Economics Bulletin

Volume 39, Issue 4

CEO human capital and venture capital investment duration: Evidence from French IPOs

Sophie Pommet
University Côte d''Azur - GREDEG-CNRS

Jean-François Sattin
University Paris 1 Panthéon-Sorbonne, PRISM

Abstract

The duration of the VC incubation period is an important parameter for the profitability of venture capital (VC) firms. This paper uses a new database of VC-backed initial public offerings (IPOs) that are listed on French financial markets in order to highlight the importance of chief executive officer (CEO) human capital on the duration of the VC incubation period prior to the IPO. By using a duration model (Weibull model) we find that while CEOs' previous academic, technical and managerial experiences seem not to affect the timing of an IPO, the CEOs' entrepreneurial background is strongly negatively correlated to the duration of VC investment (it increases the hazard ratio by more than 100%) and thus fosters IPO exit.

We thank the two anonymous referees for helpful comments on this work. Responsibility for any errors lies solely with the authors.
Citation: Sophie Pommet and Jean-François Sattin, (2019) "CEO human capital and venture capital investment duration: Evidence from French IPOs", *Economics Bulletin*, Volume 39, Issue 4, pages 2402-2414
Contact: Sophie Pommet - sophie.pommet@unice.fr, Jean-François Sattin - Jean-Francois.Sattin@univ-paris1.fr.
Submitted: July 17, 2018. **Published:** October 13, 2019.

1 Introduction

Previous literature suggests that access to VC and the human capital of the CEO are two key drivers for the success of new technology-based firms (Colombo and Grilli, 2010). Indeed, since the 1990s, VC firms have played a major role in the financing of new high-technology firms. From this perspective, having a strong private equity market is a key factor for the economic growth of countries. According to data from France Invest (the French equivalent of the European Venture Capital Association), French private equity firms raised 18.7 billion euros in 2018, making it one of the largest markets in Europe. Apart from their financing role, VC investors are also able to both select companies and to enhance their performance (Baum and Silverman, 2004). Several studies have documented the contribution of VC investors to the professionalization of firms (Hellmann and Puri, 2002), better performance (see, among others: Jain and Kini, 1995; 2000; Bertoni et al., 2013) and the guarantee of quality at IPO (Megginson and Weiss, 1991). The strength of VC firms rests on a combination of the provision of money, management support, and monitoring (Sahlman, 1990; Sapienza et al., 1996).

A CEO's human capital is an essential part of the strategy for VC firms. First, as previous studies have already shown, general management competencies and the industry-specific entrepreneurial experience of company founders are important selection criteria for these investors (Bertoni et al., 2011). The experience and skills of the ventures' top management team appear to have an impact both on the probability of receiving financing and on the amounts raised (see among others: Audretsch and Lehmann, 2004; Engel and Keilbach, 2007; Baum and Silverman 2004; Shane and Stuart, 2002; Patzelt, 2010; Hoenig and Haenkel, 2015). A CEO's entrepreneurial background also increases the probability of financing through syndication (Zhang, 2018). In turn, because the management of CEO competencies is a strategic driver that can be used by a VC firm in order to increase the profitability of the deal, VC firms can decide to replace the CEO. For instance Gerasymenko et al. (2015) analyzes CEO replacement by venture capitalists in the early stage of development of the companies and shows that it is related to both better VC involvement and performance of the VC-backed company.

VC firms aim to maximize their profitability. On this ground, an important but scarce resource for VC firms is time (Sorensen, 2007). Hsu (2013) shows that the length of the incubation period constitutes an intangible form of capital that creates value and has a positive impact on the VC-backed company's post-IPO performance. Moreover, because VC firms calculate their expected return on the basis of the target venture's financial statements and the PER (price-earning ratio) that the company might generate, the rate of return for a VC deal depends conjointly upon the profitability of the deal and the time that is needed to achieve it. It follows that venture capitalists are concerned with how much they will cash out and also with how long they will need to hold their portfolio investment before exiting (Giot and Schwienbacher, 2007; Gerasymenko and Arthurs, 2014). Indeed, VC firms have to stay long enough in order to add value to the companies but they also must return cash to investors. In this sense, VC firms often have an incentive to exit early (Gompers, 1996). Thus, we can imagine that VC firms try to minimize their investment duration in the private firms without neglecting their contribution to the companies. There is therefore time pressure for the IPO. According to Giot and Schwienbacher (2007, p.679), "as time flows, VC-backed firms first exhibit an increased likelihood of exiting to an IPO. However, after having reached a plateau, non-exited investments have fewer possibilities of IPO exits as time increases". Furthermore, as explained by Hsu (2013, p.38), "[…] shorter incubation periods reflect VCs' abilities to quickly exit investments; this ability to accelerate the investment process allows VCs to make and exit more

investments, creating more IPOs in their portfolios and potentially generating greater total returns for LPs at the fund level. In this case, LPs[1] could prefer to invest in VCs after shorter incubation periods".

Therefore, it is important to understand both the factors that influence VC investment duration and the timing of the IPO. The time dimension of the profitability of VC deals has received limited attention in prior studies. Cumming and Johan (2010), and Hsu (2013) investigate this question, but only by considering variables that are mainly related to industry, sector, or characteristics of companies and VC firms in the US and Canada. However, to our knowledge, no empirical study has yet focused on the impact of a CEO's human capital on the duration of VC deals.

The remainder of the paper proceeds as follows. The next section describes the database and methodology. The empirical results are presented in Section 3, followed by the concluding remarks in Section 4.

2 Data and methodology

The sample includes French IPOs that were floated on the main and second-tier markets over the period 1996-2006[2]. Our preliminary list of IPOs was obtained from the *Euronext* files and was augmented by additional data that were manually collected from *Autorité des Marchés Financiers* (AMF) publications that contain companies' listing prospectuses and annual reports.

VC firms were identified from various sources: European Private Equity & Venture Capital Association (EVCA), *Association Française des Investisseurs pour la Croissance* (AFIC), venture capitalists' websites, and *Les Echos*. Similar to the methodologies used by Coakley *et al*. (2007), from the original list of more than 600 IPOs in the period 1996–2006, we excluded investment trusts, financial companies, building societies, transfers from other stock markets or market tiers, foreign-incorporated companies, de-mergers or equity reorganizations, and registrations at the time of a relisting following the temporary suspension of a firm. This resulted in a final sample of 122 entrepreneurial VC-backed IPOs in France for which we have all the information required for this analysis. In this paper, our main independent variables are defined to assess the human characteristics of the CEO. We consider here the experience and education of the latest CEO running the company before the IPO. In our sample, we have 28 observations where the CEO has been replaced before IPO, among which there are only 9 cases where the incumbent CEO has been replaced by a new CEO who was not a founder of the company[3].

Following Cumming and Johan (2010), we employ a hazard model which is standard procedure for dealing with duration data. In our case, the hazard rate is the probability that the firm leaves its pre-IPO VC financing state and goes public at a particular point in time. The dependent variable is the time lapse between the date of the first VC financing and the date of the IPO (measured in months). In this study, we employ a parametric (Weibull) model, selected on maximum likelihood and minimum AIC criteria.

---

[1] Limited Partners.

[2] We excluded firms issued on the *Premier Marché* in order to avoid a sample dispersion that was too broad.

[3] In the 19 other cases, the new CEO was one of the founder of the company.

As described by Jenkins (2005), a basic concept when analyzing survival times is the hazard function *h(t),* which is the conditional failure rate defined as the probability of exit during a very short time interval, assuming the firm has survived up to the beginning of that interval. The hazard function is defined as the probability density function and the cumulative distribution function. The hazard function is given by:

$$h(t) = \frac{f(t)}{S(t)} = \lim_{\Delta t \to 0} \frac{\Pr(t < T \leq t + \Delta t | T > t)}{\Delta t}$$

where Δt is a very short time interval. This conditional probability is the probability that exit occurs in the time interval $[t\ ;\ t + \Delta t]$, based on no exit before the beginning of time *t*.
The hazard function of a firm *i* is expressed as:

$$h(t|x_i) = h_0\,(\mathrm{t})\exp(x_i\beta_x)$$

In this expression, $h_{0(t)}$ is an arbitrary and unspecified baseline hazard function reflecting the probability of failure conditional on the firm having survived until time t after its IPO and exp(.) is the exponential function.
The Weibull model assumes a baseline hazard of the form: $h_0(t) = pt^{p-1}\exp(\beta_0)$, where *p* is the shape parameter. Thus, the Weibull model is specified as:

$$h(t|x_i) = pt^{p-1}\exp(\beta_0 + x_i\beta_x)$$

The Weibull distribution can provide a variety of monotonically increasing or decreasing shapes of the hazard function. The hazard rate either rises monotonically with time ($p > 1$), falls monotonically with time ($p < 1$), or is constant $p=1$ (that is the special case of the Weibull model known as the Exponential model)[4].

We test the robustness of our estimations using a Cox proportional hazard semi-parametric model (Cox, 1972; Jenkins, 2005). The two models deliver very similar results, which is a good indicator of the robustness of our estimations. Results for the Cox model are reported in Appendix 1.

3 Results

3.1 Descriptive statistics

Table 1 presents the independent variables and the descriptive statistics for the entire sample[5]. Concerning the characteristics of VC firms, we see that VC firms are typically around 13 years old at their first investment with a proportion of captive *versus* independent VC firms that is quite similar. We find also that VC-backed companies are typically around 6 years old when they receive their first VC financing, with 55% of them being financed in the first 3 years of their existence.

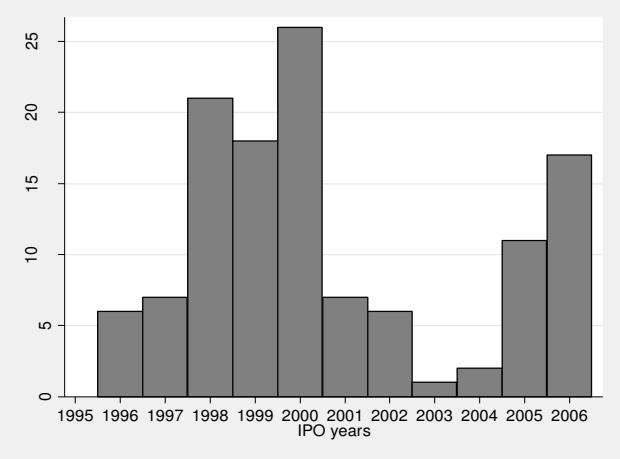
[4] For more details, see Jenkins (2005).
[5] Table 5 in Appendix 2 presents the correlations between the model variables.

Table 1: Definitions of variables and descriptive statistics

Variable	Description	Mean	SD	Min	Max
Market conditions					
IPO bubble	1 if the first VC investment was during the hot issue market period of 1998, 1999 or 2000, 0 if not	0.402	0.492	0	1
IPO hot issue	1 if the IPO was during the hot issue market period 1998, 1999, or 2000, 0 if not	0.533	0.501	0	1
Market return	The stock index return in the 3 months prior to exit (CAC All tradable - ex SBF 250)	6.290	8.020	-11.829	28.074
Fund growth	The percentage change in the funds raised by the VC sector in the year of IPO	106.313	143.193	-88.465	410.340
VC characteristics					
VC age	Age of the lead VC at first VC investment (in years)	13.19	11.53	0	58
VC number	Number of VC firms involved in the financing	3.148	2.188	1	11
Captive VC	1 if the lead VC firm is captive (bank, corporate or government affiliated), 0 if not	0.541	0.500	0	1
VC reputation	1 if the number of IPOs the lead VC firm has backed in the sample is higher than the average number of IPOs backed by VC firms in the sample, and 0 otherwise	0.533	0.501	0	1
Firm characteristics					
Firm age	Age of the financed firm at the first VC investment (in years)	5.992	7.830	0	45
Patent	1 if the firm holds at least 1 patent at the date of IPO, 0 if not	0.287	0.454	0	1
Early stage	1 if the first VC investment was within the 2 years after the company was established, 0 if not	0.361	0.482	0	1
Firm size	The number of employees of the firm the year before the IPO	211.451	443.621	8	4105
Firm past performance	Revenue/assets (for the year before the IPO)	1.077	0.765	0.003	5.617
CEO human capital					
CEO age	Age of CEO at IPO (years)	45.29	8.92	28	71
CEO experience within the firm	Number of years the CEO had been managing the company at first VC investment	3.098	4.831	0	23
CEO Exp.: Entrepreneurial	1 if the CEO has created a former venture, 0 if not	0.270	0.446	0	1
CEO Exp.: Managerial	1 if the CEO occupied a prior managerial position in a company, 0 if not	0.459	0.500	0	1
CEO Exp.: Technical	1 if the CEO has previous technical work experience in the same sector as the company, 0 if not	0.533	0.501	0	1
CEO School: Sciences	1 if the CEO's academic education is in the sciences, 0 if not	0.557	0.499	0	1
CEO School: Management	1 if the CEO's academic education is in management, 0 if not	0.057	0.234	0	1

The distribution of the IPO dates of the firms (Figure 1) shows that most of them went public in the years 1998, 1999 and 2000. This is not surprising given that these years constituted the hot issue market period in France.

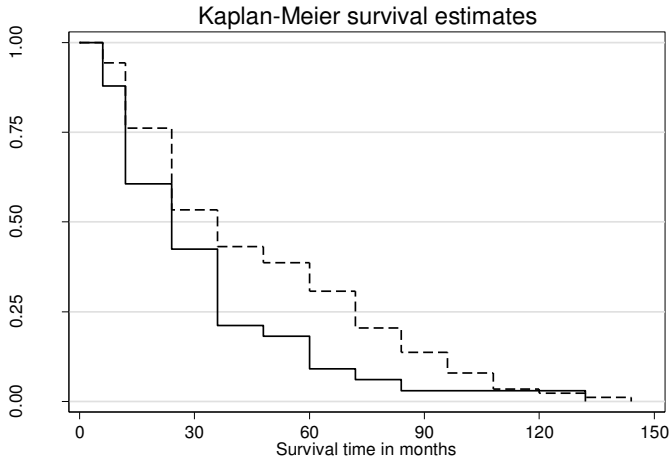
Figure 1: Distribution of the number of IPOs for the 122 firms in our sample



Concerning the dependent variable, i.e., the duration of VC investment, we find that the mean VC incubation period in the sample is 3.66 years (44 months) and the median value is 3 years (36 months).

Figure 2 gives the Kaplan-Meier non-parametric survivor function for VC-backed companies depending on the entrepreneurial experience of the CEO. If we compare the average duration of VC investment for firms managed or not by a CEO with entrepreneurial experience, we find that VC firms stay invested for shorter periods if the firm is managed by a CEO with an entrepreneurial background than if the CEO has no entrepreneurial experience.

Figure 2: Kaplan-Meier survival curves (CEO Experience)

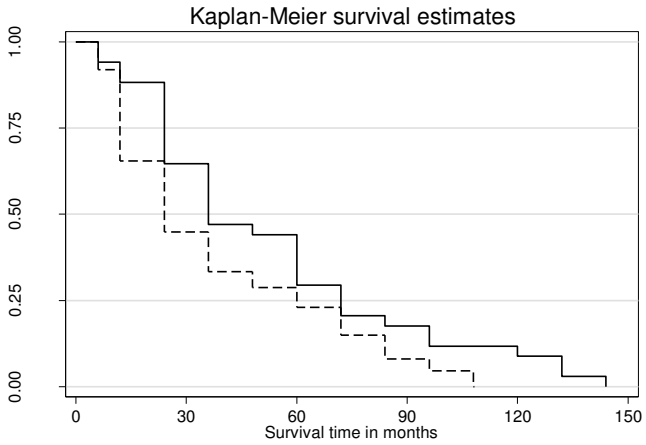


Survival curves by CEO entrepreneurial background with:
(—) *CEO Exp.: Entrepreneurial* = 1
(- -) *CEO Exp.: Entrepreneurial* = 0

It seems that the length of VC investment is also affected by one other important characteristic for private companies: the patenting activity of firms. Figure 3 gives the Kaplan–Meier non-parametric survivor function for VC-backed companies depending on the patent activity of firms. Here, in contrast to the result for Figure 2, we find that VC firms stay invested for longer periods if the firm holds at least one patent before the IPO. This positive correlation is possibly

due to the fact that more innovative companies need a longer time to market their products and thus need a longer duration of investment.

Figure 3: Kaplan-Meier survival curves (Patent activity)



Survival curves by patent activity with:
(—) Patent = 1
(- -) Patent = 0

3.2. Multivariate survival analysis

Table 2 presents the results for the five specifications of the duration model (model 5 does not include the variable *Firm age* due to the high correlation with the variable *CEO experience within the firm*[6]). We report the coefficients of the variables. If the estimated coefficient is higher than 0, then this variable increases the hazard ratio (there is a negative correlation with the duration of investment), and thus, decreases the expected duration of VC investment, and vice versa. The Cox models presented in Appendix 1 (Table 3) deliver very similar results to the Weibull models, which is a good indicator of the robustness of our estimations.

We can first see that the duration of VC investment is correlated to the market conditions. The positive and highly significant coefficients of the variables *IPO bubble* and *IPO hot issue* imply that the duration of the VC incubation period is shorter during stronger market conditions. This result is in line with prior research, which has found that the key determinants of the VCs' exit decisions are equity market conditions (Lerner, 1994). The reputation of VC firms is also correlated to the duration of the VC incubation period. Reputable VC firms stay invested for a longer period. This result is consistent with the idea developed by Gompers (1996) that argues that reputable VC firms have fewer incentives to exit early than less reputable VC firms. Moreover, our results suggest that there are significant differences between captive and independent VC firms in relation to the duration of their investment and the quality of their support. As found by Hsu (2013), it appears also that the duration of VC incubation period is positively and significantly correlated to the holding of patents. This result confirms that which was already obtained from the Kaplan-Meier graph (Figure 2). As explained above, this positive correlation is possibly due to the fact that more innovative companies need a longer time to market their products and, thus require a longer duration of investment.

[6] Our results are stable to the inclusion of the variable *Firm age*. These results are available on request.

For the effect of the variables related to the CEO's human capital, models 3, 4, and 5 confirm the results from Figure 1 and show that venture capitalists stay invested for a shorter period of time if the CEO has previous entrepreneurial experience. Model 3 shows that the hazard rate increases by more than 100% if the company is managed by a CEO with some entrepreneurial experience. Model 5 shows also that the duration of the VC participation is negatively correlated (but with a low hazard rate) to the past experience of the CEO within the firm. However, no other human capital dimensions related to general managerial/technical experience or CEO education seem to be correlated to the length of incubation of VC-backed firms.

Table 2: Weibull regressions

VARIABLES	(1)	(2)	(3)	(4)	(5)
IPO bubble	1.219***	1.207***	1.238***	1.237***	1.231***
	[0.249]	[0.245]	[0.265]	[0.270]	[0.248]
IPO hot issue	0.844***	0.804***	0.789***	0.787***	0.775***
	[0.238]	[0.241]	[0.250]	[0.251]	[0.254]
Market return	0.005	0.014	0.013	0.012	0.010
	[0.014]	[0.013]	[0.013]	[0.012]	[0.013]
Fund growth	-0.002**	-0.001*	-0.001	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
VC age	0.008	0.017*	0.019*	0.019*	0.026***
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
VC number	-0.156***	-0.132***	-0.156***	-0.157***	-0.116***
	[0.042]	[0.044]	[0.043]	[0.042]	[0.041]
Captive VC	0.582**	0.684***	0.569**	0.633**	0.589**
	[0.255]	[0.250]	[0.244]	[0.266]	[0.265]
VC reputation		-0.506**	-0.585***	-0.610***	-0.676***
		[0.200]	[0.200]	[0.200]	[0.228]
Firm age	-0.035	-0.027	-0.023	-0.021	
	[0.025]	[0.028]	[0.030]	[0.030]	
Patent	-0.685**	-0.603*	-0.724**	-0.721**	-0.573*
	[0.343]	[0.321]	[0.352]	[0.344]	[0.333]
Early stage	-1.160***	-1.103***	-1.222***	-1.257***	-0.852***
	[0.252]	[0.277]	[0.282]	[0.285]	[0.226]
Firm size			-0.001*	-0.001*	-0.001
			[0.000]	[0.000]	[0.001]
Firm past performance			-0.392**	-0.384***	-0.477***
			[0.153]	[0.148]	[0.147]
CEO age		-0.030**	-0.008	-0.010	-0.026*
		[0.015]	[0.014]	[0.014]	[0.015]
CEO Exp.: Entrepreneurial			0.913***	0.878***	0.844***
			[0.268]	[0.268]	[0.301]
CEO Exp.: Managerial			-0.094	-0.065	0.255
			[0.237]	[0.250]	[0.256]
CEO Exp.: Technical			0.050	0.397	0.430
			[0.228]	[0.384]	[0.416]
CEO School: Sciences				-0.481	-0.465
				[0.480]	[0.511]
CEO School: Management				-0.088	-0.205
				[0.320]	[0.334]

CEO experience within the firm					0.084**
					[0.035]
Constant	-6.228***	-5.203***	-5.994***	-5.906***	-5.947***
	[0.670]	[0.822]	[0.829]	[0.850]	[0.859]
Sector	Yes	Yes	Yes	Yes	Yes
Observations	122	122	121	121	121
Log likelihood	-118.950	-115.062	-106.084	-105.526	-102.253
Ln_p	0.568***	0.599***	0.657***	0.666***	0.692***

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All models contain dummy variables for the sectors. All the models are significant at the 1% level.

4 Conclusion

Our results show that the investment strategies of venture capitalists depend, in part, on the entrepreneurial experience of the CEO of the VC-backed company. Thus, we are able to confirm here the findings of Beckman et al. (2007) regarding the positive impact of entrepreneurial experience on the timing of the IPO within the VC financing context. Moreover, our results show the relative importance of CEO experience and scholarly background in the VC financing context. Previous literature suggests that CEO human capital characteristics are key drivers of firm success, regardless of their technological profile (Gimmon and Levie, 2010; Cauchie and Vaillant, 2016). However, given the "coaching" function of VC, some CEO human capital characteristics appear to be less important here for firm achievement (Colombo and Grilli, 2010). Because they can be substituted at least partially by VC competencies, CEO scholarly profile, managerial and technical experiences have no impact on the IPO timing for financed companies on the financial market.

It seems that VC firms save time when they invest in companies managed by a CEO with entrepreneurial experience – likely by reducing the cost of their "coaching" function but maybe also because this precise type of CEO sends a good signal to the market and therefore makes an IPO more likely at a sooner date. Also, this investment strategy perhaps allows VC firms to manage their firm portfolios more efficiently in order to avoid the "plateau effect" described by Giot and Schwienbacher (2007). In that particular case, VC firms' performance could be improved by investing in companies managed by a certain type of CEO during the selection process.

This paper contributes to research on entrepreneurial finance by analyzing the human capital features of an important parameter of the investment strategy of VC firms, i.e. the duration of their investment. We find that CEO human capital matters only along specific dimensions, and that venture capitalists stay invested for shorter periods of time, on average, if the CEO has an entrepreneurial background. CEO profiles of VC-backed firms and the timing of the VC deals are key aspects that should be taken into account when assessing the performance of VC companies. Future research is needed on these topics in order to refine our knowledge of the VC industry.

References

Audretsch, D. and E. Lehmann (2004) "Financing high-tech growth: the role of banks and venture capitalists" *Schmalenbach Business Review* **56**, 340–357.

Baum, J.A.C. and B.S. Silverman (2004) "Picking winners or building them? Alliance, intellectual, and human capital as selection criteria in venture financing and performance of biotechnology startups" *Journal of Business Venturing* **19**, 411–436.

Beckman, C.M., Burton, M.D. and C. O'Reilly (2007) "Early teams: the impact of team demography on VC financing and going public" *Journal of Business Venturing* **22**, 147–173.

Bertoni, F., Colombo, M.G. and L. Grilli (2011) "Venture capital financing and the growth of high-tech start-ups: Disentangling treatment from selection effects" *Research Policy* **40**, 1028– 1043.

Bertoni F., Ferrer M.A. and J. Marti (2013) "The different roles played by venture capital and private equity investors on the investment activity of their portfolio firms" *Small Business Economics* **40**, 607-640.

Cauchie, G. and N. Vaillant (2016) "New firm survival: Isolating the role of Founder's human capital in accounting for firm longevity" *Journal of Human Capital* **10**, 186–211.

Coakley J., Hadass L. and A. Wood (2007) "Post-IPO operating performance, venture capital and the bubble years" *Journal of Business Finance & Accounting* **34**, 1423–1446.

Colombo M.G. and L. Grilli (2010) "On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital" *Journal of Business Venturing* **25**, 610-626.

Cox, D.R. (1972) "Regression models and life tables" *Journal of Royal Statistical Society* **34**, 187–220.

Cumming D. and S. Johan (2010) "Venture capital investment duration" *Journal of Small Business Management* **48**, 228-257.

Engel, D. and M. Keilbach (2007) "Firm level implication of early stage venture capital investment: an empirical investigation" *Journal of Empirical Finance* **14**, 150–167.

Gerasymenko V., De Clercq, D. and H.J. Sapienza (2015) "Changing the business model: effects of venture capital firms and outside CEOs on portfolio company performance, *Strategic Entrepreneurship Journal* **9**, 79-98.

Gerasymenko V. and J.D. Arthurs (2014) "New insights into venture capitalists' activity: IPO and time-to-exit forecast as antecedents of their post-investment involvement" *Journal of Business Venturing* **29**, 405–420

Gimmon, E. and J. Levie (2010) "Founder's human capital, external investment, and the survival of new high-technology ventures" *Research Policy* **39**, 1214-1226.

Giot P. and A. Schwienbacher (2007) "IPOs, trade sales and liquidations: Modelling venture capital exits using survival analysis" *Journal of Banking & Finance* **31**, 679-702.

Gompers, P.A. (1996) "Grandstanding in the venture capital industry" *Journal of Financial Economics* **42**, 133–156.

Hellmann T. and M. Puri (2002) "Venture capital and the professionalization of start-up firms: Empirical evidence" *Journal of Finance* **57**, 169-198.

Hoenig, D. and J. Henkel (2015) "Quality signals: The role of patents alliances, and team experience in venture capital financing" *Research Policy* **44**, 1049-1064

Hsu, H-C S. (2013) "Technology timing of IPOs and venture capital incubation" *Journal of Corporate Finance* **19**, 36–55.

Jain, B.A. and O. Kini (1995) "Venture capitalist participation and the post-issue operating performance of IPO firms" *Managerial and Decision Economics* **16**, 593-606.

Jain, B.A. and O. Kini (2000) "Does the presence of venture capitalists improve the survival profile of IPO firms?" *Journal of Business Finance and Accounting* **27**, 1139-1183.

Jenkins, S.P. (2005) 'Survival analysis,' Unpublished manuscript, Institute for Social Science and Economic Research, University of Essex, Colchester, UK Downloadable from: http ://www.iser.essex.ac.uk/study/resources/module-ec968.

Lerner, J. (1994) "Venture capitalists and the decision to go public" *Journal of Financial Economics* **35**, 293–316.

Megginson, W. and K.A Weiss. (1991) "Venture capitalist certification in initial public offerings" *Journal of Finance* **46**, 879–903.

Patzelt, H. (2010) "CEO human capital, top management teams, and the acquisition of venture capital in new technology ventures: An empirical analysis" *Journal of Engineering and Technology Management* **27**, 131-147.

Sahlman, W.A. (1990) "The structure and governance of venture-capital organizations" *Journal of Financial Economics* **27**, 473-521.

Sapienza H. J., Manigart S. and W. Vermeir (1996) "Venture capitalist governance and value added in four countries" *Journal of Business Venturing* **11**, 439-469.

Shane, S. and T. Stuart (2002) "Organization endowments and the performance of university start-ups" *Management Science* **48**, 154–170.

Sorensen, M. (2007) "How smart is smart money? A two-sided matching model of venture capital" *Journal of Finance* **62**, 2725-2762.

Zhang, L. (2018) "Founders Matter! Serial entrepreneurs and venture capital syndicate formation" *Entrepreneurship Theory and Practice*, published online February 22, 2018 https://doi.org/10.1177/1042258718758641

Appendix 1: The Cox model

The hazard function of a firm *i* is expressed as:

$$h(t|x_i) = h_0\,(\mathrm{t})\exp(x_i\beta_x)$$

The Cox regression uses the proportional hazard assumption, which assumes that all groups of firms face a hazard function of the same shape. The shape of the hazard function remains unspecified and it can take any form (Jenkins, 2005). Cox proportional hazards models assume that the hazard ratio is constant over time. In the presence of hazards that do not satisfy the proportional assumption the estimates can give biased and inefficient results for all the parameters.

We reported here the results for two models but the results for all models are available by request.

Table 3: Cox model

VARIABLES	(1)	(2)	(3)
IPO bubble	1.001***	0.996***	1.057***
	[0.198]	[0.199]	[0.203]
IPO hot issue	0.490***	0.496***	0.513***
	[0.188]	[0.188]	[0.190]
Market return	0.011	0.010	0.005
	[0.011]	[0.011]	[0.011]
Fund growth	-0.001	-0.001	-0.000
	[0.001]	[0.001]	[0.001]
VC age	0.018**	0.018**	0.020***
	[0.007]	[0.007]	[0.007]
VC number	-0.122***	-0.124***	-0.096***
	[0.036]	[0.035]	[0.037]
Captive VC	0.491**	0.504**	0.412**
	[0.198]	[0.204]	[0.189]
Firm age	-0.016	-0.017	-0.037*
	[0.020]	[0.019]	[0.020]
Patent	-0.565*	-0.563**	-0.437
	[0.290]	[0.286]	[0.272]
Early stage	-0.980***	-1.005***	-0.896***
	[0.199]	[0.198]	[0.195]
Firm size	-0.000**	-0.000**	-0.001*
	[0.000]	[0.000]	[0.000]
Firm past performance	-0.312***	-0.309***	-0.359***
	[0.117]	[0.119]	[0.117]
VC reputation	-0.485***	-0.508***	-0.558***
	[0.157]	[0.161]	[0.172]
CEO age	-0.004	-0.004	-0.012

	[0.010]	[0.010]	[0.011]
CEO Exp.: Entrepreneurial	0.691***	0.696***	0.730***
	[0.197]	[0.203]	[0.210]
CEO Exp.: Managerial	-0.078	-0.087	0.086
	[0.176]	[0.191]	[0.188]
CEO Exp.: Technical	0.012	0.165	0.199
	[0.178]	[0.303]	[0.318]
CEO School.: Sciences		-0.155	-0.073
		[0.371]	[0.387]
CEO School.: Management		0.058	0.024
		[0.252]	[0.266]
CEO experience within the firm			0.083***
			[0.025]
Sector	Yes	Yes	Yes
Observations	121	121	121
Log likelihood	-442.079	-441.934	-438.645

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Appendix 2: Correlation matrix

Table 4: Correlation matrix

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IPO bubble	**1**	1																			
IPO hot issue	**2**	-0.004	1																		
Market Return	**3**	-0.210	**0.299**	1																	
Fund growth	**4**	-0.086	0.232	0.165	1																
VC age	**5**	-0.149	-0.039	0.127	0.049	1															
VC number	**6**	0.006	0.018	-0.112	-0.006	-0.062	1														
Captive VC	**7**	0.017	0.192	-0.041	0.012	**-0.307**	-0.089	1													
Firm age	**8**	-0.040	-0.098	0.001	-0.127	0.081	-0.222	0.081	1												
Patent	**9**	-0.150	-0.024	0.075	-0.022	0.046	0.207	-0.070	-0.009	1											
Early stage	**10**	0.046	-0.084	-0.056	0.018	-0.081	0.239	-0.165	-0.494	0.090	1										
CEO age	**11**	-0.156	-0.032	0.070	-0.034	0.030	0.019	-0.008	**0.321**	0.025	-0.063	1									
CEO Exp.: Entrepreneurial	**12**	0.028	-0.096	0.022	-0.060	-0.016	0.035	0.117	-0.160	-0.060	0.081	-0.213	1								
CEO Exp.: Managerial	**13**	0.118	-0.028	-0.053	-0.078	-0.032	-0.010	0.089	-0.229	-0.039	0.096	0.049	**0.550**	1							
CEO Exp.: Technical	**14**	-0.171	0.012	0.072	-0.091	-0.070	-0.004	0.094	-0.043	0.158	-0.049	0.008	-0.096	-0.094	1						
CEO School: Sciences	**15**	-0.112	-0.008	0.001	-0.193	-0.148	-0.046	0.106	0.018	0.127	-0.087	0.018	-0.089	-0.073	**0.786**	1					
CEO School: Manag.	**16**	0.093	-0.043	0.016	0.103	0.141	0.039	-0.053	0.054	-0.093	0.076	-0.122	0.051	0.053	**-0.547**	**-0.726**	1				
CEO exp. within the firm	**17**	0.062	0.023	0.200	-0.075	0.043	-0.234	0.043	**0.638**	0.040	**-0.356**	**0.314**	-0.242	**-0.326**	-0.063	-0.033	0.080	1			
VC reputation	**18**	-0.003	0.780	0.129	0.058	0.228	0.063	0.060	-0.007	0.085	0.053	-0.155	0.015	-0.093	-0.021	-0.140	0.209	-0.049	1		
Firm size	**19**	-0.093	-0.104	-0.054	-0.071	0.064	-0.115	0.085	0.295	-0.134	-0.164	**0.330**	-0.0956	-0.074	0.023	-0.008	0.027	0.161	-0.078	1	
Firm past perf.	**20**	0.089	0.016	0.121	0.168	0.096	**-0.259**	0.046	0.198	-0.095	-0.134	0.056	-0.005	0.025	0.029	-0.068	-0.031	0.213	0.049	0.030	1

Variables significant at 1% are in bold letters.