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ORIGINAL RESEARCH

Venture capital activities under uncertainty: US and UK investors behavior

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Abstract
We investigate how in the context of Corporate Venture Capital (CVC), the investment decisions affect the likelihood of their subsequent exit strategies. We use OLS and probit regression as well as Weibull distribution of residual values, given its reliability and validity for studying lifetime analysis. Based on a sample of 8722 VC-backed ventures with the first investment dates between 1999 and 2018 in United States (US) and United Kingdom (UK), the results show that the presence of CVCs positively affects the funding amounts and the duration of the investment. CVC funds are more generous and more patient than Independent Venture Capital (IVC) funds regarding their investments in ventures. Moreover, the findings provide evidence that the exit strategies are directly influenced by the funding amounts and the duration of the investment which are influenced, in turn, by the fund type. Greater funding increases the likelihood of IPO exit which is reduced by longer investment duration. Our results are robust to alternative estimation methods, namely two-stage treatment-effects regressions. These results help the various stakeholders (VC funds, investors, ventures) make crucial decisions regarding investment amounts and duration, and exit.

Keywords Corporate Venture Capital · Independent Venture Capital · Funding · Duration · Exit strategies

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Highlights

CVCs positively affects the funding amounts and the duration of the investment.

Greater funding amounts lead to a greater likelihood of an exit through IPO.

Longer duration reduces the likelihood of IPO exit route.

Investment decisions in VC affect the exit strategy.

CVC-backed ventures receive larger funding amounts.

VC firms consider the staging decision at each financing round as deciding between investing and delay.

JEL classification G24 · G32 · G34

1 Introduction

Venture capital (VC) is an external means for firm growth and technology development (Ma, 2020). Venture capitalists (VCs) as corporate investors and independent venture capitalists (IVCs)[1] decide their funding for a venture to enhance the likelihood of their success (Guo et al., 2015). Non-financial firm pursuit in external privately held entrepreneurial companies direct equity investment defined as corporate venture capital (CVC) as illustrated by Wadhwa et al., (2016) and Yang et al., (2014) for both financial and strategic objectives. The other type is IVC limited partnerships firms that strive for morally financial retrievals as defined by Chemmanur et al. (2014). After the dot.com bubble, the value of American VC investments peaked in 2018, totalling over 118 billion dollars whereas European VC deal value 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.

A stream of research examines why firms pursue CVC investments and value creation for investing firms (Anokhin et al., 2016; Yang et al., 2014). Existing literature has comparatively analysed the influence of CVC and IVC on ventures' performance regarding innovation (Alvarez-Garrido & Dushnitsky, 2016; Shuwaikh & Dubocage, 2022), going public (Ivanov & Xie, 2010) and growth (Bertoni et al., 2013). 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; Cumming & Johan 2010; Lindström, 2006; 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. The proposed models state 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).

This paper aims to answer the research question: Does the CVC financing program impact the investment decisions and the chosen exit strategy? Our results clearly show that

[1] Refer to Appendix A for a brief comparison between both types of VC funds.

staged financing is an effective mechanism for VCs to control risks. Moreover, the findings provide evidence that the exit strategies are directly influenced by the funding amounts and the duration of the investment which are influenced, in turn, by the fund type. Our paper is among a few recent papers to propose a formal model for staged financing in controlling risks in VC by staging investment decisions. Using a dataset of 8622 VC-backed companies between 1999 and 2018, this study seeks to examine different patterns within funding amounts and duration before exit amongst CVC and IVC-backed companies across the US and the UK as well as to analyse the consequent impact on exit strategy decisions undertaken by the correspondent investors.

This study has essential approaches contributing to the literature. First, this study expands research stream on investment decisions (Aouni et al., 2013; Archibald & Possani, 2021; Franklin, 2015; Yang et al., 2009). We bring CVC investments and IVC together rather than discussing them independently, and our conclusions validate the notion that the both funding types deliver alternative styles of corporate development and business growth (Keil et al., 2008). These dynamics might influence the choices of small companies to engage in relationships with corporate investors. By doing so, this paper joins the literature regarding acquisitions by investing firms (Benson & Ziedonis, 2009), the likelihood of building investment link between a firm and an entrepreneur (Katila et al., 2008) and the selection entrepreneurs have within CVC and IVC (Maula et al., 2005; Keil et al., 2008) study acquisition and CVC funding as two governance forms by examining their differential impacts on performance consequences. This study adopts a comparative lens to analyze CVC investments and IVC empirically to study the implications of choice between them and to complement research streams (Chemmanur et al., 2014; Shuwaikh & Dubocage 2022).

Second, this study joins the comprehensive creek of literature on financing arrangements (Dushnitsky & Shaver, 2009; Katila et al., 2008). As discussed earlier, previous research has emphasized CVC funding role in the evolution of cooperation networks (Dushnitsky & Lavie, 2010) and the value of CVC investments for innovation and learning purposes (Keil et al., 2008; Shuwaikh & Dubocage, 2022). This study improves our perception of external technology sourcing and business growth. Corporate investors need to discover technology displays and innovative growth events apart from developing their potential to examine different techniques efficiently. Consequently, the firms invest for a long duration in their CVC-backed companies to acquire different experiences to understand advanced external technology and innovation as a way of initiating their innovation. Essential decisions regarding such investments are critical to creating opportunities for growth (Aouni et al., 2013). This study is in line with previous studies on linkages between acquisition and CVC investments (Capron & Shen, 2007). We highlight the function of CVC investment as real option to achieve acquisitions. Generally, IVCs are interested in liquidity events, so they have concerns about driving companies towards IPOs as quickly as possible. In contrast, corporate investors are principally interested in the acquisition exits mainly if they are interested in the underlying technology in line with our findings and consistent with the literature.

The ensuing research has the following structure. Section two presents the literature review contemplating past findings, and section three presents the data retrieval and methodology. Section four presents the results and the discussion; this paper ends with a conclusion and some avenues for future research.

2 Theoretical background

2.1 Funding amount

With respect to the amount invested, CVC is second only to IVC, in addition to leading other investor groups (Cumming, 2012; Dushnitsky, 2008, 2012; Siegel et al., 1988) find that CVCs and IVCs use similar investment criteria and that CVCs face difficulties in attracting ventures, especially if they operate in an industry that is attractive to the investor. According to Dushnitsky (2012), the current fourth wave of CVC is characterized by a new change in the structure and objectives of corporate investors. At the beginning of the year 2000, the dollar volume of rounds for CVC funding participation exceeded USD 18 billion (Dushnitsky & Shaver, 2009; Gompers & Lerner, 1998a, b; Stuart & Sorenson, 2003). The following examples are enlightening. BlackBerry Partners Fund (CVC) conducted a drive in 2008 for one hundred fifty million dollars in software application ventures. At the beginning of that same year, Apple launched one hundred million dollars by the prominent VC firm Kleiner Perkins Caufield & Byers. In 2009, Google Ventures (CVC) led a fifteen million dollar investment in a biotech venture (Adimab)(Cumming, 2012; Dushnitsky, 2012).

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; Cumming & MacIntosh, 2000) and the US's market size and maturity imply that American ventures have easier access to funding (Schwienbacher, 2005). Global Corporate Venturing 2018 report illustrates CVC investors' view of the power of investment amount from corporate investors. VCs typically provide massive amounts of funding to companies with the potential for rapid growth. However, because investors are wary of investing in companies and innovative companies due to the enormous risks and business costs involved, they expect the supposed interest to be considerably more prominent than the risk. We suggest that corporate investors will help inject additional investments amounts:

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

2.2 Duration before exit

Besides pursuing financial returns, CVCs also seek out strategic benefits on their value chain (Dushnitsky & Lenox, 2005a; Hellmann et al., 2008). 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. 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; Cumming & MacIntosh, 2000; 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 (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; Bertoni et al., 2015).

Previous studies examine CVC activities via organizational learning theory, and scholars identify CVC as a powerful means to acquire knowledge outside of firm boundaries (Dushnitsky & Lenox, 2005b; Maula et al., 2005). Previous research focuses on the strategic outcomes linked to organizational learning in the CVC setting and identifies corporate knowledge as an inspiration for CVC actions and its powerful function for company performance, as Chesbrough & Tucci (2002) find regarding technology innovation. We expect that the duration of a CVC program is longer than that of an IVC program in firms that seek technology innovation and organizational learning.

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

2.3 Exit strategy

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). 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 an acquisition for a lower expected value (Schwienbacher, 2005, 2008).

A model proposed by Guo et al. (2015) reasons that larger investments positively correlate with the likelihood of going public whilst prolonged duration directs to lower IPO probability. Accurate information regarding the venture's success results in prolonged durations, reflecting the possibility 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 (Guo et al., 2015). 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, 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; Gompers & Lerner 1998a, b).

Hypothesis ***a***: *Larger investment* amounts *before exit increase IPO exit.*

Hypothesis ***b***: *Prolonged duration before exit decrease the likelihood of an IPO.*

3 Methodology

3.1 Sample and data

The study dataset comprises 8622 US and UK formerly VC-backed firms with first investment date between the 1999 and 2018. The correspondent data regarding VC activity was retrieved from Thomson One private equity database. This database encompasses firm, investors, and funds' characteristics inherent to each venture. 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, acquisition, or Write-Off and whose first investment date lies between the 1999 and 2018. This data frame was chosen to take into account the impact of the financial crisis besides the dot.com bubble on investment and exit decisions. Also, we pick 1999 to be our study year as it resembles CVC funding growth between investors and their backed ventures (Dushnitsky and Lenox, 2006) as well as the beginning of the fourth wave of CVC investments (Dushnitsky, 2012). 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, we exclude from our sample the financial firms[2] in order to avoid biases (Bayar & Chemmanur, 2012). Financial data was retrieved from Compustat-Capital IQ and historical industry and stock market information was respectively retrieved from Damodaran Online and from the Morgan Stanley Capital International (MSCI) database. We use PATSTAT database, European Patent Office (EPO), to get Patent data. After merging and clearing data from different sources, the final dataset consisted of a cross sectional data sample at company level of 8622 US and UK VC-backed ventures with first investment date between 1999 and 2018.

3.2 Variables description

3.2.1 Dependent variables

As a combination of existing literature, this study analyses three dependent variables focused on funding amount, investment duration and exit strategy (Guo et al., 2015; Schwienbacher 2005; Cumming & MacIntosh, 2000). We operationalize the dependent variables as follows:

Funding amount 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 first investment date in the venture and exit date.

[2] SIC codes between 6000 and 6999.

IPO dummy variable taking the value of 1 when the companies exits through an IPO, and 0 otherwise.

3.2.2 Independent variables

In order to understand the power of financing nature on the dependent variables, three variations of CVC financing variables were constructed and independently studied on each model. They are proxied as follows:

CVC Is a dummy variable that takes the value of one if there is one CVC investor or more backing the company, and 0 if the company is totally IVC-backed.

CVC_1st Is a dummy variable that takes the value of one 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 This variable is a proxy for the involvement of CVC funds in the total VC funds that the company receives (Masulis & Nahata, 2009). This variable was constructed as a proxy for CVC participation in investment.

$$\%\mathrm{CVC} = \frac{CVCinvestmentamountsinacompany}{TotalCVCandIVCinvestmentamountsinacompany} * 100$$

3.2.3 Contro variables

Following the literature, we add control variables to address confounding factors that could predict funding amount, duration, and exit strategies undertaken by ventures. The variable *#Funds* translates the total number of investment funding 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 (Cumming & Johan, 2010; Dushnitsky & Shapira, 2010; Lindström, 2006; Cumming, 2006; Schwienbacher, 2005). *Fund Size* comprises the average size 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 resources, expertise and reputation 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 one if the venture's funding is at early stages (Guo et al., 2015; Cumming & Johan 2010).

As 41% 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 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 Guo et al., (2015) on the rationale that investment is driven by industries' extra cash and liquidity, *AvgWC* measures the average working capital available in the venture's industry 5 years before first investment date, as a representation of accounting liquidity. Similarly, *AvgNETCF* 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 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).

To decrease the endogeneity of matters in which CVCs are experts, such as choosing superior companies over IVCs and funding further R&D plans, we added the control variable *patent stock*, as a representative of that company's character and innovativeness (Chemmanur et al., 2014). We use the patent stock for measuring the quality of the funded company. This is a proxy of the quality of the company and a step to eliminate the endogeneity concern. Following Blundell et al., (1995), patent stock is the number of all patents at a depreciating rate λ of 30% at time (t).

$$\mathrm{PatentStock}_{it} = \ln(patents)_{it} + (1-\delta)\, PatentStock_{it}$$

Finally, and following Shuwaikh & Dubocage (2022) we construct *industry relatedness*, to represent the percentage of similarity in the partners' sectors. using Kenneth French 17 industries classification. A full description of all variables used in this research is available on Appendix B.

4 Empirical results

4.1 Descriptive statistics and correlations

Table 1 delivers descriptive statistics of our variables. The sample is composed of 8622 companies, of which 83% are located in US. In our sample, 3017 companies (35%) are financed by CVCs. 862 companies (10% of the whole sample) had early-on CVC funding. Their first-round funding contains a CVC investor. On average, the CVC fund amount invested in a company represents 7% of the total VC funds. The sample average investment amount is USD 35.07 million. The average of the syndicate size i.e. funds number at the investment date is 5. On average, the number of funding rounds a venture raised is 4. Moreover, 24% of the companies have IPO exit.

Table 2 reports the matrix of correlation of our variables. The correlation between investment amount and CVC is 0.16, and that between investment duration and CVC is 0.12. The

Table 1 – Descriptive Statistics

	Full Sample					
	N	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
USA	8622	0.83	1	0.23	0	1
CVC	8622	0.35	0	0.33	0	1
CVC_1st	8622	0.10	0	0.20	0	1
% CVC	8622	0.07	0	0.23	0	1
Funding Amount (million)	8622	35.07	6.57	37.67	0	2295
Duration (months)	8622	68.38	61	42.25	0	246
IPO	8622	0.24	0	0.32	0	1
Merger	8622	0.81	1	0.39	0	1
# Rounds	8622	3.95	3	2.96	1	31
# Funds	8622	5.34	5	4.65	1	35
Fund Size	8622	415.72	246.67	905.02	0	22,887
VC Age	8622	3.58	3.13	2.67	0	49
IVC Age	8622	3.39	3	2.49	0	49
Early 1st Inv.	8622	0.45	0	0.50	0	1
Bubble 1st Inv.	8622	0.34	0	0.47	0	1
Fin. Crisis 1st Inv.	8622	0.06	0	0.24	0	1
Fin. Crisis Exit	8622	0.12	0	0.33	0	1
Business Serv.	8622	0.41	0	0.49	0	1
High Tech	8622	0.55	1	0.50	0	1
Patent Stock	8622	0.84	2.62	2.33	0	67
Industry Relatedness	8622	0.73	1.51	1.22	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 2018. 83% of the sample corresponds to American ventures whilst 35% of all ventures host CVC financing

correlation between the investment amount and duration is -0.04 mitigating the concern of the highly correlated main variables. The correlations among the variables in our models are relatively small and below the critical value of 0.8, which suggests that multicollinearity is not likely to be an issue in our multivariate tests.

4.2 Univariate analysis

Panel A of Table 3 show cases disparities induced by CVC financing, whilst Panel B portraits differences between both sampled countries. CVC-backed ventures show higher funding levels than IVCs: on average, the funding amount is US$ 62 million for CVC-backed ventures and US$ 30 million for IVC-backed ventures. The difference between both funding amounts is significant at the level of 1%. CVC and IVC demonstrate a significant difference between first investing time and exit process. CVC-backed ventures take an average of 95 months to exit compared to only 78 months for IVC-backed. Moreover, 38.5% of CVC-backed ventures exits through an IPO whilst only 34.4% of IVC-backed firms exits through an IPO. Its mean difference is significant at the level of 1%. CVC-backed ventures tend to be backed by older experienced funds which tend to have smaller sizes than those of fully IVC-backed ventures. CVC-backed ventures have more investment rounds (4.8 rounds) than IVC-backed ventures (3.8 rounds) and larger syndicate size with a difference of 4 funds. 41.1% of IVC-backed ventures' first investment was performed at seed or early

Table 2 Pearson Pairwise Correlation Matrix

	CVC	Funding Amount	Duration (m)	IPO	Fund Size	VC Age	Early 1stInv	AvgWC	Avg NETCF
CVC	1								
Funding Amount	0.16***	1							
Duration	0.12***	-0.04	1						
IPO	0.1290***	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		
AvgWC	-0.014	0.017	0.037***	0.110***	0.030***	0.083***	-0.011	1	
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

stage while it is the case for 45.1% of CVC-backed ventures. The difference is statistically significant at the level of 10%.

Panel B presents the differences between US and UK backed ventures, 12.7% US ventures had at least one CVC as an investor whilst only 10.7% of UK companies did. Investors are faster at exiting US ventures, taking on average 14.4 months less to do so than UK investors. Moreover, 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; Cumming & MacIntosh, 2000).

4.3 Investment amount model

The following regression model assess CVC financing using ordinary least squares (OLS) on the full sample, and on US and UK sub-samples.

$$Ln\left(FundingAmount\right) = \propto_0 + \propto_1 CVC_i + \sum_{k=1}^{15} \propto_k Z_{ki} + ?_i \quad (1)$$

Table 4 reports OLS estimations of funding amount. The results show a positive and significant relation between having CVC investor backing the venture and funding amount. This result implies that CVC-backed ventures tend to receive 17% larger funding amounts in the US and 11% in the UK than IVC-backed ones. This means that the positive impact of CVC backing on funding amount is stronger for US ventures. These findings complement research of Cumming et al., (2005) who find that additional capital is allocated to VCs provide strategic and managerial advice to ventures and results suggest that the maturity, size, capital availability and liquidity inherent to the US capital market strengthen the comparative advantages of CVC financing. Moreover, if CVC is the first investor, this will increase the funds to be 18% greater in the US and 12% greater in the UK than the IVC funding amounts. Additionally, once having multiple CVCs in the syndication, the ventures experience 19% increase in the funding amount in the US and 13% in the UK.

4.4 Duration model

To estimate the duration model, we follow Guo et al. (2015) and Cumming & MacIntosh (2001), using Weibull distribution of residual values, given its reliability and validity for studying lifetime analysis. As a consequence, the survivor function *S(t) and* the hazard rate *h(t)* for the Weibull distribution are stated as the following:

$h\left(t\right) = pt^{p-1}e^{\alpha x}\, S\left(t\right) = e^{-e^{\alpha x}t^{p}}$ *(2).*

In the aforementioned equation, *t* denotes months number between investment and exit, as in the variable *Duration (months)*, *p* represents the shape parameter whilst *e* concerns the exponential transformation. Vectors x and α symbolised independent variables and their coefficients. *Failure* is defined as having exited before *t*, and this is the survival model. Since the dataset is uncensored, all ventures will have exited through an IPO or a Merger before *t*. Accordingly, a *Failure* case in the presented model is every single sampled venture. The duration variable *t* will therefore capture time needed by each firm to exit. Ventures will host a shorter duration before exit, for a higher *Failure* likelihood indicated by hazard rate

Table 3 Univariate Analysis

Panel A. Analysis by Investor Type				
	IVC-Backed	CVC-Backed	Difference	t-stat
USA	0.964	0.994	-0.03	(-1.117)
IPO	0.343	0.385	-0.042***	(-5.481)
Acquisition	0.763	0.84	-0.077***	-5.632
Funding Amount	30.66	62.71	-32.05***	(-3.384)
Duration (m)	78.026	95.446	-17.42***	(-4.178)
# Rounds	3.841	4.889	-1.048***	(-8.453)
# Funds	5.6	9.4	-3.8***	(-16.957)
Fund Size	324.091	228.975	95.116***	-4.637
VC Age	7.564	8.463	-0.899***	(-8.451)
IVC Age	6.058	7.463	1.405***	-4.513
Patent in Stock	0.451	0.671	-0.22**	-2.072
Early 1stInv	0.533	0.84	-0.307*	-2.138
Bubble_1stInv	0.08	0.086	-0.006***	(-9.122)
FCrisis_1stInv	0.149	0.142	0.007***	-3.487
FCrisis_Exit	0.405	0.442	-0.037	-1.12
Business Services	0.562	0.573	-0.011**	-3.037
High Tech	0.994	0.964	0.03	-1.623
N	5605	3017		
Panel B. Analysis by Country				
	USA	UK	Difference	t-stat
CVC	0.148	0.121	0.027*	(-1.119)
CVC_1st	0.127	0.107	0.02*	-0.727
% CVC	0.074	0.091	-0.017**	-1.581
Funding Amount	11.046	11.678	-0.632	-0.54
Duration (m)	67.615	81.999	14.384***	-6.211
IPO	0.139	0.100	0.039*	(-2.041)
Merger	0.824	0.907	-0.083***	-5.128
# Rounds	4.071	2.242	1.829***	(-14.136)
# Funds	6.188	4.221	1.967***	(-8.702)
Fund Size	377.281	1081.450	-104.169***	-4.609
VC Age	3.558	4.328	-0.77***	-4.246
IVC Age	3.365	4.187	-0.822***	-4.598
Early 1stInv	0.487	0.115	0.372***	(-20.724)
Bubble_1stInv	0.364	0.339	0.025	(-0.656)
FCrisis_1stInv	0.083	0.079	0.004	-0.197
FCrisis_Exit	0.140	0.165	-0.025	-1.618
Business Services	0.442	0.302	0.140***	(-5.062)
High Tech	0.579	0.425	0.154***	(-5.304)
N	7156	1466		

This table details a comparison between sampled CVC and IVC in Panel A and US and UK-backed ventures in Panel B. US firms host longer durations, a higher percentage 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

Table 4 – OLS estimation of Funding Amount

	Panel A. OLS Estimations						
D.V: ln (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	0.188***	0.176***			0.112**		
	(2.039)	(3.039)			(1.260)		
CVC_1st			0.189***			0.123**	
			(1.041)			(1.342)	
% CVC				0.192***			0.136**
				(2.143)			(1.224)
# Funds	0.153***	0.160***	0.162***	0.162***	0.194***	0.113***	0.113***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.025)	(0.024)	(0.024)
Ln (Fund Size)	0.346***	0.380***	0.380***	0.382***	0.156***	0.157***	0.155***
	(0.010)	(0.010)	(0.011)	(0.010)	(0.038)	(0.038)	(0.038)
VC Age	0.001**	0.003**	0.004**	0.001**	0.017	0.014	0.015
	(0.005)	(0.005)	(0.005)	(0.005)	(0.025)	(0.025)	(0.025)
High-Tech	-0.073**	-0.041	-0.045	-0.040	-0.537***	-0.526***	-0.519***
	(0.033)	(0.033)	(0.034)	(0.033)	(0.195)	(0.196)	(0.196)
Business Services	-0.116***	-0.152***	-0.152***	-0.150***	0.496**	0.468**	0.451**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.216)	(0.216)	(0.216)
Bubble_1stInv	0.213***	0.230***	0.238***	0.227***	0.081	0.096	0.098
	(0.029)	(0.029)	(0.029)	(0.029)	(0.181)	(0.181)	(0.181)
FCrisis_1stInv	-0.084	-0.091*	-0.095*	-0.095*	-0.108	-0.070	-0.090
	(0.053)	(0.052)	(0.052)	(0.052)	(0.333)	(0.335)	(0.335)
FCrisis_Exit	-0.123***	-0.142***	-0.141***	-0.136***	0.277	0.315	0.292
	(0.039)	(0.039)	(0.039)	(0.039)	(0.227)	(0.227)	(0.228)
AvgWC	0.006***	0.005***	0.005***	0.005***	0.027***	0.027***	0.026**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)	(0.010)	(0.010)
Avg NETCF	0.000**	0.000*	0.000*	0.000*	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Early 1stInv	-0.059**	-0.068***	-0.069***	-0.072***	-0.145	-0.156	-0.148
	(0.025)	(0.025)	(0.025)	(0.025)	(0.286)	(0.288)	(0.288)
Patent Stock	0.138***	0.127***	0.127***	0.129***	0.021***	0.022***	0.024***
	(4.12)	(3.11)	(3.02)	(3.17)	(2.12)	(2.19)	(2.14)
Industry Relatedness	0.127**	0.116**	0.113**	0.121**	0.011**	0.012**	0.014**
	(1.12)	(1.12)	(1.03)	(1.12)	(1.13)	(1.11)	(1.11)
N	8622	7156	7156	7156	1466	1466	1466
R-squared	0.494	0.481	0.400	0.414	0.306	0.289	0.288

*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. %CVC is the percentage of the investment amounts from CVC funds scaled by venture capital total investment amounts. 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* larger than 1. Contrarily, a hazard rate inferior to 1 will suggest a slower exiting process. The hazard rates for the normal survival estimations are portraited in Table 5. As mentioned earlier, a hazard rate larger than 1 is an indication for shorter duration before exit whilst values below 1 hint a slower exiting process.

Table 5 reports 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 longer durations 41% in the US and 25% in the UK, relatively to their IVC-backed counterparts. Capturing the effect of having CVC as first financing, this will increase the funding duration to be 43% greater in the US and 28% greater in the UK than the IVC funding duration. Additionally, we apprehend that the interpretation of these effects significantly remains the same when the independent variable is changed to grasp the majority of capital being provided by CVCs (*%CVC*), the ventures experience 45% increase in the funding duration in the US and 29% in the UK. US CVC-funded ventures host longer investment duration compared to IVC-funded ones and UK backed ventures.

4.5 Exit model

Exit model aims to assess the effects of the CVC investment decisions on the ventures' exit strategies. A binary logistic regression is utilised to model the likelihood of exiting through an IPO. An OLS model is run to shed a light on the magnitude of these effects following the subsequent equation:

$$IPO = \propto_0 + \propto_1 CVC_i + \propto_2 ln\left(FundingAmount\right)_i + \propto_3 ln\left(Duration\right)_i + \sum_{k=1}^{15} \propto_k Z_{ki} + ?_i \quad (3)$$

Table 6 reports the estimations of the effect of investment decisions on the exit route variable. Model (1.1, 2.1, 3.1) shows CVC funding impact on the exit route of backed companies for the full sample as well as in the US and the UK by controlling for CVC fund only and neither the duration nor the funding, revealing a positive impact of CVC funding on IPO route. We find that CVC funding encourages the IPO exit of backed companies. In Models (2.2, 3.2), we add the investment duration and the investment amount. The results reveal that investment duration has negatively affect impact the IPO and hence a positive direct effect on acquisition exit. For the purpose of organizational learning and innovation, investment duration has a positive impact on acquisition exit in CVC-backed companies. As we have expected, companies seeking innovation continue their investment longer before exiting in order to enhance both learning and knowledge transfer, which may then motivate the acquisition exit option. Additionally, we find a significant positive impact on IPO exit for CVC-backed companies in the US and IVC- backed companies for the UK. As a result, the amounts of follow-on investment increase the likelihood of IPO exit in CVC- and IVC-backed companies. In Models (2.3, 3.3), we control for the investor type and the results of CVC funds are not significant. The results in Models (4.1, 4.2) Panel B and using the OLS estimation approach give the same output regarding the successful exit IPO following the VC funding (CVC and IVC).

Moreover, we find that the non-linear impact of duration before exit is positive and statistically significant Models (2.4, 3.4). The opposite signs of the coefficients from *Duration (m)* and *Duration*$_2$ imply that shorter duration negatively affect the likelihood of IPO exit.

Table 5 – 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	0.311***	0.412***			0.255**		
	(0.116)	(0.149)			(0.108)		
CVC_1st			0.434***			0.281**	
			(0.151)			(0.174)	
% CVC				0.451***			0.288**
				(0.171)			(0.158)
# Rounds	0.791***	0.895***	0.896***	0.899***	0.943	0.920	0.913
	(0.005)	(0.005)	(0.005)	(0.005)	(0.036)	(0.037)	(0.036)
# Funds	0.971***	0.977***	0.980***	0.998***	0.945***	0.937***	0.938***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.021)	(0.020)	(0.020)
ln (Fund Size)	1.005	1.001	1.001	1.002	1.022	1.020	1.021
	(0.010)	(0.011)	(0.011)	(0.011)	(0.036)	(0.036)	(0.035)
VC Age	0.953***	0.952***	0.953***	0.952***	1.020	1.017	1.020
	(0.006)	(0.006)	(0.006)	(0.006)	(0.021)	(0.021)	(0.021)
High-Tech	0.938*	0.948	0.946	0.943*	0.716**	0.698**	0.711**
	(0.032)	(0.033)	(0.033)	(0.033)	(0.116)	(0.114)	(0.116)
Business Services	1.006**	0.977**	0.977**	0.981**	1.258**	1.301**	1.280**
	(0.035)	(0.034)	(0.034)	(0.034)	(0.221)	(0.228)	(0.225)
Bubble_1stInv	0.894***	0.928**	0.934**	0.932**	0.677***	0.666***	0.673***
	(0.026)	(0.028)	(0.028)	(0.028)	(0.092)	(0.091)	(0.092)
FCrisis_1stInv	1.256***	1.279***	1.273***	1.269***	0.907	0.859	0.880
	(0.068)	(0.071)	(0.071)	(0.071)	(0.234)	(0.223)	(0.227)
FCrisis_Exit	1.041	1.053	1.057	1.059	1.238	1.219	1.236
	(0.041)	(0.043)	(0.043)	(0.043)	(0.212)	(0.208)	(0.211)
AvgWC	0.997	0.998	0.997	0.998	1.001	1.001	1.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)	(0.008)	(0.008)
Avg NETCF	1.000***	1.001***	1.001***	1.001***	1.001	1.001*	1.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Early 1stInv	1.260***	1.200***	1.199***	1.195***	1.151	1.155	1.140
	(0.033)	(0.032)	(0.032)	(0.032)	(0.248)	(0.249)	(0.246)
Patent Stock	0.979	0.877	0.877	0.877	0.649	0.649	0.649
	(-0.09)	(-0.07)	(-0.01)	(-0.14)	(-0.13)	(-0.09)	(-0.01)
Industry Relatedness	0.864	0.672	0.674	0.677	0.312	0.313	0.313
	(-0.00)	(-0.00)	(-0.11)	(-0.10)	(-0.00)	(-0.00)	(-0.01)
N	8622	7156	7156	7156	1466	1466	1466
Pseudo R2	0.318	0.332	0.308	0.337	0.232	0.208	0.235
Wald Chi2	90.84***	88.42***	81.07***	80.78***	78.45***	71.17***	70.75***

*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. %CVC is the percentage of the investment amounts from CVC funds scaled by venture capital total investment amounts. 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*

Table 6 – Logistic and OLS estimations of Exit Strategy

	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
D.V. IPO	Full Sample	US	US	US	US	UK	UK	UK	UK	US	UK
CVC	0.591***	0.538**		-0.048	-0.019	1.346**		-0.021	-0.011	-0.041	-0.132
	(0.145)	(0.215)		(0.118)	(0.012)	(0.513)		(0.118)	(0.001)	(0.022)	(0.043)
CVC_1st	0.212*										
	(0.101)										
% CVC	0.464**	0.344		0.361	0.325	0.144		0.114	0.135*	0.234	0.164
	(1.07)	(1.42)		(1.072)	(1.071)	(0.071)		(0.047)	(0.045)	(0.418)	(0.107)
ln Duration (m)			-0.243***	-0.212***			-1.558**	-1.144***		-0.035***	-0.103***
			(2.74)	(2.07)			(0.527)	(0.394)		(0.106)	(0.031)
Duration (m)					-0.057*				-0.016*		
					(1.13)				(0.143)		
$Duration_2$ (m)					0.204*				0.000*		
					(1.074)				(0.000)		
ln (Funding Amount)			0.674***	0.694***	0.673***		0.078**	0.068**	0.082	0.589***	0.003**
			(0.046)	(0.046)	(0.045)		(0.167)	(0.168)	(0.170)	(0.004)	(0.012)
ln (Fund Size)	0.040	0.047	0.041	0.033	0.078*	0.030	0.032	0.023	0.016	0.000	0.002
	(0.041)	(0.047)	(0.047)	(0.047)	(0.046)	(0.109)	(0.107)	(0.107)	(0.106)	(0.004)	(0.008)
VC Age	0.068***	0.076***	0.073***	0.085***	0.076***	0.013	-0.003	0.023	0.019	0.007***	-0.002
	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.068)	(0.065)	(0.067)	(0.067)	(0.002)	(0.005)
ln (MSCI index)	0.789***	0.578***	0.535**	0.554***	0.779***	-1.026	-0.887	-1.184	-1.004	0.076***	-0.040
	(0.178)	(0.190)	(0.208)	(0.190)	(0.172)	(1.936)	(1.864)	(1.911)	(1.893)	(0.017)	(0.103)
High-Tech	-0.289***	-0.318***	-0.343***	-0.320***	-0.331***	-0.909	-0.743	-0.959*	-0.871	-0.045***	-0.053
	(0.109)	(0.113)	(0.114)	(0.114)	(0.114)	(0.568)	(0.569)	(0.570)	(0.570)	(0.011)	(0.040)

Table 6 (continued)

	Panel A. Logistic Estimations									Panel B. OLS Estimations	
Business Services	-0.619***	-0.619***	-0.619***	-0.621***	-0.617***	1.050*	0.866	0.951	0.923	-0.043***	0.061
	(0.123)	(0.127)	(0.129)	(0.129)	(0.129)	(0.600)	(0.594)	(0.592)	(0.593)	(0.011)	(0.044)
Bubble_1stInv	-0.220*	-0.297**	-0.239*	-0.237**		0.976*		0.995**	0.984*	-0.025**	0.074*
	(0.114)	(0.120)	(0.127)	(0.119)		(0.514)		(0.505)	(0.507)	(0.010)	(0.038)
	Table 6– *Logistic and OLS estimations of Exit Strategy (continuation)*										
	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
D.V. IPO	Full Sample	US	US	US	US	UK	UK	UK	UK	US	UK
FCrisis_1stInv	0.190	0.198	0.184	0.195		0.102		0.250	0.218	0.030*	0.012
	(0.169)	(0.175)	(0.178)	(0.174)		(0.907)		(0.898)	(0.890)	(0.017)	(0.068)
FCrisis_Exit	-1.698***	-1.725***	-1.774***	-1.723***	-1.586***					-0.073***	-0.111**
	(0.289)	(0.294)	(0.295)	(0.294)	(0.291)					(0.014)	(0.048)
AvgWC	0.002	0.004	0.004	0.005	0.007	-0.103*	-0.108**	-0.108**	-0.104**	0.002***	-0.002
	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.053)	(0.052)	(0.053)	(0.053)	(0.001)	(0.002)
Avg NETCF	0.002***	0.003***	0.003***	0.003***	0.003***	0.006**	0.006**	0.006**	0.006**	0.000***	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.003)	(0.002)	(0.000)	(0.000)
Early 1stInv	-0.004	-0.039	-0.033	-0.040	-0.046	-0.900	-0.961	-0.964	-0.952	-0.003	-0.046
	(0.090)	(0.092)	(0.092)	(0.092)	(0.092)	(1.224)	(1.153)	(1.221)	(1.226)	(0.008)	(0.058)
Patent Stock	0.139**	0.029**	0.029**	0.029**	0.029**	0.019**	0.019**	0.019**	0.019**	0.019**	0.019**
	(3.152)	(2.15)	(2.24)	(2.53)	(2.54)	(2.51)	(2.23)	(2.24)	(2.53)	(2.53)	(2.33)
Industry Relatedness	0.241**	0.138**	0.141**	0.139**	0.139**	0.022**	0.022**	0.022**	0.022**	0.022**	0.022**
	(3.263)	(2.26)	(2.35)	(2.64)	(2.55)	(2.43)	(2.39)	(2.37)	(2.41)	(2.43)	(2.43)

Table 6 (continued)

	Panel A. Logistic Estimations									Panel B. OLS Estimations	
Pseudo R2	0.493	0.482	0.481	0.471	0.474	0.375	0.384	0.381	0.371	0.493	0.393
N	8622	7156	7156	7156	7156	1465	1465	1465	1465	7156	1465

*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. %CVC is the percentage of the investment amounts from CVC funds scaled by venture capital total investment amounts. 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*

Ventures' CVC funding Determinants

This is explained by information asymmetry. Investment period is positively correlated with the mitigation of information asymmetries and agency costs amongst the venture's insiders and outside investors (Cumming & MacIntosh, 2001; Gompers & Lerner, 1998a, b; Sahlman, 1990).

4.6 Treatment Effects Robustness tests

In an effort to mitigate the identification concern of VCs investing in better quality firms, the model of treatment-effect regression is employed across the three previously mentioned models. This model accommodates a comprehensive selection model version two-step Heckman that contemplates omitted variables' impact that simultaneously influence investor type, funding amount, duration before exit, and exit strategies (Guo et al., 2015). In the first stage regression, CVC is the dependent variable which aims to understand the CVC financing determinants. Using Probit regression we attempt to measure the CVC fund determinants at the first stage regression. Based on the rationale that CVCs will invest in industries with more liquidity and extra cash (Guo et al., 2015), we included *AvgWC* which measures for five years the average working capital available in the venture's industry before first investment date, as a representation of accounting liquidity. Similarly, *AvgNETCF* captures the average net cash-flow in an industry, as a proxy for extra available cash in a specific industry. To decrease the endogeneity of matters in which CVCs are experts, such as choosing superior companies over IVCs and funding further R&D plans, we added the variable *patent stock*, that covers patents number implemented by a company prior to VC funding to represent the company's character and innovativeness (Guo et al., 2015). Additionally, we added industry relatedness, to measure the similarity degree in the business sectors between the partners. Finally, we included three variables that capture whether the venture's first investment was performed at seed, early or later stage.

The first stage equation:

$$prob(CVC)_i = 1|x_i' = \frac{\exp(x_i')\beta}{1 + \exp(x_i')\beta} \tag{4}$$

where $(CVC)_i$ is the response which equals 1 for a CVC company *i*.

$(x_i')\beta = \beta_0 + \beta_1$AvgWC + β_2 Avg NETCF + β_3Patents in Stock + β_4Industry Relatedness + β_5Seed Stage + β_6Early Stage + β_7Later Stage + β_8Year Fixed Effects + β_9Industry Fixed Effects (5)

Table 7 presents first stage regression. The results show that venture's accounting liquidity as well as its innovativeness has a statistically positive impact on the CVC funding. Corporate investors tend to fund innovative companies with higher patents applications. Moreover, the industry's characteristics such as extra available cash in a specific industry and the degree of similarity in the business sector between the CVC fund and the venture affect statistically and positively the CVC funding. However, performing the venture's first investment at seed, early or later stage has a statistically negative impact on the CVC funding. The early stage of new business development is risky and uncertain which may explain this result.

Table 7 Probit estimation for CVC financing

Panel A. Probit Estimation			
D.V: CVC	Model 1	Model 2	Model 3
	Full Sample	USA	UK
AvgWC	-0.036***	-0.033***	-0.066***
	(0.004)	(0.004)	(0.017)
Avg NETCF	-0.002***	-0.002***	-0.000*
	(0.000)	(0.000)	(0.001)
Patents in stock	0.087***	0.054***	0.038***
	(3.071)	(2.101)	(1.081)
Industry Relatedness	0.345**	0.415**	0.174**
	(4.122)	(3.451)	(2.412)
Seed Stage	-0.838***	-0.832***	-1.054***
	(0.066)	(0.067)	(0.368)
Early Stage	-0.950***	-0.952***	-0.912***
	(0.038)	(0.039)	(0.221)
Later Stage	-0.857***	-0.860***	-0.828***
	(0.044)	(0.045)	(0.220)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
N	8622	7156	1465

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

The second stage estimation seizes the unobservable effect of the connection between ventures and investor type and accordingly we control the inverse Mills ratio estimated on first stage.

The second stage equations are:

Ln($\mathrm{fundingamount}_i$)= β_0+ $\beta_1\mathrm{CVC}_i$ + $\beta_2\mathrm{CVC\_1st}_i$ + $\beta_3\ln\left(\mathrm{FundSize}\right)_i$ + $\beta_4\mathrm{VCAge}_i$ + $\beta_5\mathrm{High-Tech}_i$ + $\beta_6\mathrm{BusinessServices}_i$ + $\beta_7\mathrm{Bubble\_1stInv}_i$ + $\beta_8\mathrm{FCrisis\_1stInv}_i$ + $\beta_9 5-\mathrm{YearAvgWC}_i$ + $\beta_{10}\mathrm{YearAvgNETCF}_i$+ $\beta_{11}\mathrm{Early1stInv}_i$+ $\beta_{12}\mathrm{PatentStock}_i$ + $\beta_{13}\mathrm{IndustryRelatdness}_i$+ $\beta_{14}\mathrm{InverseMillsRatio}_i$+$?_i$ (6)

Ln($\mathrm{duration}_i$)= β_0+ $\beta_1\mathrm{CVC}_i$ + $\beta_2\mathrm{CVC\_1st}_i$ + $\beta_3\ln\left(\mathrm{FundSize}\right)_i$ + $\beta_4\mathrm{VCAge}_i$ + β_5 $\mathrm{High-Tech}_i$ + $\beta_6\mathrm{BusinessServices}_i$ + $\beta_7\mathrm{Bubble\_1stInv}_i$ + $\beta_8\mathrm{FCrisis\_1stInv}_i$ + β_9 $5-\mathrm{YearAvgWC}_i$ + $\beta_{10}\mathrm{YearAvgNETCF}_i$+ $\beta_{11}\mathrm{Early1stInv}_i$ + $\beta_{12}\mathrm{PatentStock}_i$+ β_{13} $\mathrm{IndustryRelatdness}_i$+ $\beta_{14}\mathrm{InverseMillsRatio}_i$+$?_i$ (7)

We now turn to the analysis of the determinants of exit routes.

$$prob(IPO)_i = 1|x_i' = \frac{\exp(x_i')\beta}{1+\exp(x_i')\beta} \tag{8}$$

where $(IPO)_i$ is the variable which equals 1 if the company *i* exit via IPO and zero otherwise.

$(x_i')\beta$ = β_0+ $\beta_1\mathrm{CVC}_i$ + $\beta_2\mathrm{CVC\_1st}_i$ + $\beta_3\ln\left(\mathrm{duration}\right)_i$ +$\beta_4\ln\left(\mathrm{fundingamount}\right)_i$ + $\beta_5\ln\left(\mathrm{FundSize}\right)_i$ + $\beta_6\mathrm{VCAge}_i$+$\beta_7\ln\left(\mathrm{MSCIindex}\right)_i$ + $\beta_8\mathrm{High-Tech}_i$ + β_9 $\mathrm{BusinessServices}_i$ + $\beta_{10}5-\mathrm{YearAvgWC}_i$ + $\beta_{11}\mathrm{AvgNETCF}_i$+ $\beta_{12}\mathrm{Early1stInv}_i$ + β_{13} $\mathrm{PatentStock}_i$ + $\beta_{14}\mathrm{IndustryRelatdness}_i$+ $\beta_{15}\mathrm{InverseMillsRatio}_i$+$?_i$ (9)

In all the models, year fixed effects are included, and the standard errors are corrected for heteroscedasticity. The output of second stage treatment-effects estimation of funding amount is reported in Table 8. The statistically significant inverse Mills ratios throughout

Table 8 Treatment Effects estimation of Funding Amount

	Panel A. Treatment Effects						
D.V: ln (Funding Amount)	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	0.247**	0.189***			0.114**		
	(1.120)	(0.211)			(0.473)		
CVC_1st			0.191***			0.133**	
			(0.142)			(0.212)	
% CVC				0.193***			0.143**
				(0.144)			(0.665)
# Funds	0.062***	0.059***	0.061***	0.060***	0.097***	0.105***	0.106***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.024)	(0.023)	(0.023)
ln (Fund Size)	0.313***	0.318***	0.305***	0.307***	0.156***	0.164***	0.165***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.032)	(0.031)	(0.032)
VC Age	-0.010**	-0.010**	-0.010**	-0.013***	-0.014	-0.022	-0.012
	(0.005)	(0.005)	(0.005)	(0.005)	(0.024)	(0.024)	(0.024)
High-Tech	-0.088***	-0.074**	-0.083**	-0.073**	-0.518***	-0.520***	-0.510***
	(0.033)	(0.034)	(0.034)	(0.034)	(0.190)	(0.191)	(0.191)
Business Services	-0.120***	-0.158***	-0.165***	-0.165***	0.508**	0.479**	0.464**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.210)	(0.210)	(0.210)
Bubble_1stInv	0.186***	0.193***	0.189***	0.178***	0.094	0.104	0.112
	(0.029)	(0.029)	(0.029)	(0.029)	(0.176)	(0.175)	(0.177)
FCrisis_1stInv	-0.110**	-0.124**	-0.132**	-0.133**	-0.092	-0.061	-0.073
	(0.053)	(0.052)	(0.052)	(0.052)	(0.325)	(0.327)	(0.326)
FCrisis_Exit	-0.141***	-0.166***	-0.171***	-0.167***	0.278	0.316	0.292
	(0.039)	(0.039)	(0.039)	(0.039)	(0.223)	(0.223)	(0.224)
AvgWC	0.004**	0.003	0.003*	0.003*	0.030***	0.030***	0.029***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.010)	(0.010)	(0.010)
Avg NETCF	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Early 1stInv	-0.142***	-0.186***	-0.162***	-0.157***	-0.092	-0.110	-0.097
	(0.027)	(0.028)	(0.026)	(0.026)	(0.264)	(0.265)	(0.266)
Patent Stock	0.017**	0.016**	0.014**	0.015**	0.007**	0.007**	0.007**
	(3.22)	(2.12)	(2.14)	(2.28)	(0.11)	(0.12)	(0.11)
Industry Relatedness	0.117**	0.025**	0.025**	0.025**	0.105**	0.104**	0.104**
	(4.22)	(2.23)	(2.25)	(2.29)	(0.33)	(0.34)	(0.33)
Inverse Mills Ratio	-0.337***	-0.311***	0.299***	0.300***	-0.077	-0.126	-0.181
	(0.057)	(0.058)	(0.051)	(0.050)	(0.291)	(0.287)	(0.298)
N	8622	7156	7156	7156	1466	1466	1466

*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. % CVC the percentage of the investment amounts from CVC funds scaled by venture capital total investment amounts. Standard errors are reported in parentheses and *, **, *** correspondently represent statistical significance at a 10%, 5% and 1% level* the treatment-effects estimations, portraited on confirm an identification problem within the estimation of investment strategies in US and UK sampled ventures. Following our control for the inverse Mills ratio, we continue to see that 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 (*Hypothesis1)* and the findings allow to understand that the positive impact of CVC financing on funding raised is stronger for the US, when compared to UK.

The second stage treatment-effects estimation portraited on Table 9 indicates the presence of selection bias across both sub-samples effects after controlling for Inverse Mills. Nevertheless, the main dependent variable *CVC* remains significant across all estimations indicating that CVC financing impacts duration before exit. CVC-backed ventures stay longer than IVC backed ventures in the investment process. Finally, the treatment-effects estimation reported at Table 10 shows a sample selection bias, though the qualitative interpretation of the estimation of exit strategies remains unchanged. Further, we find CVC-backed firms to have less probability of IPO, than their IVC peers and that this influence is stronger in the USA when compared to the UK. We find a positive impact of fund size on exit routes, and we observe that innovative companies with patents applied for before the first investment has more power to exit through IPO. This result suggests that higher innovative quality increases the possibility of IPO exit for a company.

5 Discussion

The results from the funding amount models support previous literature enhancing CVCs' ability to certify firm quality and to provide confidence to outsider investors (Alvarez-Garrido & Dushnitsky, 2016), thus increasing ventures' funding amounts. Our results echo existing literature (Guo et al., 2015; Cumming 2006). However, only in the US, the VC age has a positive and significant impact of funding amount. This result suggests that older funds hold substantial resources allowing them to invest large amounts in ventures (Bertoni et al., 2015; Schwienbacher, 2005, 2008). In addition, raising funds at a seed or early stage has a negative and significant impact on the funding amount in the US. Regarding the venture's industry, we find that when the venture belongs to the business industry, this has significant positive impact on the raised funds in the US and in the UK. On the contrary, when the venture operates in the high-tech sectors, it has a significant negative impact on the funding amount. Moreover, US ventures with first investment during the dot.com bubble receive larger investment amounts, which is not the case for UK ventures. We find a significant negative relationship between financial crisis distressed times and the VC funding amount in the US. 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 results also show a positive and significant relation among venture's innovativeness, assessed by the venture's patent stock, and the funding amount in both countries. This result suggests that the uncertainty about the venture's quality is reduced thanks to the number of patents implemented by the venture allowing the VC fund to increase its funding amount. This result is consistent with Guo et al. (2015). Finally, the findings show that the percentage of similarity in the business sector between the VC fund and the backed company, both in the US and in the UK, has a significant positive impact on amounts of funding. Industry

Table 9 Treatment Effects estimation of Duration before Exit

	Panel A. Treatment Effects						
D.V. ln 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	0.523***	0.518***			0.146***		
	(1.041)	(1.124)			(0.201)		
CVC_1st			0.532***			0.152*	
			(0.696)			(0.601)	
%CVC				0.540***			0.227**
				(0.454)			(0.301)
# Rounds	5.889***	6.164***	6.144***	6.096***	4.293***	4.240***	4.279***
	(0.199)	(0.200)	(0.200)	(0.200)	(1.397)	(1.428)	(1.405)
# Funds	1.121***	1.150***	1.057***	1.114***	2.422***	2.706***	2.679***
	(0.129)	(0.128)	(0.125)	(0.126)	(0.745)	(0.737)	(0.737)
ln (Fund Size)	3.798***	3.699***	4.322***	4.258***	3.208***	3.621***	3.215***
	(0.265)	(0.276)	(0.245)	(0.249)	(0.981)	(0.939)	(0.979)
VC Age	2.377***	2.279***	2.343***	2.411***	0.662	0.766	0.663
	(0.178)	(0.183)	(0.183)	(0.183)	(0.732)	(0.727)	(0.735)
High-Tech	5.849***	5.900***	5.970***	5.781***	12.783**	12.478**	13.267**
	(1.252)	(1.270)	(1.277)	(1.271)	(5.592)	(5.584)	(5.634)
Business Services	0.966	1.376	1.858	1.801	0.698	1.776	-0.198
	(1.269)	(1.279)	(1.279)	(1.276)	(6.034)	(6.009)	(6.016)
Bubble_1stInv	4.189***	2.399**	2.969***	3.212***	22.319***	23.436***	22.770***
	(1.076)	(1.088)	(1.083)	(1.082)	(4.968)	(4.986)	(4.983)
FCrisis_1stInv	-4.489**	-5.536***	-5.131***	-5.122***	10.095	11.380	11.147
	(1.963)	(1.975)	(1.976)	(1.973)	(9.652)	(9.776)	(9.741)
FCrisis_Exit	1.574	0.646	0.878	0.741	-1.873	0.254	-1.855
	(1.440)	(1.457)	(1.459)	(1.457)	(6.394)	(6.390)	(6.426)
AvgWC	0.184***	0.127*	0.100	0.103	0.879***	0.811**	0.863***
	(0.070)	(0.071)	(0.070)	(0.070)	(0.334)	(0.319)	(0.334)
Avg NETCF	-0.000	-0.011*	-0.014***	-0.014**	0.016	0.019	0.019
	(0.005)	(0.006)	(0.006)	(0.006)	(0.017)	(0.017)	(0.017)
Early 1stInv	-2.490**	-1.336	-2.785***	-2.631***	18.534**	18.726**	17.907**
	(1.023)	(1.042)	(0.994)	(0.993)	(8.338)	(8.180)	(8.347)
Patent Stock	0.774	0.714	0.714	0.714	0.701	0.701	0.701
	(-0.094)	(-0.024)	(-0.024)	(-0.024)	(-0.58)	(-0.58)	(-0.58)
Industry Relatedness	0.871*	0.511**	0.512**	0.511**	0.482	0.471	0.470
	(-1.014)	(-1.294)	(-1.294)	(-1.287)	(-0.218)	(-0.311)	(-0.315)
Inverse Mills Ratio	-11.904***	-10.876***	-4.197**	-4.387**	-36.544***	-32.888***	-36.884***
	(2.116)	(2.176)	(1.926)	(1.887)	(8.164)	(7.746)	(8.154)
N	8622	7156	7156	7156	1466	1466	1466

*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. % CVC the percentage of the investment amounts from CVC funds scaled by venture capital total investment amounts. Z-values are reported in parentheses and *, **, *** correspondently represent statistical significance at a 10%, 5% and 1% level*

Table 10 –Treatment Effects Estimation of Exit Strategy

	Panel A. Treatment Effects								
D.V. IPO	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	US	US	US	US	UK	UK	UK	UK
CVC	0.475***	0.427***		-0.077	-0.081	0.026*		0.006	0.007
	(0.039)	(0.040)		(0.001)	(0.041)	(0.108)		(0.104)	(0.105)
CVC_1st	0.102								
	(0.138)								
% CVC	0.414*	0.214*	0.245	0.237	0.252	0.145	0.152	0.152	0.154
	(1.001)	(1.039)	(1.138)	(1.039)	(1.039)	(0.111)	(0.031)	(0.021)	(0.164)
ln Duration (m)			-0.212***	-0.215***			-0.092***	-0.094***	
			(2.06)	(1.046)			(0.028)	(0.025)	
Duration (m)					-0.021***				-0.015***
					(1.01)				(0.125)
Duration^2					0.241***				0.000***
					(1.020)				(0.000)
ln (Funding Amount)			0.672***	0.077***	0.074***	0.003	0.005	0.006	0.005
			(0.004)	(0.004)	(0.004)	(0.011)	(0.011)	(0.011)	(0.011)
ln (Fund Size)	-0.002	-0.002	-0.002	-0.003	-0.001	0.002	0.002	0.002	0.002
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.008)	(0.008)
VC Age	0.006***	0.007***	0.008***	0.008***	0.007***	-0.002	-0.003	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)	(0.005)
ln (MSCI index)	0.003	0.001	0.001	-0.001	-0.002	0.072***	0.033***	0.070***	0.073***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.019)	(0.013)	(0.019)	(0.019)
High-Tech	-0.049***	-0.054***	-0.060***	-0.057***	-0.054***	-0.056	-0.044	-0.054	-0.054
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.039)	(0.039)	(0.039)	(0.039)

Table 10–*Treatment Effects estimation of Exit Strategy (continuation)*

Panel A. Treatment Effects

Table 10 (continued)

	Panel A. Treatment Effects								
D.V. IPO	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***	-0.036***	-0.032***	-0.037***	-0.036***	0.060	0.047	0.052	0.051
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.043)	(0.043)	(0.043)	(0.043)
Bubble_1stInv	-0.037***	-0.039***		-0.035***	-0.040***	0.069*		0.071*	0.072**
	(0.009)	(0.009)		(0.009)	(0.009)	(0.037)		(0.036)	(0.036)
FCrisis_1stInv	0.035**	0.038**		0.038**	0.037**	0.017		0.025	0.018
	(0.016)	(0.017)		(0.017)	(0.017)	(0.066)		(0.067)	(0.067)
FCrisis_Exit	-0.106***	-0.106***	-0.104***	-0.107***	-0.107***	-0.092**	-0.093**	-0.087*	-0.087*
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.045)	(0.046)	(0.045)	(0.045)
AvgWC	0.001	0.001*	0.001*	0.001*	0.001	-0.003	-0.003	-0.003	-0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
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**	-0.028***	-0.028***	-0.024***	-0.027***	-0.054	-0.058	-0.061	-0.061
	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.058)	(0.058)	(0.058)	(0.058)
Patent Stock	0.086**	0.026**	0.026**	0.026**	0.026**	0.003**	0.003**	0.003**	0.003**
	(2.18)	(2.38)	(2.38)	(2.38)	(2.38)	(1.16)	(1.17)	(1.12)	(1.14)
Industry Relatedness	0.104**	0.126**	0.126**	0.123**	0.125**	0.013**	0.011**	0.011**	0.012**
	(1.15)	(1.32)	(1.31)	(1.32)	(1.31)	(2.02)	(2.21)	(2.11)	(2.12)
Inverse Mills Ratio	0.088***	0.095***	0.108***	0.088***	0.093***	0.076*	0.063*	0.102*	0.120*

Table 10 (continued)

	Panel A. Treatment Effects								
	(0.020)	(0.021)	(0.021)	(0.017)	(0.017)	(0.077)	(0.077)	(0.069)	(0.079)
N	8622	7156	7156	7156	7156	1465	1465	1465	1465

*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. % CVC the percentage of the investment amounts from CVC funds scaled by venture capital total investment amounts. 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* relatedness mitigates uncertainty (Cefis et al., 2020) and enables VC funds to invest high amounts. In sum, results firmly support the intuition that CVC-backed ventures receive larger funding amounts, when compared to their IVC-backed counterparts (*Hypothesis1)* and the findings allow understanding that the positive impact of CVC financing on funding raised is stronger for the US, when compared to UK.

Our finding related to the duration investment is in accordance with Guo et al., (2015) who 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. This result complements previous literature findings which state that the maturity, size and liquidity, as well as better screening and monitoring skills (Schwienbacher, 2005, 2008; Lindström, 2006) of the US market allow for a longer investment duration. We find that US ventures which have raised a higher number of rounds and with more invested funds have longer duration, however, fund size does not seem to play a significant role on investment duration. We find also 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 (Gompers, 1996) and premature exits (Cumming & MacIntosh, 2001; Gompers & Lerner, 1998a, b). Relative to other industries, we find that firms in business services industry and in high-tech industry tend to have slower exiting processes implying due to information asymmetry effect. As pointed out by (Cumming & MacIntosh, 2000), there is an inverse relationship between information asymmetry and the duration of investment. Technology firms are characterised by greater information asymmetry because they have large intangible assets, which are specifically hard to value in early business stages, leading to lengthier investment durations (Cumming & Johan, 2010; Cumming & MacIntosh, 2001).

We also find a positive impact of the financial crisis besides the dot.com bubble on investment and exit. The duration is long when a venture's first investment was made in 1999, 2000, 2008, or 2009. This supports the fact that VC fundraising is reliant on inherent market conditions. In addition, CVC-backed ventures with a higher cash flow will host a longer duration before exit, relatively to their IVC-backed counterparts. Investment is then driven by industries' liquidity and extra cash according to Guo et al. (2015). The results show also that US ventures whose first VC investment was made during the early stages of development are associated with a shorter average duration. Indeed, 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 (Cumming & MacIntosh, 2001).

Guo et al., (2015) demonstrate that if the acquisition market is an uninformed one then it is better possible to encourage IPO exit as the information asymmetry creates the possibility of IPO valuation higher than the deal price the venture would obtain from an M&A operation, and the probability of an IPO diminishes as the duration is longer. 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 longer durations as investors seek to reduce information asymmetries with ventures to maximise potential gains. Moreover, Gompers & Lerner (1998a, b) show that IPOs are correlated with exits earlier than optimal, implying shorter durations, as inexperienced VCs seek to send positive signals to outsiders. This insight joins Guo et al., (2015) who report that CVC funding indirectly affects funding amount and duration levels. We also find that, for UK, having Multiple CVCs significantly increases the probability of a successful exit Model (3.4), reiterating CVCs' superior skills at taking ventures public (Guo et al., 2015).

This paper finds that high-technology companies have less probabilities 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 (Cumming & MacIntosh, 2001) and inherently provide investors a window of opportunity to obtain higher exit valuations, boosting compensation (Cumming & Johan, 2010). Likewise, firms who exited during the financial crisis (*FCrisis_Exit*) have less likelihood of IPO exit 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 (*Avg NetCF)*. Lastly, most control variables were statistically significant in the US but not in the UK, suggesting that the US and UK VC markets are yet to be entirely incorporated, and theoretical models maintain more in the US than in the UK.

6 Conclusion

Our paper focuses on the impact of CVC financing on funding, duration and exit strategy decisions in an international comparative context. We focus on investment decisions based on the two types of investors (CVC and IVC) that lead to their exit routes (IPO, acquisition, write-off). Both the length of involvement in a company and the level of investment are essential for an entrepreneur and VCs to increase the company's chances of success. Our results build a model that explains how investment decisions in VC affect the exit strategy. This study investigates how the presence of CVC develops more substantial dedication (high investment amounts) once uncertainty decreases (longer duration).

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 US when compared to the UK. Findings show that US CVC-backed firms are linked to longer durations before exit than IVC-backed ones. The Funding amount is positively correlated with the likelihood of an IPO exit. Our empirical results show that CVC funding motivates higher injections of the amounts to be invested. Additionally, CVC financing motivates longer duration of funding. Our results support the impact of the investment decisions on the exit strategy, but we didn't find direct impact of the fund on the exit decision. As ventures are not randomly assigned to CVC and IVC investors, revealing endogeneity concerns, our analysis reduces bias selection. We first start by controlling for the quality of the ventures (patent stock) before being funded by a VC investor. Additionally, and to mitigate endogeneity, we employ treatment effects to consider potential unobservables.

This research joins the CVC literature 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 types in countries other than the US. This study has useful, practical implications. VC firms can consider the staging decision at each financing round as deciding between investing and delay. Regarding the funding amount and the timing of funding, while liquidity conditions, syndicate features, and portfolio company performance are all critical factors, VC firms need to assess the wider decision context and the results of real options factors such as uncertainty on the staging decision. By evaluating the effects of investments, this study has implications on 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 their advantages and contingencies for both VCs and entrepreneurial firms will likewise support a conscious decision-making process regarding harvesting and divesting.

Our study offers possible directions for future research by focusing on joint ventures alliances (Keil et al., 2008). Future research can select specific industries and concentrate on collecting information on the technology of the funded company and its components at different company growth to examine the particular sources of business uncertainty more explicitly. Additionally, more research can be done to compare CVC investment across different sectors to enhance our understanding of the investment consequences in specific sector. Finally, we need to increase our understanding of the special requirements for the funded company at each stage which will impact the investment decisions of the corporate investor.

Appendix A - CVC and IVC comparison

	CVC	IVC
Definition	Minority equity investor through a subsidiary of a parent corporation.	Limited liability partnership.
Value Creation	Strategic and financial gains through knowledge, innovation or technologies synergies.	Purely financial gains – growing and exiting at the highest possible value.
Funding	Stems from the parent company’s assets and revenues.	Stems from capital raised from institutional investors and wealthy individuals.
Investment Horizon	Open-ended.	Usually around 7–10 years.
Managers’ Compensation Scheme	Reliant on parent company – salary and bonus structure.	Reliant on fund’s performance – annual management fee and profit share.
Benefits	Complementary assets such as network, expertise, accommodations, and R&D.	Network, strategy advisory.
Risk tolerance	Increased tolerance to failure.	Low tolerance for venture failure.
Exit Strategy	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 B - Variables Description

Variable	Definition
CVC	A variable equal one if a company has one CVC investor or more.

Variable	Definition
CVC_1st	A variable equal one if a venture has one CVC investor or more in its first investment round.
% CVC	CVC amounts scaled by venture capital total investment amounts.
Funding Amount	Disclosed equity amount received by a venture, in $ millions, summed over number of investment rounds.
Duration (m)	First investment to completion of exit dates measured by months.
IPO	A variable equal to one if a company exit 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	A variable equal to one if a venture is at the High-Tech sector (SIC=28. 357, 481, or 737).
Business Services	A variable where the venture belongs to business service sector SIC=73.
Bubble_1stInv	A variable equal one if a company's first investment is made in 1999 or 2000.
FCrisis_1stInv	A variable equal one if a company's first investment is made in 2008 or 2009.
FCrisis_Exit	A variable equal one if a company exit in 2008 or 2009.
MSCI	Country specific 0–3 months MSCI return before a venture's exit date.
AvgWC	Average working capital available in a venture's industry 5 years before a specific year in a specific industry.
Avg NETCF	Average Net Cash-flow available in a venture's industry 5 years before a specific year in a specific industry.
Early 1stInv	A variable equal to one if a company's first investment is made at early stages.
Seed Stage	The venture's first investment is made at seed stage of development.
Early Stage	The venture's first investment is made at early stage of development.
Expansion Stage	The venture's first investment is made at expansion stage of development.
Patent Stock	Patents number implemented by a company prior to the VC funding.
Industry Relatedness	Degree of business similarity among partners (investor-venture).

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