (0.171)	
CVC_Leader				1.360*** (0.081)			0.691* (0.148)
# Rounds	0.891*** (0.005)	0.882*** (0.005)	0.882*** (0.005)	0.883*** (0.005)	0.943 (0.036)	0.950 (0.037)	0.943 (0.036)
# Funds	0.978*** (0.004)	0.977*** (0.004)	0.980*** (0.004)	0.978*** (0.004)	0.945*** (0.021)	0.937*** (0.020)	0.938*** (0.020)
ln (Fund Size)	1.005 (0.010)	1.001 (0.011)	1.001 (0.011)	1.002 (0.011)	1.022 (0.036)	1.020 (0.036)	1.021 (0.035)
VC Age	0.953*** (0.006)	0.952*** (0.006)	0.953*** (0.006)	0.952*** (0.006)	1.020 (0.021)	1.017 (0.021)	1.020 (0.021)
High-Tech	0.938* (0.032)	0.948 (0.033)	0.946 (0.033)	0.943* (0.033)	0.716** (0.116)	0.698** (0.114)	0.711** (0.116)
Business Services	1.006 (0.035)	0.977 (0.034)	0.977 (0.034)	0.981 (0.034)	1.258 (0.221)	1.301 (0.228)	1.290 (0.225)
Bubble_1stInv	0.894*** (0.026)	0.928** (0.028)	0.934** (0.028)	0.932** (0.028)	0.677*** (0.092)	0.666*** (0.091)	0.673*** (0.092)
FCrisis_1stInv	1.256*** (0.068)	1.279*** (0.071)	1.273*** (0.071)	1.269*** (0.071)	0.907 (0.234)	0.859 (0.223)	0.880 (0.227)
FCrisis_Exit	1.041 (0.041)	1.053 (0.043)	1.057 (0.043)	1.059 (0.043)	1.238 (0.212)	1.219 (0.208)	1.236 (0.211)
5-Year Avg WC	0.997 (0.002)	0.998 (0.002)	0.997 (0.002)	0.998 (0.002)	1.001 (0.008)	1.001 (0.008)	1.002 (0.008)
5-Year Avg NETCF	1.000*** (0.000)	1.001*** (0.000)	1.001*** (0.000)	1.001*** (0.000)	1.001 (0.000)	1.001* (0.000)	1.001* (0.000)
Early 1stInv	1.260*** (0.033)	1.200*** (0.032)	1.199*** (0.032)	1.195*** (0.032)	1.151 (0.248)	1.155 (0.249)	1.140 (0.246)
N	6,161	5,848	5,848	5,848	313	313	313

This table presents the hazard rates of a survival model based on a Weibull distribution of the residual values, aiming to understand whether CVC-backed ventures have longer durations than IVC-backed ones. The dependent variable for all regressions is *Duration (m)* measured by the difference in months between first investment and exit dates. The main independent variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. Dummy *CVC\_1st* equals 1 when the first investment round contains, at least, one CVC investor and 0 otherwise. Dummy *CVC\_Leader* equals 1 when over 50% of funding amount stems from CVC funding, and 0 otherwise. *N* represents the sampled number of observations. Standard errors are reported in parentheses and \*, \*\*, \*\*\*correspondently represent statistical significance at a 10%, 5% and 1% level.

Duration, on the other hand, has shown opposing results on exit strategy outcomes. We find that, in the US, a higher duration increases the likelihood of an IPO. Duration of investment is positively correlated with the mitigation of information asymmetries and agency costs amongst the venture's insiders and outside investors (D. J. Cumming & MacIntosh, 2001; P. Gompers & Lerner, 1998; Sahlman, 1990) and IPOs are linked to better quality firms and to a higher degree of VC involvement to avoid failure (Schwienbacher, 2005). Hence, ventures exiting through an IPO can incur on longer durations as investors seek to reduce information asymmetries with ventures to maximise potential gains. Moreover, we find that the non-linear effect of investment duration before exit is statistically significant for the US database (Model 2.2). The opposite signs of the coefficients from *Duration (m)* and *Duration<sup>2</sup>* imply that the positive effect of investment duration on the probability of an IPO for US ventures is stronger for shorter durations. Contrarily, we find that an increased duration reduces the likelihood of an IPO in the UK. Guo et al., (2015) find that the likelihood of an IPO decreases as duration increases, stating that an uninformed acquisition market is more likely to promote IPO exits as the information asymmetry creates the possibility of an IPO valuation higher than the deal price the venture would obtain from an M&A operation. Moreover, P. Gompers & Lerner, (1998) show that IPOs are correlated with exits earlier than optimal, implying shorter durations, as inexperienced VCs seek to send positive signals to outsiders.

These contradicting effects between countries suggest that the UK's less mature market prospers under larger levels of information asymmetry, supporting the belief that the US market is relatively more skilled at fostering and taking firms public (D. Cumming & Johan, 2010).

Across all models, CVC-backed firms are significantly more likely than IVC-backed to exit through an IPO, thus supporting *Hypothesis 3b*. This insight opposes that of Guo et al., (2015) who find that CVC funding does not directly affect exit strategies, implying it indirectly affects funding amount and duration levels. We also find that, for both the US and the UK, having CVC as lead investors significantly increases the probability of an IPO exit (Models 2.4 and 3.4), reiterating CVCs' superior skills at taking ventures public (Guo et al., 2015; Chemmanur et al., 2014). Model 4.2 infers that US CVC-funded ventures are 5.1% more likely to exit through an IPO when compared to fully IVC-backed ones. In turn, CVC funding in the UK increases the likelihood of an IPO by 11.2%. As seen in Table 2, the proportion of US ventures who have exited through an IPO (11.8%) is higher than that of UK (8.6%). This provides

support for the hypothesis that CVC financing has a weaker impact on the likelihood of an IPO exit for US ventures, relative to their UK counterparts.

We find that high-technology ventures are less likely to exit through an IPO and we complement the findings that strong market conditions (*ln MSCI Index*) increase IPO likelihood as bull markets are characterised by greater capital availability to the VC industry (D. J. Cumming & MacIntosh, 2001) and inherently provide investors a window of opportunity to obtain higher exit valuations, boosting compensation (D. Cumming & Johan, 2010). Likewise, firms who exited during the financial crisis (*FCrisis\_Exit*) were less likely to exit through an IPO and the magnitude of this effect is stronger amongst UK ventures. This supports the finding that IPOs are more likely to occur amongst industries with higher signs of liquidity (*5-Year Avg Net CF*).

The treatment-effects estimation reported on Table 13 shows a sample selection bias, though the qualitative interpretation of the estimation of exit strategies remains unchanged.

We thus find partial support for *Hypothesis 3a* is found. Whilst funding amount increases the likelihood of an IPO exit, the impact of duration is ambiguous. Further, we find CVC-backed firms to be significantly more likely to exit through an IPO exit, than their IVC-backed peers (*Hypothesis 3b*) and that this effect is stronger in the UK when compared to the US. Lastly, most control variables were statistically significant in the US but not in the UK, suggesting that the English and American VC markets are yet to be perfectly integrated and that theoretical models are more likely to hold in the US rather than in the UK.

Table 5 – Logistic and OLS estimations of Exit Strategy

	Panel A. Logistic Estimations						Panel B. OLS Estimations				
	Model 1.1 Full Sample	Model 2.1 USA	Model 2.2 USA	Model 2.3 USA	Model 2.4 USA	Model 3.1 UK	Model 3.2 UK	Model 3.3 UK	Model 3.4 UK	Model 4.1 USA	Model 4.2 UK
CVC	0.491*** (0.115)	0.488*** (0.119)	0.487*** (0.119)			1.398** (0.613)	1.549** (0.627)			0.051*** (0.012)	0.112** (0.053)
CVC_1st				0.158 (0.212)				1.267* (0.764)			
CVC_Leader					0.997*** (0.155)				1.116* (0.670)		
ln Duration (m)	0.123* (0.070)	0.193*** (0.074)		0.204*** (0.074)	0.212*** (0.073)	-1.222*** (0.399)		-1.144*** (0.394)	-1.104*** (0.388)	0.006 (0.006)	-0.103*** (0.030)
Duration (m)			0.017*** (0.004)				-0.006 (0.023)				
Duration <sup>2</sup> (m)			-0.000*** (0.000)				-0.000 (0.000)				
ln (Funding Amount)	0.899*** (0.052)	0.976*** (0.056)	0.985*** (0.056)	0.992*** (0.056)	0.947*** (0.055)	0.021 (0.171)	0.078 (0.167)	0.068 (0.168)	0.082 (0.170)	0.075*** (0.004)	0.003 (0.012)
ln (Fund Size)	0.040 (0.041)	0.047 (0.047)	0.041 (0.047)	0.033 (0.047)	0.078* (0.046)	0.030 (0.109)	0.032 (0.107)	0.023 (0.107)	0.016 (0.106)	0.000 (0.004)	0.002 (0.008)
VC Age	0.068*** (0.015)	0.076*** (0.016)	0.073*** (0.016)	0.085*** (0.016)	0.076*** (0.016)	0.013 (0.068)	-0.003 (0.065)	0.023 (0.067)	0.019 (0.067)	0.007*** (0.002)	-0.002 (0.005)
ln (MSCI index)	0.789*** (0.178)	0.578*** (0.190)	0.535** (0.208)	0.554*** (0.190)	0.779*** (0.172)	-1.026 (1.936)	-0.887 (1.864)	-1.184 (1.911)	-1.004 (1.893)	0.076*** (0.017)	-0.040 (0.103)
High-Tech	-0.289*** (0.109)	-0.318*** (0.113)	-0.343*** (0.114)	-0.320*** (0.114)	-0.331*** (0.114)	-0.909 (0.568)	-0.743 (0.569)	-0.959* (0.570)	-0.871 (0.570)	-0.045*** (0.011)	-0.053 (0.040)
Business Services	-0.609*** (0.123)	-0.619*** (0.128)	-0.619*** (0.129)	-0.621*** (0.129)	-0.617*** (0.129)	1.050* (0.600)	0.866 (0.594)	0.951 (0.592)	0.923 (0.593)	-0.043*** (0.011)	0.061 (0.044)
Bubble_1stInv	-0.220* (0.114)	-0.297** (0.120)	-0.239* (0.127)	-0.237** (0.119)		0.976* (0.514)		0.995** (0.505)	0.984* (0.507)	-0.025** (0.010)	0.074* (0.038)

Table 5 – Logistic and OLS estimations of Exit Strategy (continuation)

D.V. IPO	Panel A. Logistic Estimations						Panel B. OLS Estimations				
	Model 1.1	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 3.1	Model 3.2	Model 3.3	Model 3.4	Model 4.1	Model 4.2
	Full Sample	USA	USA	USA	USA	UK	UK	UK	UK	USA	UK
FCrisis_1stInv	0.190 (0.169)	0.198 (0.175)	0.184 (0.178)	0.195 (0.174)		0.102 (0.907)		0.250 (0.898)	0.218 (0.890)	0.030* (0.017)	0.012 (0.068)
FCrisis_Exit	-1.698*** (0.289)	-1.725*** (0.294)	-1.774*** (0.295)	-1.723*** (0.294)	-1.586*** (0.291)					-0.073*** (0.014)	-0.111** (0.048)
5-Year Avg WC	0.002 (0.005)	0.004 (0.006)	0.004 (0.006)	0.005 (0.007)	0.007 (0.007)	-0.103* (0.053)	-0.108** (0.052)	-0.108** (0.053)	-0.104** (0.053)	0.002*** (0.001)	-0.002 (0.002)
5-Year Avg NETCF	0.002*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.006** (0.003)	0.006** (0.002)	0.006** (0.003)	0.006** (0.002)	0.000*** (0.000)	0.000* (0.000)
Early 1stInv	-0.004 (0.090)	-0.039 (0.092)	-0.033 (0.092)	-0.040 (0.092)	-0.046 (0.092)	-0.900 (1.224)	-0.961 (1.153)	-0.964 (1.221)	-0.952 (1.226)	-0.003 (0.008)	-0.046 (0.058)
R-squared	-	-	-	-	-	-	-	-	-	0.140	0.090
N	6,161	5,848	5,851	5,848	5,848	268	268	268	268	5,848	313

This table presents the regression results aiming to understand whether CVC-backed ventures have a higher likelihood of an IPO exit, relative to fully IVC-backed ones. Panel A presents the LOGIT estimation results whilst Panel B presents the OLS regression results. The dependent variable for all regressions is the dummy *IPO*, equalling 1 when the venture exits through an IPO, and 0 otherwise. The dummy variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. Dummy *CVC\_1st* equals 1 when the first investment round contains, at least, one CVC investor and 0 otherwise. Dummy *CVC\_Leader* equals 1 when over 50% of funding amount stems from CVC funding, and 0 otherwise. *ln (Funding Amount)* measured by total disclosed equity amount received before exit whilst *Duration (m)* is measured by the difference in months between first investment and exit dates. Lastly, N represents the sampled number of observations. Standard errors are reported in parentheses, and \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

## **5. Conclusion**

The main goal of this research was to evaluate how the impact of CVC financing on funding, duration and exit strategy decisions varies between the US and the UK. As differences between CVC and IVC funding have only recently been getting attention by academia, to the best of my knowledge, this is the first comparative study done on CVC financing across the US and UK.

Results show that CVC-backed ventures receive larger funding amounts and support the rationale that the positive impact of CVC financing on funding raised by ventures is stronger for the UK, when compared to US. Findings show that US CVC-backed firms are linked to shorter durations before exit whereas UK CVC-backed start-ups lean towards longer durations than IVC-backed ones. Furthermore, CVC-funding decreases duration in US ventures. Funding amount is positively correlated with the likelihood of an IPO exit, yet the impact of duration is ambiguous, in line with the conflicting existing literature. CVC-financing has a positive impact on the probability of an IPO exit and this effect is stronger in the UK, when compared to the US. Finally, most of the studied control variables were statistically significant in the US but not in the UK, suggesting that the English and American VC markets are yet to be perfectly integrated and that theoretical models are more likely to hold in the US rather than in the UK.

Results support the comparative advantage of CVC financing relative to fully IVC funding and, as expected, a statistically significant gap between the US and UK markets is found. This investigation contributes to the growing research on VC activity and on differences induced by CVC and IVC financing, crucial to optimise decision making and align incentives between ventures, VCs, and fund investors. Moreover, this research contributes to the relatively unexplored field of differences amongst investor type on countries other than the US.

## **6. Limitations and Future Research**

The major limitation of this study concerns database complications. Inconsistencies were found amongst the Thomson Reuters Screener - Private Equity Investments and Exits databases which implied time-consuming manual work, liable to error, and forced the deletion of a considerable amount of data. Past VC literature has mainly used NXpert and VentureXpert as databases which would enable access to patent information, an accurate measure of innovation, and would in addition enable access to accounting information for private firms. The youth and relative

smaller size of the UK sample, compared to the US, imply an underlying justification for part of the differences amongst statistical significance of the studied variables.

The treatment-effects model was employed in this study in an effort to capture the unobservable effect between ventures and its investors. Still, endogeneity concerns are not fully mitigated. One way to contribute to this problem would be to control for firm quality prior to first investment through patents and patent citations, reliant on the availability of the aforementioned databases.

To improve the current research, after having access to financial data for private firms, it would be fruitful to study the impact of financial metrics on CVC financing and, consequently, on the chosen exit strategy. Additionally, understanding the driving factors of differences amongst CVC financing in the US and UK, such as government stimulus to entrepreneurial activity through start-up programmes and policies, incentives or tax framework will further contribute to the growing literature regarding countries other than the US.

The European Central Bank introduced negative interest rates in late 2014. Since ventures have investors from various nationalities who refinance themselves through different geographies, studying the impact of negative interest rates would allow to have a further comprehensive look into funding and exit strategy drivers and consequences. Likewise, VC investment and respective company valuations have beaten all kinds of records during recent times. As such, replicating this study on a more recent time frame through separate sub-samples would shed a light on the effect that quantitative easing measures undertaken by Central Banks and subsequent Covid-19 induced capital injection in the market have on VC activity as a whole, on CVC financing, and on exit strategies.

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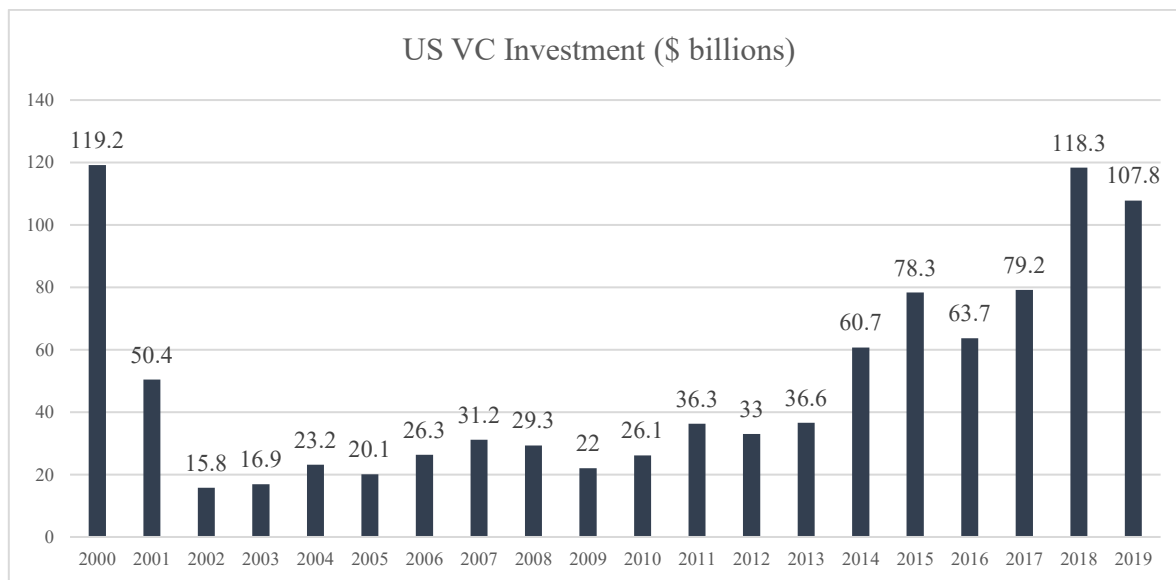
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## 8. Appendices

### Appendix A - Venture Capital investment in the United States (2000 – 2019)

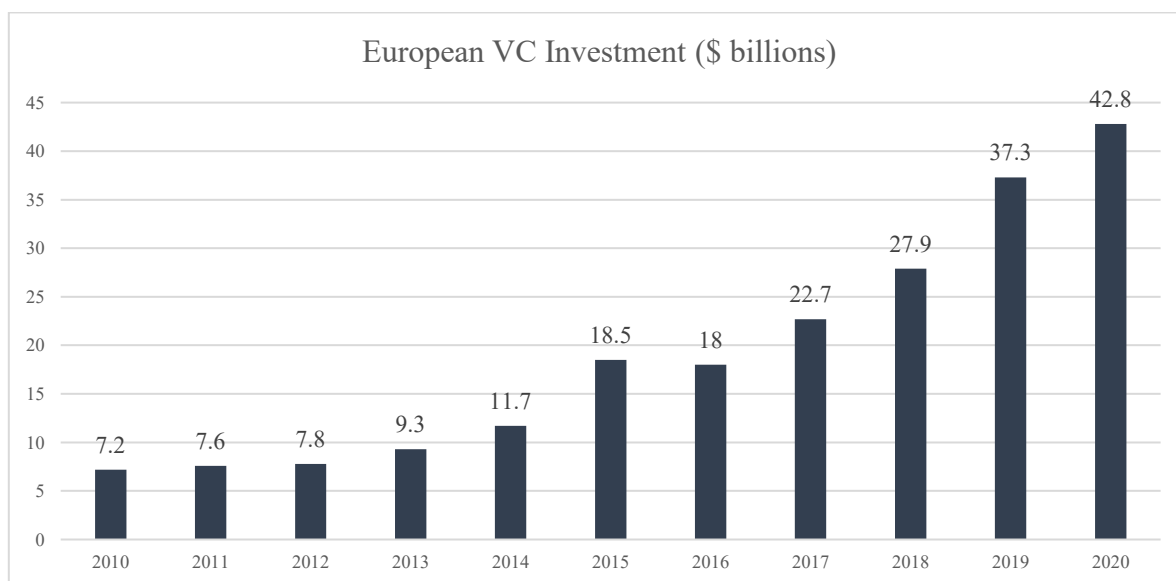
Table 6 - Value of Venture Capital investment in the United States (\$ billions)



This table enumerates the yearly value of VC investment in the United States, in \$ billions, between 2000 and 2019. Despite peaking in 2018, the value of VC investment in the US has yet to match the value of 2000, correspondent to the last year before the dot.com bubble burst. Source: Statistica.com

### Appendix B - Venture Capital investment in Europe (2010 – 2019)

Table 7 - Value of Venture Capital investment in Europe (\$ billions)



This table reports the yearly value of VC investment in Europe, in \$ billions, between 2010 and 2020. Between these years, European VC investment has almost sextupled. Source: European Venture Report by PitchBook

## Appendix C - World's most valuable companies (2018)

Table 8 - World's most Valuable Companies in 2018, by Market Capitalisation (\$ billions)

Company Name	Market Capitalisation (\$ billion)
Apple	926.9
Amazon.com	777.8
Alphabet	766.4
Microsoft	750.6
Facebook	541.5
Alibaba	499.4
Berkshire Hathaway	491.9
Tencent Holdings	491.3
JP Morgan Chase	387.7
ExxonMobil	344.1

This table portrays the largest 10 firms in the World, ranked by market capitalisation in \$ billion, in 2018. Remarkably, Apple's market cap is around 2.7x larger than ExxonMobil, the company taking the 10<sup>th</sup> position. Source: Statistica.com

## Appendix D - Stages of VC Investing

*Seed Stage* - At this stage, firms usually host a minimum viable product, as in, an early version of the innovative product with enough features to be improved through iterative validating processes. Start-ups approach investors with the aim of obtaining investment to further develop their product or service, as well as to attract quality management teams. Seed investment rounds typically vary between \$ 250,000 and \$ 1 million.

*Early Stage* – At this stage, the product has been developed and is typically already being commercialised in the market. Raised funds tend to focus on sales, marketing, advertising and production processes, as well as on product improvement, with the aim of achieving profitability. Funding raised tends to be significantly higher than during previous rounds.

*Expansion Stage* – Revenues portray a more significant role at this stage and raised funds tend to focus on scaling the company, reducing relative costs and increasing market share. If not yet achieved, business profitability is usually attained during this stage.

## Appendix E - CVC and IVC comparison

	Corporate Venture Capital (CVC)	Independent Venture Capital (IVC)
<b>Definition</b>	Minority equity investor through a subsidiary of a parent corporation.	Limited liability partnership.
<b>Value Creation</b>	Strategic and financial gains through knowledge, innovation or technologies synergies.	Purely financial gains – growing and exiting at the highest possible value.
<b>Funding</b>	Stems from the parent company’s assets and revenues.	Stems from capital raised from institutional investors and wealthy individuals.
<b>Investment Horizon</b>	Open-ended.	Usually around 7-10 years.
<b>Managers’ Compensation Scheme</b>	Reliant on parent company – salary and bonus structure.	Reliant on fund’s performance – annual management fee and profit share.
<b>Benefits</b>	Complementary assets such as network, expertise, accommodations, and R&D.	Network, strategy advisory.
<b>Risk tolerance</b>	Increased tolerance to failure.	Low tolerance for venture failure.
<b>Exit Strategy</b>	Exit like an IVC though it can hold on to investments for much longer and even acquire the venture in some cases.	Realisation of profits through an IPO, M&A operation, or Write-off.

## Appendix F - Variables Description

<b>Variable</b>	<b>Definition</b>
CVC	Dummy variable equal to 1 if a venture has, at least, one CVC investor.
CVC_1st	Dummy variable equal to 1 if a venture has, at least, one CVC investor in its first investment round.
CVC_Leader	Dummy variable equal to 1 if over 50% of a venture's funding is provided by CVCs.
Funding Amount	Total funding amount received by a venture measured by disclosed equity amount, in \$ millions, summed over number of investment rounds.
Duration (m)	Difference, in months, between the first investment and completion of exit dates.
IPO	Dummy variable equal to 1 if a venture has exited through an IPO.
# Rounds	Number of funding rounds raised by a venture.
# Funds	Total number of funds invested in a venture.
Fund Size	Average fund size, in \$ millions, across all funds invested in a venture.
VC Age	Average VC age across all funds invested in a venture.
High-Tech	Dummy variable equal to 1 if a venture belongs to a High-Tech industry (SIC=28, 357, 481, or 737).
Business Services	Dummy variable equal to 1 if a venture belongs to the Business Services industry (SIC=73).
Bubble_1stInv	Dummy variable equal to 1 if a venture's first investment was made in 1999 or 2000.
FCrisis_1stInv	Dummy variable equal to 1 if a venture's first investment was made in 2008 or 2009.
FCrisis_Exit	Dummy variable equal to 1 if a venture exited in 2008 or 2009.
3-month MSCI	Country specific MSCI return 0-3 months before a venture's exit date.
5-Year Avg WC	Average working capital available in a venture's industry 5 years before a specific year in a specific industry.
5-Year Avg NETCF	Average Net Cash-flow available in a venture's industry 5 years before a specific year in a specific industry.
Early 1stInv	Dummy variable equal to 1 if a venture's first investment was made at seed or early stage of development.
Seed Stage	Dummy variable equal to 1 if a venture's first investment was made at seed stage of development.
Early Stage	Dummy variable equal to 1 if a venture's first investment was made at early stage of development.
Expansion Stage	Dummy variable equal to 1 if a venture's first investment was made at expansion stage of development.

## Appendix G - Pearson Pairwise Correlations

Table 9 - Pearson Pairwise Correlation Matrix

	CVC	Funding Amount	Duration (m)	IPO	Fund Size	VC Age	Early 1stInv	5-Year Avg WC	5-Year Avg NETCF
CVC	1								
Funding Amount	0.026***	1							
Duration	0.060***	-0.020	1						
IPO	0.090***	0.145***	0.071***	1					
Fund Size	-0.038***	0.058***	0.010	0.035***	1				
VC Age	0.134***	-0.015	0.213***	0.089***	0.091***	1			
Early 1stInv	-0.026***	-0.041***	-0.124***	-0.011	-0.057***	-0.040***	1		
5-Year Avg WC	-0.014	0.017	0.037***	0.110***	0.030***	0.083***	-0.011	1	
5-Year Avg NETCF	-0.017	-0.000	0.008	0.125***	0.010	0.090***	0.029***	0.422***	1

This table reports the Pearson Pairwise Correlations between the main variables of this study. \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level. Correlation between the dummy variable *CVC* and *Funding Amount* equals 0.03 whilst between *CVC* and *Duration* equals 0.06. Correlation between *Funding Amount* and *Duration* totals -0.02.

## Appendix H - Ventures' CVC funding Determinants

Table 10 - Probit estimation for CVC financing

Panel A. Probit Estimation			
	Model 1	Model 2	Model 3
D.V: CVC	Full Sample	USA	UK
5-Year Avg WC	-0.036*** (0.004)	-0.033*** (0.004)	-0.066*** (0.017)
5-Year Avg NETCF	-0.002*** (0.000)	-0.002*** (0.000)	-0.000* (0.001)
Seed Stage	-0.838*** (0.066)	-0.832*** (0.067)	-1.054*** (0.368)
Early Stage	-0.950*** (0.038)	-0.952*** (0.039)	-0.912*** (0.221)
Later Stage	-0.857*** (0.044)	-0.860*** (0.045)	-0.828*** (0.220)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
N	6,189	5,851	338

This table reports the first stage treatment effects regressions where a Probit regression is run aiming to predict the likelihood of a venture receiving any CVC funding. The dependent variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. N represents the sampled number of observations. Standard errors are reported in parentheses and \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

## Appendix I - Treatment Effects – Funding Amount

Table 11 - Treatment Effects estimation of Funding Amount

Panel A. Treatment Effects							
D.V: <i>ln</i> (Funding Amount)	Model 1.1 Full Sample	Model 2.1 USA	Model 2.2 USA	Model 2.3 USA	Model 3.1 UK	Model 3.2 UK	Model 3.3 UK
CVC	0.247** (0.110)	0.379*** (0.111)			0.762 (0.583)		
CVC_1st			0.283** (0.124)			0.800 (0.665)	
CVC_Leader				0.081 (0.117)			0.569 (0.646)
# Funds	0.062*** (0.003)	0.059*** (0.003)	0.061*** (0.003)	0.060*** (0.003)	0.097*** (0.024)	0.105*** (0.023)	0.106*** (0.023)
<i>ln</i> (Fund Size)	0.303*** (0.007)	0.318*** (0.007)	0.305*** (0.006)	0.308*** (0.006)	0.166*** (0.032)	0.164*** (0.031)	0.165*** (0.032)
VC Age	-0.010** (0.005)	-0.010** (0.005)	-0.010** (0.005)	-0.013*** (0.005)	-0.014 (0.024)	-0.012 (0.024)	-0.012 (0.024)
High-Tech	-0.098*** (0.033)	-0.074** (0.034)	-0.083** (0.034)	-0.074** (0.034)	-0.528*** (0.190)	-0.520*** (0.191)	-0.510*** (0.191)
Business Services	-0.120*** (0.034)	-0.158*** (0.034)	-0.165*** (0.034)	-0.165*** (0.034)	0.508** (0.210)	0.479** (0.210)	0.464** (0.210)
Bubble_1stInv	0.186*** (0.029)	0.193*** (0.029)	0.189*** (0.029)	0.178*** (0.029)	0.094 (0.176)	0.104 (0.175)	0.112 (0.177)
FCrisis_1stInv	-0.110** (0.053)	-0.124** (0.052)	-0.132** (0.052)	-0.133** (0.052)	-0.092 (0.325)	-0.061 (0.327)	-0.073 (0.326)
FCrisis_Exit	-0.141*** (0.039)	-0.166*** (0.039)	-0.171*** (0.039)	-0.167*** (0.039)	0.278 (0.223)	0.316 (0.223)	0.292 (0.224)
5-Year Avg WC	0.004** (0.002)	0.003 (0.002)	0.003* (0.002)	0.003* (0.002)	0.030*** (0.010)	0.030*** (0.010)	0.029*** (0.010)
5-Year Avg NETCF	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Early 1stInv	-0.152*** (0.027)	-0.186*** (0.028)	-0.162*** (0.026)	-0.167*** (0.026)	-0.092 (0.264)	-0.110 (0.265)	-0.097 (0.266)
Inverse Mills Ratio	0.237*** (0.057)	0.301*** (0.058)	0.199*** (0.051)	0.200*** (0.050)	-0.087 (0.291)	-0.116 (0.287)	-0.081 (0.298)
N	6,164	5,851	5,851	5,851	313	313	313

This table reports the second stage treatment effects regressions by controlling for the inverse Mills ratio. The dependent variable for all regressions is *ln* (Funding Amount) measured by total disclosed equity amount received before exit. The main independent variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. Dummy *CVC\_1st* equals 1 when the first investment round contains, at least, one CVC investor and 0 otherwise. Dummy *CVC\_Leader* equals 1 when over 50% of funding amount stems from CVC funding, and 0 otherwise. Lastly, N represents the sampled number of observations. Standard errors are reported in parentheses and \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

## Appendix J - Treatment Effects – Duration before Exit

Table 12 - Treatment Effects estimation of Duration before Exit

Panel A. Treatment Effects							
D.V. ln Duration (m)	Model 1.1 Full Sample	Model 2.1 USA	Model 2.2 USA	Model 2.3 USA	Model 3.1 UK	Model 3.2 UK	Model 3.3 UK
CVC	17.179*** (4.091)	14.317*** (4.194)			83.186*** (16.291)		
CVC_1st			3.182 (4.696)			89.902*** (17.612)	
CVC_Leader				-1.240 (4.454)			86.927*** (17.391)
# Rounds	5.889*** (0.199)	6.164*** (0.200)	6.144*** (0.200)	6.096*** (0.200)	4.293*** (1.397)	4.240*** (1.428)	4.279*** (1.405)
# Funds	1.121*** (0.129)	1.150*** (0.128)	1.057*** (0.125)	1.114*** (0.126)	2.422*** (0.745)	2.706*** (0.737)	2.679*** (0.737)
ln (Fund Size)	3.798*** (0.265)	3.699*** (0.276)	4.322*** (0.245)	4.258*** (0.249)	3.208*** (0.981)	3.621*** (0.939)	3.215*** (0.979)
VC Age	2.377*** (0.178)	2.279*** (0.183)	2.343*** (0.183)	2.411*** (0.183)	0.662 (0.732)	0.766 (0.727)	0.663 (0.735)
High-Tech	5.849*** (1.252)	5.900*** (1.270)	5.970*** (1.277)	5.781*** (1.271)	12.783** (5.592)	12.478** (5.584)	13.267** (5.634)
Business Services	0.966 (1.269)	1.376 (1.279)	1.858 (1.279)	1.801 (1.276)	0.698 (6.034)	1.776 (6.009)	-0.198 (6.016)
Bubble_1stInv	4.189*** (1.076)	2.399** (1.088)	2.969*** (1.083)	3.212*** (1.082)	22.319*** (4.968)	23.436*** (4.986)	22.770*** (4.983)
FCrisis_1stInv	-4.489** (1.963)	-5.536*** (1.975)	-5.131*** (1.976)	-5.122*** (1.973)	10.095 (9.652)	11.380 (9.776)	11.147 (9.741)
FCrisis_Exit	1.574 (1.440)	0.646 (1.457)	0.878 (1.459)	0.741 (1.457)	-1.873 (6.394)	0.254 (6.390)	-1.855 (6.426)
5-Year Avg WC	0.184*** (0.070)	0.127* (0.071)	0.100 (0.070)	0.103 (0.070)	0.879*** (0.334)	0.811** (0.319)	0.863*** (0.334)
5-Year Avg NETCF	-0.000 (0.005)	-0.011* (0.006)	-0.014*** (0.006)	-0.014** (0.006)	0.016 (0.017)	0.019 (0.017)	0.019 (0.017)
Early 1stInv	-2.490** (1.023)	-1.336 (1.042)	-2.785*** (0.994)	-2.631*** (0.993)	18.534** (8.338)	18.726** (8.180)	17.907** (8.347)
Inverse Mills Ratio	-11.904*** (2.116)	-10.876*** (2.176)	-4.197** (1.926)	-4.387** (1.887)	-36.544*** (8.164)	-32.888*** (7.746)	-36.884*** (8.154)
N	6,164	5,851	5,851	5,851	313	313	313

This table reports the second stage treatment effects regressions by controlling for the inverse Mills ratio. The dependent variable for all regressions is *Duration (m)* measured by the difference in months between first investment and exit dates. The main independent variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. Dummy *CVC\_1st* equals 1 when the first investment round contains, at least, one CVC investor and 0 otherwise. Dummy *CVC\_Leader* equals 1 when over 50% of funding amount stems from CVC funding, and 0 otherwise. *N* represents the sampled number of observations. *Z-values* are reported in parentheses and \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.

## Appendix K - Treatment Effects – Exit Strategy

Table 13 –Treatment Effects estimation of Exit Strategy

D.V. IPO	Panel A. Treatment Effects								
	Model 1.1	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 3.1	Model 3.2	Model 3.3	Model 3.4
	Full Sample	USA	USA	USA	USA	UK	UK	UK	UK
CVC	-0.109*** (0.039)	-0.124*** (0.040)	-0.155*** (0.039)			-0.026 (0.148)	0.006 (0.148)		
CVC_1st				-0.177*** (0.041)				-0.106 (0.156)	
CVC_Leader					-0.052 (0.039)				-0.154 (0.164)
ln Duration (m)	0.009 (0.006)	0.012** (0.006)		0.012** (0.006)	0.015*** (0.006)	-0.097*** (0.028)		-0.092*** (0.028)	-0.092*** (0.028)
Duration (m)			0.001*** (0.000)				-0.002 (0.001)		
Duration^2			-0.000*** (0.000)				0.000 (0.000)		
ln (Funding Amount)	0.070*** (0.004)	0.076*** (0.004)	0.072*** (0.004)	0.077*** (0.004)	0.074*** (0.004)	0.003 (0.011)	0.005 (0.011)	0.006 (0.011)	0.005 (0.011)
ln (Fund Size)	-0.002 (0.003)	-0.002 (0.004)	-0.002 (0.004)	-0.003 (0.004)	-0.001 (0.004)	0.002 (0.008)	0.002 (0.008)	0.002 (0.008)	0.002 (0.008)
VC Age	0.006*** (0.002)	0.007*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.007*** (0.002)	-0.002 (0.005)	-0.003 (0.005)	-0.001 (0.005)	-0.002 (0.005)
ln (MSCI index)	0.003 (0.004)	0.001 (0.004)	0.001 (0.004)	-0.001 (0.004)	-0.002 (0.004)	0.072*** (0.019)	0.033*** (0.013)	0.070*** (0.019)	0.073*** (0.019)
High-Tech	-0.049*** (0.010)	-0.054*** (0.011)	-0.060*** (0.011)	-0.057*** (0.011)	-0.054*** (0.011)	-0.056 (0.039)	-0.044 (0.039)	-0.054 (0.039)	-0.054 (0.039)

Table 13 –Treatment Effects estimation of Exit Strategy (continuation)

D.V. IPO	Panel A. Treatment Effects								
	Model 1.1	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 3.1	Model 3.2	Model 3.3	Model 3.4
	Full Sample	USA	USA	USA	USA	UK	UK	UK	UK
Business Services	-0.036*** (0.010)	-0.036*** (0.011)	-0.032*** (0.011)	-0.037*** (0.011)	-0.036*** (0.011)	0.060 (0.043)	0.047 (0.043)	0.052 (0.043)	0.051 (0.043)
Bubble_1stInv	-0.037*** (0.009)	-0.039*** (0.009)		-0.035*** (0.009)	-0.040*** (0.009)	0.069* (0.037)		0.071* (0.036)	0.072** (0.036)
FCrisis_1stInv	0.035** (0.016)	0.038** (0.017)		0.038** (0.017)	0.037** (0.017)	0.017 (0.066)		0.025 (0.067)	0.018 (0.067)
FCrisis_Exit	-0.106*** (0.012)	-0.106*** (0.012)	-0.104*** (0.012)	-0.107*** (0.012)	-0.107*** (0.012)	-0.092** (0.045)	-0.093** (0.046)	-0.087* (0.045)	-0.087* (0.045)
5-Year Avg WC	0.001 (0.001)	0.001* (0.001)	0.001* (0.001)	0.001* (0.001)	0.001 (0.001)	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)	-0.004 (0.002)
5-Year Avg NETCF	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Early 1stInv	-0.023** (0.010)	-0.028*** (0.010)	-0.028*** (0.010)	-0.024*** (0.009)	-0.027*** (0.009)	-0.054 (0.058)	-0.058 (0.058)	-0.061 (0.058)	-0.061 (0.058)
Inverse Mills Ratio	0.088*** (0.020)	0.095*** (0.021)	0.108*** (0.021)	0.088*** (0.017)	0.093*** (0.017)	0.076 (0.077)	0.063 (0.077)	0.102 (0.069)	0.120 (0.079)
N	6,161	5,848	5,851	5,848	5,848	313	313	313	313

This table reports the second stage treatment effects regressions by controlling for the inverse Mills ratio. The dependent variable for all regressions is the dummy *IPO*, equalling 1 when the venture exits through an IPO, and 0 otherwise. The dummy variable *CVC* will equal 1 if the venture has, at least, one CVC investor and 0 if fully IVC-backed. Dummy *CVC\_1st* equals 1 when the first investment round contains, at least, one CVC investor and 0 otherwise. Dummy *CVC\_Leader* equals 1 when over 50% of funding amount stems from CVC funding, and 0 otherwise. *ln (Funding Amount)* measured by total disclosed equity amount received before exit whilst *Duration (m)* is measured by the difference in months between first investment and exit dates. Lastly, N represents the sampled number of observations. Z-values are reported in parentheses, and \*, \*\*, \*\*\* correspondently represent statistical significance at a 10%, 5% and 1% level.