The impact of venture capital financing on the survival of IPO firms

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Abstract: We analyze the impact of venture capital involvement on the survival time of French Initial Public Offerings (IPO) during the period 1996-2006. We examine the link between the survival time of IPO companies, and several proxies for the quality of venture capitalist financing. Our results show that, taken as a whole, venture capital financing has a negative impact on firm survival. However, the quality of venture capitalist monitoring, measured by the duration of their investment before the IPO, enhances company survival times.

Keywords: Venture Capital, IPO, Survival, France

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INTRODUCTION

Venture capital (VC) firms are financial intermediaries that provide funding to young innovative companies. According to Gompers and Lerner (2004), venture capitalists also provide pre-investment screening, post-investment monitoring, and value-added, activities that, if performed well, should lead to improved performance by portfolio companies (Manigart *et al*., 2002). In addition, VC firms contribute also to the process of going public. Previous research based on U.S. data shows that VC firms' experience helps companies choose the most favorable time for an Initial Public Offerings (IPO) (Lerner, 1994), and leads to reduced instances of underpricing and higher levels of economic performance, providing support for the contribution of venture capitalists' certification role in IPOs (Megginson and Weiss, 1991).

Prior research on French VC-backed IPOs focuses mostly on financial performance and underpricing (see among others: Chahine *et al*., 2007; Chahine and Filatotchev, 2008; Goergen *et al*., 2009; Sentis, 2009). In the present study, the focus is on the effects of venture capitalists' participation in IPOs in France and the impact of VC involvement on another critical aspect of the process of going public: the survival of IPO firms after going public (Jain and Kini, 2000; Audretsch and Lehmann, 2005). The advantage of survival analysis is that it overcomes the problem of inadvertent survivorship bias. Our analysis is based on hand-collected data that include 209 French companies that went public between 1996 and 2006. This sample allows comparison of survival times among VC-backed and non-VC-backed IPOs. We estimate a survival model known as the Accelerated Failure Time (AFT) model, and compute a competing risk model (CRM) that takes account of different exit routes such as bankruptcy or voluntary liquidation, and merger/acquisition.

Use of a set of variables related to VC financing provides some interesting results. They indicate that VC firms generally do not make a positive contribution to the survival of the firms in which they invest, based on their equity positions. However, our findings also show that longer period of investment before the IPO allows venture capitalists to monitor firms efficiently and add some value. If we split the sample into two sub-periods of analysis - normal and bubble activity – we find that during normal periods of activity, the longer the duration of VC involvement/monitoring the greater the positive effect on firm survival time, while this positive impact disappears during bubble periods.

The remainder of the paper is structured as follows. Section 2 briefly summarizes previous findings on the impact of VC financing on firm's IPO performance. Section 3 presents the

data sources, definition of the variables, and the research methodology. Section 4 discusses the main results, Section 5 provides some additional results and robustness tests, and Section 6 offers some conclusions.

1. LITERATURE REVIEW

According to European Venture Capital Association (EVCA) statistics, the French VC industry is one of the most dynamic in Europe. In 2013, French VC firms invested €5.9 billion compared with €10.1 billion in 2006 (EVCA, 2014). However, stock markets in France are less developed than those in the U.K. and the U.S., and exits by IPOs are less common in France than in the Anglo-Saxon countries.

Several studies on the relationship between IPO performance and the VC industry show significant differences between Anglo-Saxon and Continental European countries. Previous research based on U.S. data show that VC firms' experience helps companies choose the most favorable time for their IPO (Lerner, 1994) and leads to lower levels underpricing, which supports the contribution of the certification role of venture capitalists in IPOs (Megginson and Weiss, 1991). In contrast, Lee and Wahal (2004) for the U.S. during the period 1980-2000, and Chahine *et al*. (2007) for the French context, find that the certification role of VC firms is not effective. Chahine and colleagues' results show French VC-backed companies show greater underpricing than IPOs without VC financing. The findings for France indicate that French VC firms appear to engage in "grandstanding".

There is another strand of work that analyzes the impact of VC financing on the financial and economic performance of IPO firms. Indeed, Barry *et al*. (1990), Megginson and Weiss (1991), and Jain and Kini (2000) indicate that venture capitalists continue to be involved in issuing firms' projects even after the IPO event. This is particularly important result because an IPO implies an organizational change that can be destabilizing for the company. Jain and Kini (1995) argue that VC backing can provide effective monitoring following an IPO but according to Bruton *et al*. (2010), active monitoring by VC firms of their post-IPO company would seem to be limited, and impact of VC firms on IPO performance can be negative rather than positive. The findings for the U.S. indicate that VC-backed IPOs outperform non-VC-backed issues in terms of operating, financial, and long-run performance (see among others, Jain and Kini, 1995, 2000; Brav and Gompers, 1997; Megginson and Weiss, 1991). Concerning the impact of VC firms on the economic performance of French VC-backed IPOs, the results in Bruton *et al*. (2010) show that venture capitalist involvement has a negative

effect on operating performance at the end of the IPO. Their study shows that this negative outcome is the result of less efficient post-IPO monitoring in France compared to other countries. More generally, the results for Continental European IPOs show that VC-backed IPOs generally do not outperform non-VC-backed issues in relation to operating or financial performance (Bottazzi and Da Rin, 2002; Rindermann, 2003) and this applies particularly to France (Bottazzi and Da Rin, 2002).

Overall, the VC industry in Continental European countries is less mature than in Anglo-Saxon countries. Important differences in the institutional systems of Anglo-Saxon and Continental European countries may lead to some differences in VC involvement and performance (Chahine *et al*., 2007; Bruton *et al*., 2010). Indeed, according to Lerner and Tåg (2013), the legal environment can affect certain aspects of the VC investment process such as board representation, the contributions of VC firms and entrepreneurs, *etc*. As a consequence, findings from the Anglo-Saxon context may not be generalizable to Continental European countries.

This paper analyzes the impact of VC financing on a basic measure of economic impact: French IPOs' survival during the period 1996-2006. The literature uses firm survival as a measure of firm performance (Caves, 1998; Fontana and Malerba, 2010), and Audretsch and Lehmann (2005) suggest that the ability of IPO firms to survive over time is an appropriate measure of their performance.

Few studies examine the survival of firms after the IPO. The literature review is not exhaustive but includes some relevant studies based on North American and European data. Based on a sample of U.S. IPOs, Jain and Kini (2000) employ an AFT model to analyze the impact of venture capitalist involvement at the time of the IPO on firm survival time. They find that the presence of a VC firm improves the survival profile of IPO firms. Cockburn and Wagner (2010) analyzed the survival rates of U.S. IPO Internet-related firms during the period of the Internet bubble. They find patent applications to be significant determinants of firm survival, and show that among exiting VC-backed firms this is more likely due to a merger/acquisition. Espenlaub *et al*. (2012) estimate an AFT model for IPOs included in the UK Alternative Investment Market (AIM). They find that the Nomad's (Nominated Advisor's) reputation has a significant impact on IPO survival. They show also that VC financing has no impact on firm survival time. Based on a sample of U.S. IPOs for the period 1985-2005, Kooli and Meknassi (2007) show that larger IPOs, VC-backed IPOs, and IPOs backed by prestigious underwriters, experience a lower risk of delisting.

There are only a few studies that consider Continental European countries. Based on a sample of German IPOs issued on the *Neuer Markt,* Audretsch and Lehmann (2005) study the impact of different types of ownership, human capital, and patents on firm survival rates. They find that qualified human capital (measured as the number of directors with an academic degree) and number of patents, are positively related to the likelihood of firm survival. However, they also show that firm survival decreases with the share ownership of VC firms.

In the French case, there are no studies that examine the survival of French firms after the IPO based on the impact of venture capitalist involvement. The present study tries to fill this gap. It should be noted that venture capitalists have an impact on the performance of companies at the time of IPO and also after the IPO. For example, even after the IPO, the average aggregate equity holding of the VC firms in our sample is 21.4% (compared to 32% on average at the time of the IPO). This trend was observed by Barry *et al*. (1990) for the U.S. market where the average aggregate equity holdings of VC firms after the IPO is 24.6%, and by Goergen *et al*. (2009) for the French *Nouveau Marché*. Venture capitalists retain a large fraction of their pre-IPO shares after the IPO. As a consequence, VC firms can continue to influence the firm's strategic decisions, and can continue to monitor and influence the performance of the company after the IPO. In our sample, as shown by Barry *et al*. (1990), the IPO cannot be viewed as an immediate "exit strategy" for a VC firm. Indeed, in our sample, some venture capitalists had maintained substantial ownership positions in their portfolio companies two years after the IPO. Also, in our sample, during the period 1996-2006, VC firms faced explicit lock-up agreements involving 60% of the total of financing. For instance, in the case of the French *Nouveau Marché,* Goergen *et al*. (2009) explain that venture capitalists are forced to keep most of their equity stake (80%-100% for between 6 and 12 months after the IPO. On the basis of our data, it is clear that most VC firms retain their equity positions even after the end of lock-up period. Finally, we observe that in 26% of already VC-backed firms, a new VC firm buys equity shares after the IPO (3 years after the IPO on average).

Thus, it can be expected that VC financing will have an impact on the survival of IPO firms. However, we would not expect to obtain similar positive results for the case of France to those obtained for Anglo-Saxon countries. More specifically, according to studies discussed above, we would argue that there is no reason to think that the general impact of VC financing on firm survival in France will be positive. Moreover, we believe that a more refined assessment that takes account of the heterogeneity of VC financing would be required to achieve a better understanding of VC financing on firm survival. For instance, even among VC firms there is likely to be wide variation in the quality and effectiveness of their

monitoring and value added activities (Jain and Kini, 1995; Dimov and De Clercq, 2006). Thus, we examine the link between firm survival time and several proxies for the VC firm skills used to guide portfolio companies, and the quality of their monitoring. In addition, a bubble period can lead to overestimation of the negative/positive impact of VC financing on firm survival, and thus the impact of VC involvement on firm survival time has to be mitigated depending on the period of analysis.

2. DATA, METHODOLOGY, AND VARIABLES

3.1 Data

Our sample includes French IPOs that were floated on the main and second tier markets over the period 1996-2006[1]. Our primary list of IPOs was obtained from the *Euronext* files. These files contain information such as first-day closing price, money raised at the IPO, issue proceeds, etc. Additional data are from *Autorité des Marchés Financiers* (AMF) publications which contain company listing prospectuses and annual reports. We use these prospectuses and annual reports to derive quantitative information on several financial and business variables. We obtained data from the DIANE (Van Dijk) database if annual reports were not available. We identified VC firms using various sources: EVCA, *Association Française des Investisseurs pour la Croissance* (AFIC), venture capitalists' websites, and *Les Echos*. Similar to the methodologies used by Chahine *et al*. (2007) and 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 temporary suspension of a firm. As a result of this selection, the final sample includes 209 entrepreneurial IPOs in France for which we have all the information required for the study.

3.2 Methodology

We use a survival analysis methodology to analyze the impact of involvement of VC in firm survival. Survival analysis deals with right censored data which represents situations where a failure event has not yet occurred, and with time-series data with different time horizons (Jenkins, 2005).

[1] We excluded firms issued on the *Premier Marché* in order to avoid too large dispersion in the sample.

IPOs are tracked up to December 2012 for whether or not they were delisted. Delisting dates and modes of exit were collected from official reports available on the NYSE Euronext website and the economic newspaper *Les Echos*. We define survivors as firms that continue to operate independently as public corporations. Thus, firms delisted due to failure or an acquisition or merger are classified as non-survivors. However, there are important economic differences between the forms of exit (Fontana and Nesta, 2009). In general, we consider involvement in a merger or acquisition compared to liquidation could be positive for the firm (Caves, 1998). However, although bankruptcy can be interpreted as failure, being bought is more ambiguous. On the one hand, a firm whose business is profitable may represent a valuable investment for another firm, while a non-profitable firm facing bankruptcy might be bought by another firm that wants to acquire its assets not its operations (Cockburn and Wagner, 2010). To try to mitigate this ambiguous effect, we classify firms closed due to bankruptcy or because of being bought by another firm as involved in a liquidation event. Not here that the type of exit cannot be viewed as an "exit strategy" for the VC firm; in our sample, some venture capitalists (75% of the cases) liquidated their equity participation before the merger/acquisition or liquidation of the company.

We investigate firm survival time using a duration variable[2]. Let *T* be the number of months that our companies have survived up to the end of 2012. A basic concept when analyzing survival times is the hazard function *h(t)* which is defined as the limit. It is the conditional failure rate defined as the probability of exit during a very short time interval, assuming the firm has survived 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*.

We estimate a survival model known as the AFT model. The advantage of this model is that it allows the impact of the independent variables on survival time to vary over the post-IPO period, depending on the length of time since listing. Indeed, we would expect that the impact

[2] The explanations are based on Jenkins (2005) and Cleves *et al*. (2004).

of VC involvement on survival might be greater for newer IPO firms compared to those with a long history as public companies (Jain and Kini, 2000). The AFT model is parametric; making it necessary to specify the distribution of the baseline survival function (Jenkins, 2005). In line with Cleves *et al*. (2004), we use the Akaike Information Criterion (AIC) test to select a nested and a non-nested parametric model. The AIC test shows that for our model, the log-normal distribution has a lower AIC value than other distributions, hence we select the log-normal distribution.

We relax the assumption of homogeneous exit by accounting for mode of exit (bankruptcy or voluntary liquidation, or merger/acquisition). Thus, we compute a CMR which is an extension of a standard duration model with the possibility of exit to one of several destination states (Jenkins, 2005). We report the estimation results for the pooled model which does not distinguish between modes of exit, and a CRM which takes explicit account of the different exit routes.

According to Cleves *et al*. (2004) and Jenkins (2005), AFT models typically follow the parameterization:

$$\ln(t_j) = x_j\beta_x + \epsilon_j$$

Specifically, we estimate the following model:

$$\begin{aligned}\ln(t_j) = \beta_0 + \ & \beta_1 VC\ Share + \beta_2 VC\ Experience \\ & + \beta_3 VC\ Reputation + \beta_4 PreIPO\ Duration + \beta_5 Age + \beta_6 Age2 \\ & + \beta_7\ Ln(size) + \beta_8 Growth\ Rate + \beta_9\ Investment\ Bank\ Reputation \\ & + \beta_{10} Insider\ Ownership + \beta_{11}\text{Intangibles Ratio} + \beta_{12}\ Ln(patent) \\ & + Year\ Dummies + Industry\ Dummies + \epsilon_j\end{aligned}$$

where $\ln(t_j)$ is time to failure which is measured (in months) as the time interval from IPO date to delisting date. Survival time is the period between 1996 (year of first listing in the sample) and the year that the company exited as a result of liquidation or merger/acquisition. Survival time is right censored to December 2012 since for continuing firms we do not have a recorded exit event.

3.3 Variables

We are interested in both the impact of the quality of VC monitoring on survival time, and VC ability to create additional value.

First, we define the independent variable *Venture Capital* as a dummy variable that takes the value 1 if the IPO firm was VC-backed before the date of the IPO and zero otherwise. Second, we use four proxies for quality of VC involvement and monitoring. The variable *VC Share* is derived from Barry *et al*. (1990), Audretsch and Lehmann (2005) and Coakley *et al*. (2007). It represents the aggregate equity stake of venture capitalists at the time of the IPO. A high level of aggregate equity share should increase the incentive to add value to the company (Kaplan and Strömberg, 2004) and to monitor it (Barry *et al*., 1990). Thus, we would expect larger VC firm holdings to be associated with longer survival times. However, beyond this positive effect predicted by agency theory, Bruton *et al*. (2010) argue that ownership concentration from VC firms could amplify agency risks. According to them, active monitoring by venture capitalists of their post-IPO firm would seem to be limited because of the strong motivations to exit the investment in order to redeploy the resources elsewhere and to distribute assets to their fund providers. In that case, ownership concentration by VC firms could have a negative effect on firm survival. Derived from Gompers (1996), the variable *VC Experience* is a dummy variable that takes the value 1 if the age of the lead venture capitalist is above the median value in the sample (12 years) and zero otherwise. The age of the lead VC firm is calculated as the difference between the founding year of the VC firm and the year of the IPO. Following Lee and Wahal (2004), the VC firm is defined as the lead if it participated in the firm's first VC financing round. In general (90% of cases), the lead VC firm will also hold the largest venture capitalist equity share in a particular IPO. Like Barry *et al*. (1990) we consider here that the longer the lead VC firm has been in business the more experience it will have accumulated, and the more it should enhance IPO survival. Thus, we expect the variable *VC Experience* to be positively associated with firm survival. We also include a variable that takes account of the number of prior IPOs in the sample in which the lead VC firm has participated (during 1996-2006) (Lee and Wahal, 2004). Here, *VC Reputation* is a dummy variable that takes the value 1 if the lead venture capitalist participated in several prior IPOs above the median for the sample and zero otherwise. VC firms that have participated in numerous IPO deals may be more able to monitor, and most importantly to guide their portfolio companies, and thus, to improve their survival time. Finally, we include a variable to account for length of the lead venture capitalist's investment period before the IPO. *Pre-IPO Duration* is calculated as the difference (in months) between the date of first VC firm investment and the date of the IPO. In line with prior VC research by Wang *et al*. (2003), this paper argues that the ability of VC firms to add value to portfolio companies depends, among other elements, on their investment duration. For Jain and Kini (1995), the length of VC firm

participation is a proxy for the quality of its monitoring. Exerting effort is costly; therefore, a VC firm that wants to monitor and create more added value through its management support needs a long-term relationship with its portfolio company (Tykvová, 2006). On the other hand, short investment duration might be indicative of the VC firm's decision to take advantage of the market and invest before rapid exit (Tykvová, 2006; Cumming and Johan, 2010). In that case, VC firms engage in grandstanding. We could argue that longer VC participation would lead to a more positive impact on firm survival.

We include a broad set of variables to control for alternative determinants of firm survival. Organizational characteristics such as firm's age, size, and growth rate have been shown to be important determinants of firm survival (Evans, 1987; Caves, 1998). *Age* is calculated as the difference (in years) between the founding date of the company and the date of its IPO. Based on evidence that the link between age and survival can follow an inverted U-shape (Evans, 1987), we include in the model the squared term of age: *Age2* (Cefis and Marsili, 2005). *Ln(size)* is the natural logarithm of the market capitalization of the IPO firm at the IPO price (in euros). Although company size is often measured as operating revenues or total assets (Revest and Sapio, 2013), following Coakley *et al*. (2007), we use the market capitalization of the firm in order to obtain a homogeneous measure of firm size. *Growth Rate* is the difference in the number of the firm's employees at the time of IPO, and one year after the IPO (measured as the difference in the natural logarithm). We expect a positive impact of these variables on firm survival time.

Investment Bank Reputation is a dummy variable used to control for lead underwriter reputation. Indeed, Jain and Kini (2000) argue that reputable investment banks enhance IPO survival. Following the methodology in Broye and Schatt (2003) for the French case, we distinguish two groups of investment banks - reputable and non-reputable - according to the number of their participations in IPOs during the period of analysis (1996-2006), in each year. We consider that an investment bank is reputable if it has participated in a number of IPOs above the median value. The variable *Investment Bank Reputation* is a dummy that takes the value 1 if the IPO is backed by a reputable lead investment bank and zero otherwise.

The corporate governance literature shows that ownership structure can also influence corporate performance although not necessarily positively. For instance, McConnell and Servaes (1990) show that the relation between ownership structure and performance should be considered non-linear, which is confirmed by Séverin (2001) for the French case. However, according to Hensler *et al*. (1997), the percentage of shares held by insiders enhances IPO survival. Similar to Hensler *et al*. (1997) and Séverin (2001), we define the variable *Insider*

Ownership as ownership (percentage) by members of the board of directors at the time of the IPO.

We include two independent variables *Ln(patent)* and *Intangibles/Assets* to account for some of the firm's intangible assets. According to Cefis and Marsili (2005), the level of intangible assets and the quality of capital stock is a source of heterogeneity in firm survival. Based on the types of companies listed on the financial market during the period 1996-2006, the innovation potential of these companies would seem important. The variable *Ln(patent)* is defined as the natural logarithm of the number of patents owned by the company at the time of the IPO. Due to the limited availability of research and development expenses (a problem encountered by Bottazzi and Da Rin, 2002), we calculate the ratio of intangible assets to total assets to account for the nature of the assets (Hasan and Wang, 2008) and the proportion of intangible assets owned by the company (Villalonga, 2004). The variable *Intangibles Ratio* is the capitalized amount of intangible assets divided by total assets[3].

Finally, to control for differences in technology sectors, we include aggregated industry dummy variables for six industry sectors, based on the Euronext classification and the APE codes (French company sectoral classification codes). We define six dummy variables for the following sectors: *ITS* (Internet, IT services, E-commerce and software), *Life Sciences* (biomedical and pharmaceutical sectors), *Media* (media and entertainment), *Telecom*, *NHT* (non-high tech products and service), and *Other* (other high-technology and electronics products and services). To control for time effects, we include the dummy variable IPO date for the years 1998, 1999, and 2000. These three dummies allow us to take account of the hot market issue period and its possible impact on firm survival. This period could lead to some overestimation of the lower survival of IPO firms in our sample.

4. RESULTS

4.1 Descriptive statistics

Table 1 presents the descriptive statistics for the whole sample and for the samples of VC and non-VC-backed IPOs. Average firm age and size of the IPO firms in our main sample are respectively 10.33 years and €68.32 million. VC-backed firms are relatively larger than non-VC-backed firms. In line with the results in Rindermann (2003) for the period 1996-1999, our results for *Investment Bank Reputation* show that venture capitalists in France are unable to

[3] Note that the correlation matrix does not show a significant association between *Ln(patent)* and *Intangibles Ratio*.

attract the most prestigious underwriters. IPO firms show relatively high levels of insider ownership, with mean ownership of around 75%. Non-VC-backed firms show significantly higher levels of insider ownership than VC-backed companies (86.65% and 66.97% respectively) which may reflect the fact that insiders have to relinquish a part of their equity stake in favor of venture capitalists (Kaplan and Strömberg, 2003) who are not necessarily board members. Table 1 shows also that the number of patents is higher for VC-backed firms than for non-VC-backed firms although we cannot identify the direction of the causality. For the other control variables, we observe no significant difference between years and sectors.

[Insert table 1]

Table 2 shows the differences between listed and delisted IPO firms. Our results show that surviving companies are older, larger in size, and grow more quickly than non-survivors. It is interesting that delisted firms have higher insider ownership than surviving firms which contrasts with the result in Jain and Kini (2000). In line with other studies, we find that surviving firms have a higher number of patents than delisted firms. The results for our main variables for VC financing are less conclusive. However, survivors seem to benefit from longer duration of VC investment before the IPO. This result holds if we restrict the sample to companies that received VC financing.

As already noted, most companies in our sample were listed during the bubble period but non-survivors seem to be concentrated in year 1998. We do not observe significant differences for the sector variables.

[Insert table 2]

4.2 Multivariate survival analysis

The results of our pooled model (which does not distinguish between exit routes) hide some interesting differences related to types of exit. The results of the CRM which distinguishes between exit routes, are more revealing. Table 3 column (1) presents the estimation results for the pooled model; columns (2) and (3) present the results for the CRM which distinguishes between exits due to merger/acquisition (column 2) and delisting due to business failure (column 3). We report both the coefficient and the time ratio for the independent variables of the AFT model in Table 3.

[Insert table 3]

Table 3 shows that firm *Age* and *Size* have no effect on firm survival, while the variable Age^2 has a negative and significant coefficient indicating that exits occur mainly among "middle-aged" firms. Similar to the results in Cockburn and Wagner (2010) and Esteve-Perez *et al*. (2010), we find that for exit due to liquidation, younger firms show lower survival times. Firm growth rate has a positive impact on firm survival time (columns (1) and (3)). The estimated effect of firm *Growth Rate* is positive and significant for companies that exited via liquidation, suggesting that firms that grow faster are likely to survive liquidation for longer.

Insider Ownership has a quite small negative effect on survival time. An increase in ownership by insiders accelerates the time to delisting due to business failure. The impact of this variable is surprising but seems to support the results in Serve (2007) for the *Nouveau Marché*, that IPO firms with high levels of continued managerial ownership show faster decline in post-issue operating performance than firms with lower levels of managerial ownership. This result supports the entrenchment hypothesis proposed in Shleifer and Vishny (1989).

The effect of *Intangibles/Assets* is not statistically significant in the pooled risks specification, and the competing risks specification shows that this result is due to two offsetting effects. *Intangibles/Assets* (column 2) has a significant and negative coefficient, indicating that firms reporting higher shares of intangibles assets to total assets are likely to be acquired or merged earlier, while the results are reversed for exit via liquidation. Firms with large stocks of intangibles may provide opportunities for other firms to acquire valuable intangible capital and distinctive skills (Chaudhuri and Tabrizi, 1999). The variable *Ln(patent)* has a positive coefficient, suggesting that patent ownership confers a on the firm a survival advantage. Cockburn and Wagner (2010) suggest that this might trigger a merger/acquisition and that patent ownership might delay potential business difficulties/distress. However, their findings show that the mechanism of merger/acquisition is complex, and not all intangible assets confer the same competitive advantage or protection. *Investment Bank Reputation* has no effect on firm survival whichever model is considered. Our findings show that firms whose IPO was in year 1998 have a significantly reduced survival time.

If we look at the effect of VC financing, we observe very substantial differences in the time ratios for different modes of exit[4]. Table 3 column (1) shows that firm survival time decreases with an increase in the equity share of the venture capitalist involved in financing the firm.

[4] Appendix A, table 6 presents the results for the models that include the variable *Venture Capital* to test the global impact of VC financing on firm survival time; *Venture Capital* is significant only for exit via liquidation and has a negative coefficient.

This result is consistent with Audretsch and Lehmann's (2005) findings for Germany but contrasts with the results in Jain and Kini (2000) and Cockburn and Wagner (2010) for the U.S., and those in Coakley *et al*. (2007) for the U.K. Columns (2) and (3) show that the survival time of firms decreases with the degree of VC involvement whatever the mode of exit. This result is in line with Bruton *et al*. (2010) who show that VC ownership is negatively related to the firm's operating performance. It seems that VC firm involvement may not mitigate potential agency problems and might even magnify them, leading to a negative impact of degree of their involvement on firm survival. In contrast to the findings for Anglo-Saxon countries, we find no significant effect for the variable *VC Experience*. However, *VC Reputation* has a positive effect (significant at the 11% level with a p-value= 0.107 - column (3)). This suggests that a company financed by a reputable VC firm is more likely to survive in the market for longer than firms that exit via liquidation. The result for the effect of duration of VC investment on firm survival is interesting. Columns (1) and (2) show that the variable *Pre-IPO Duration* is significant at the 11% level (p-values of 0.102 and 0.104 respectively) with a positive sign of the coefficient. Longer investment duration allows venture capitalists to monitor the firm more efficiently and to add some value, which increases the firm's survival time[5]. Also, firms that received VC financing for longer before the IPO are less likely to be acquired or merged within a short time after the IPO. These results contrast with the several studies that show no impact or a negative impact of VC financing on firms' IPO performance in the case of France. It suggests that, to achieve a more comprehensive understanding of the contribution of venture capitalists to improved firm performance, we need to consider several of their characteristics.

In the last part of the study, we separate the sample into normal and bubble periods.

5 ADDITIONAL RESULTS: FURTHER TESTS FOR PERIOD OF ANALYSIS, AND ROBUSTNESS RESULTS

5.1 Period of analysis: bubble versus normal period

We separate our sample into two periods: normal (1996-1997/2001-2006), and bubble (1998-2000). Coakley *et al*. (2007) show that poor quality companies - both VC backed and non-VC backed – go public during bubble periods, resulting in considerably decreased operating performance. A bubble period can lead to overestimates of the negative impact of VC

[5] This result holds if we consider only the sub-sample of firms that received VC financing.

financing on firm performance, and may conceal some positive effects linked to VC experience and investment duration.

The models in Table 4 treat observations delisted due to merger/acquisition or liquidation as failures, and report results separately for the normal and bubble periods[6].

In Models 1 and 2, the coefficient of *Investment Bank Reputation* is positive and significant at the 1% level which contrasts with the finding for the full sample. This suggests that it is only during a normal period that, by choosing a reputable underwriter, an IPO firm can increase its survival time. Also in Models 1 and 2, the coefficient of *Intangibles/Assets* is significant with a negative sign, indicating that firm survival time decreases as the ratio of intangible assets increases. This result can be explained by the different modes of firm exit considered. However, *Intangibles/Assets* becomes insignificant in Models 3 and 4. The coefficients of *Ln(patent), Growth Rate, Insider Ownership* are unchanged in Models 1 and 2 but *Ln(patent)* and *Insider Ownership* lose their significance in Models 3 and 4. Company age and size are important determinants of firm survival during the period of hot market issues.

The results in Model 2 and 4 indicate that, overall, degree of VC financing involvement has a negative impact on firm survival whatever the period of analysis. The result obtained for degree of VC financing involvement in a period of normal activity contrasts with the results in Coakley *et al*. (2007) for the U.K. Interestingly, the variable *VC Reputation* has a negative and significant coefficient in Model 2, indicating that firms financed and introduced by reputable VC firms survive for a shorter period of than other firms during periods of normal activity. Coakley *et al*. (2007) show also that reputable VC firms have a significantly negative impact on the post-IPO operating returns of firms but only during bubble periods. The different institutional context might explain why venture capitalists in the French market have different skills to those operating in other markets such as the U.S. and the U.K. The variable *VC Experience* does not have a significant impact on firm survival whatever the period of analysis. In Model 2, the variable *Pre-IPO Duration* is significant at the 1% level with a positive coefficient for the whole model. Firm survival time increases with the duration of pre-IPO VC investment. However, in Model 4, *Pre-IPO Duration* loses its effect on firm survival time. Thus, the impact of VC involvement on firm survival time seems to depend on the period of analysis. The positive effects due to a longer period of pre-IPO VC investment are evidence only for periods of normal activity. It seems that, whatever their skills or their involvement in monitoring and value added activities, VC firms are not able to improve firm

[6] Note that, due to the number of observations, we cannot split the sample into two sub-periods when considering the different modes of firm exit.

survival during the bubble period. Including the bubble period seems to counteract the positive impact of receiving very long duration investment from venture capitalists but does not overestimate the negative impact of degree of VC involvement.

[Insert table 4]

5.2 Robustness of results

As a robustness check, and to enable comparison with other studies, we also estimate the Cox proportional hazard (PH) model which is a semi-parametric model. We estimate the Cox PH for both the pooled model which does not distinguish between different modes of exit, and for the CRM. The Cox PH model makes no assumptions about failure distribution but requires the hazard of the independent variables to be proportional (Jenkins, 2005). We test the proportionality assumption specifications based on the Schoenfeld residuals in the Cox regressions (Cleves *et al*., 2004); the results show that this model is not particularly well suited to our data. Note however, that interpretation of the coefficients is different for the Cox PH and AFT models. While the dependent variable in the Cox model measures risk of failure, in the AFT model it measures survival time. Table 5 reports the results of the Cox PH model and shows that our results remain qualitatively unchanged (with the exception of a slight reduction in the statistical significance of the coefficients of some variables). Table 5 column (1) provides the estimation results for the pooled model; columns (2) and (3) present the results for the CRM which distinguishes between exits due to firm merger/acquisition and delistings due to business failure. This type of model requires only that competing risks are mutually exclusive and exhaustive (i.e., a firm cannot exit through simultaneous liquidation and acquisition/merger) (Estève-Perez *et al*., 2010). Narendranathan and Stewart (1991) provide a test for whether exit routes are independent, i.e., whether exit to a different state is behaviorally distinct (rather than simply incidental) in continuous time PH models (Jenkins, 2005). The proportionality of risks tests proposed by Narendranathan and Stewart (1991) show that we can reject (at the 1% statistical significance level) the null hypothesis that different forms of exit are behaviorally equal[7]. The Cox PH specification corresponding to the model for normal and bubble markets, and single exit, are available on request; the results are similar to the results for the AFT model (Table 5).

We also investigated alternative distributions as the baseline survival function for the AFT model; they suggest that our findings (not reported here) are mostly robust.

[7] The test results are available on request.

[Insert table 5]

We tested for the presence of unobserved heterogeneity which could lead to misspecification of our model. The better the model, the less will be the unobserved heterogeneity. If we accept that the individual hazards are log-normal, regardless of the choice of frailty distribution (gamma or inverse-Gaussian), the likelihood ratio test of $H_{0:}\ \theta = 0$ shows that there is not much evidence that the population is heterogeneous. There is an insignificant frailty effect (0.136 and 0.175 respectively for gamma and inverse-Gaussian distributions) (Cleves *et al*., 2004). The tests are available on request.

6 SUMMARY AND CONCLUSION

This paper examined the survival of a unique sample of 122 VC-backed and 87 non-VC-backed French IPOs over the period 1996-2006. We estimated an AFT model and presented the results of a survival analysis based on pooled data, and the results of competing risk specifications.

Controlling for a broad range of other known determinants of survival, our results do not indicate that VC firms generally contribute positively to the survival of their investee companies, based on their equity positions. In line with Bruton *et al*. (2010), we found that the French institutional context leads to some different results on the performance of VC financing to those obtained in the Anglo-Saxon institutional context. However, we find that VC firms cannot be treated as a homogeneous group of investors in an analysis of their impact on firm survival. Our findings show longer investment duration before the IPO allows venture capitalists to monitor firms efficiently and to add some value. When we split the sample into two sub-periods of analysis - normal and bubble - we found that during normal periods of activity, the longer the duration of VC involvement/monitoring the greater is the positive effect on firm survival time. This positive impact disappears for the bubble period.

Our findings have implications for entrepreneurs. When analyzing the advantages and disadvantages linked to the presence of VC firms in the capital of their companies, entrepreneurs should consider that certain types of venture capitalists might be more or less able to be involved in the monitoring and value adding process. For instance, Tykvová (2006) shows that in Germany, independent, and corporate VC firms finance their portfolio companies for longer periods of time than bank-dependent and public VC firms, before they

take the companies public. It would be interesting to replicate Tykvová's study for France and to analyze in more depth the behavior of different types of VC firms.

Our study has some limitations. First, the bubble period 1998-2000 is included in our period of analysis and may lead to some overestimation of the poor survival of VC-backed and non-VC-backed IPOs. However, we believe that our main results are not skewed by the inclusion of this bubble period. Second, our analysis includes only French IPOs; it would be interesting to compare these results for France with the findings for Germany and the U.K.

Appendix A

Table 6: Competing and single risk estimates (AFT model) with VC as a single dummy variable

	(1)		(2)		(3)	
Exit	All Exit		M&A		Liquidation	
	Coeff	TR	Coeff	TR	Coeff	TR
VARIABLES						
Age	0.036*	1.037*	0.006	1.006	0.067**	1.069**
	[0.021]		[0.034]		[0.031]	
(Age)2	-0.001***	0.999***	0.000	1.000	-0.002***	0.998***
	[0.000]		[0.001]		[0.000]	
Ln(Size)	0.051	1.052	-0.008	0.992	0.071	1.074
	[0.068]		[0.079]		[0.087]	
Growth Rate	0.451**	1.570**	0.307	1.359	0.473*	1.604*
	[0.207]		[0.279]		[0.274]	
Inv. Bank Reput.	0.164	1.179	0.069	1.071	0.202	1.224
	[0.152]		[0.217]		[0.186]	
Insider Ownership	-0.005*	0.995*	-0.001	0.999	-0.010***	0.990***
	[0.003]		[0.004]		[0.004]	
VC	-0.189	0.828	-0.021	0.979	-0.564**	0.569**
	[0.173]		[0.225]		[0.236]	
Intangibles/Assets	-0.665	0.514	-1.560***	0.210***	1.440*	4.219*
	[0.473]		[0.508]		[0.806]	
Ln(Patent)	0.282**	1.326**	0.595**	1.813**	0.027	1.027
	[0.124]		[0.233]		[0.143]	
Year 1998	-0.456**	0.634**	-0.236	0.790	-0.645***	0.525***
	[0.207]		[0.280]		[0.246]	
Year 1999	-0.250	0.779	-0.340	0.712	0.176	1.193
	[0.236]		[0.294]		[0.278]	
Year 2000	-0.264	0.768	-0.351	0.704	-0.061	0.940
	[0.236]		[0.301]		[0.330]	
Constant	4.418***		5.071***		9.139***	
	[1.266]		[1.396]		[1.588]	
Observations	211		211		211	
Exit	79		48		31	
Log Likelihood	-163.717		-119.893		-76.001	
Wald Chi2	194.23***		32.44**		53.28***	

Notes : ***, **, * significant at the 1%, 5%, 10% levels respectively. Robust standard errors in brackets. All duration models include a full vector of sector dummy variables, not reported here for reasons of space. The variables are defined in Section 3.

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Table 1: Descriptive statistics on variables used in the regression

Variables	Total sample (N=209)		VC (N=122)		NVC (N=87)		T-Diff mean (median)
	Mean (sd)	Median	Mean (sd)	Median	Mean (sd)	Median	
Age (Years)	10.33 (7.60)	9.00	10.22 (7.78)	8.00	10.48 (7.37)	9.00	_
Size (M Euros)	68.32 (92.05)	34.39	87.51 (108.21)	44.70	41.42 (52.57)	18.94	# (#)
Growth Rate	0.25 (0.37)	0.19	0.25 (0.37)	0.21	0.25 (0.36)	0.18	_
Investment Bank Reputation	0.55 (0.50)	1.00	0.47 (0.50)	0.00	0.67 (0.47)	1.00	***
Insider Ownership (%)	75.16 (23.58)	76.00	66.97 (19.38)	66.41	86.65 (24.25)	92.75	# (#)
Intangibles Ratio	0.14 (0.16)	0.08	0.14 (0.17)	0.08	0.13 (0.14)	0.09	_
Patent	1.67 (4.77)	0.00	2.37 (5.77)	0.00	0.65 (2.55)	0.00	***(***)
Year dummies							
1998	0.15 (0.36)	0.00	0.16 (0.37)	0.00	0.14 (0.35)	0.00	_
1999	0.12 (0.32)	0.00	0.15 (0.36)	0.00	0.08 (0.27)	0.00	_
2000	0.23 (0.42)	0.00	0.22 (0.42)	0.00	0.24 (0.43)	0.00	_
Industry dummies							
ITS	0.38 (0.49)	0.00	0.38 (0.49)	0.00	0.39 (0.49)	0.00	_
NHT	0.17 (0.37)	0.00	0.16 (0.36)	0.00	0.18 (0.39)	0.00	_
Media	0.12 (0.32)	0.00	0.11 (0.32)	0.00	0.13 (0.33)	0.00	_
Telecom	0.07 (0.26)	0.00	0.08 (0.27)	0.00	0.06 (0.23)	0.00	_
Life Sciences	0.08 (0.27)	0.00	0.10 (0.30)	0.00	0.05 (0.21)	0.00	_
Other	0.18 (0.39)	0.00	0.17 (0.38)	0.00	0.19 (0.40)	0.00	_

Notes : #, ***, **, * significant at the 0.1%, 1%, 5%, 10% levels respectively. The sample includes 122 VC-backed IPOs and 87 non-VC-backed IPOs during the period 1996-2006. The variables are defined in Section 3.

Table 2 : Descriptive statistics for listed and delisted IPOs

Variables	IPO still trading (N=130)		IPO Delisted (N=79)		T-Diff mean (median)
	Mean (sd)	Median	Mean (sd)	Median	
Age (Years)	10.90 (7.23)	9.00	9.40 (8.13)	8.00	_(**)
Size (M Euros)	73.67 (89.81)	40.10	59.53 (95.55)	21.31	_(**)
Growth Rate	0.28 (0.38)	0.23	0.20 (0.34)	0.15	*(*)
Venture Capital	0.59 (0.49)	1.00	0.57 (0.50)	1.00	_
VC Share	19.41 (23.02)	10.01	20.47 (25.32)	5.56	_
VC Experience	0.26 (0.44)	0.00	0.25 (0.44)	0.00	_
VC Reputation	0.15 (0.35)	0.00	0.16 (0.36)	0.00	_
Pre-IPO duration	28.98 (37.72)	12.00	19.44 (28.47)	6.00	*(_)
Investment Bank Reputation	0.55 (0.50)	1.00	0.57 (0.50)	1.00	_
Insider Ownership (%)	73.86 (22.81)	73.73	77.30 (24.80)	79.55	_(*)
Intangibles Ratio	0.13 (0.14)	0.09	0.15 (0.18)	0.07	_
Patent	1.95 (4.70)	0.00	1.16 (4.87)	0.00	_(**)
Year dummies					
1998	0.09 (0.29)	0.00	0.25 (0.44)	0.00	***
1999	0.11 (0.31)	0.00	0.14 (0.35)	0.00	_
2000	0.23 (0.42)	0.00	0.23 (0.42)	0.00	_
Industry dummies					
ITS	0.38 (0.49)	0.00	0.39 (0.49)	0.00	_
NHT	0.18 (0.38)	0.00	0.15 (0.36)	0.00	_
Media	0.13 (0.34)	0.00	0.10 (0.30)	0.00	_
Telecom	0.05 (0.23)	0.00	0.10 (0.30)	0.00	_

Life Sciences	0.09	0.00	0.05	0.00	_
	(0.29)		(0.22)		
Other	0.17	0.00	0.20	0.00	_
	(0.38)		(0.40)		

Notes : ***, **, * significant at the 1%, 5%, 10% levels respectively. For our sample of 209 firms listed during the period 1996-2006, the table shows means, medians and standard deviations of the variables separately for firms that survived to December 2012 and firms that had been delisted by December 2012. The variables are defined in Section 3.

Table 3: Competing and single risk estimates (AFT model)

Exit	(1) All Exit	(1)	(2) M&A	(2)	(3) Liquidation	(3)
	Coeff	TR	Coeff	TR	Coeff	TR
VARIABLES						
Age	0.024	1.025	-0.026	0.975	0.064*	1.066*
	[0.022]		[0.041]		[0.033]	
(Age)^2	-0.001**	0.999**	0.001	1.001	-0.002***	0.998***
	[0.000]		[0.001]		[0.001]	
Ln(Size)	0.085	1.089	0.042	1.043	0.084	1.088
	[0.066]		[0.076]		[0.095]	
Growth Rate	0.460**	1.584**	0.335	1.398	0.487*	1.627*
	[0.199]		[0.261]		[0.287]	
Invest. Bank Reput.	0.188	1.207	0.091	1.095	0.260	1.297
	[0.152]		[0.211]		[0.185]	
Insider Ownership	-0.005*	0.995*	-0.003	0.997	-0.007**	0.993**
	[0.003]		[0.004]		[0.003]	
VC Share	-0.011**	0.989**	-0.012*	0.988*	-0.011*	0.989*
	[0.005]		[0.007]		[0.006]	
VC Experience	-0.131	0.877	-0.230	0.794	-0.358	0.699
	[0.191]		[0.256]		[0.256]	
VC Reputation	0.108	1.115	-0.134	0.875	0.420[c]	1.523
	[0.219]		[0.294]		[0.261]	
Pre-IPO Duration	0.006[a]	1.006	0.010[b]	1.010	0.004	1.004
	[0.004]		[0.006]		[0.004]	
Intangibles/Assets	-0.517	0.597	-1.399***	0.247***	1.598*	4.942*
	[0.487]		[0.520]		[0.869]	
Ln(Patent)	0.244**	1.276**	0.640***	1.897***	-0.114	0.893
	[0.116]		[0.218]		[0.134]	
Year 1998	-0.390*	0.677*	-0.106	0.900	-0.616***	0.540***
	[0.204]		[0.285]		[0.236]	
Year 1999	-0.264	0.768	-0.345	0.708	0.054	1.055
	[0.233]		[0.294]		[0.292]	
Year 2000	-0.280	0.756	-0.405	0.667	-0.075	0.927
	[0.235]		[0.298]		[0.335]	
Constant	3.909***		4.494***		8.365***	
	[1.255]		[1.365]		[1.661]	
Observations	209		209		209	
Exit	79		48		31	
Log Likelihood	-159.713		-116.244		-74.628	
Wald Chi2	62.57***		38.27***		204.46***	

Notes : ***, **, * significant at the 1%, 5%, 10% levels respectively. Robust standard errors in brackets. All duration models include a full vector of sector dummy variables, not reported here for brevity. The variables are defined in Section 3. The Time Ratio (TR) is calculated as the exponential of the estimated coefficient, exp(β). A time ratio greater than 1 indicates that an increase in the covariate increases survival time (or equivalently, slows down failure). For instance, the time ratio of *Growth Rate* ranges from 1.584 to 1.627 indicating that survival time increases by a multiple of 1.584 to 1.627 as *Growth Rate* increases by one unit, or equivalently that a one-unit increase in *Growth Rate* increases survival time by between 58% and 62%. (**a): p-value= 0.102; (b): p-value= 0.104; (c): p-value= 0.107**

Table 4: AFT model for normal (1996-1997 and 2001-2006) and hot markets (1998-2000). Exits are treated as a homogeneous event.

	(1)	(2)	(2)	(3)	(4)	(4)
Exit	All Exit	All Exit		All Exit	All Exit	
		1996-1997/2001-2006			1998-2000	
	Coeff	Coeff	TR	Coeff	Coeff	TR
VARIABLES						
Age	0.003	-0.027	0.973	0.096*	0.107**	1.113**
	[0.022]	[0.024]		[0.050]	[0.048]	
(Age)^2	-0.000	0.000	1.000	-0.003	-0.003*	0.997*
	[0.000]	[0.000]		[0.002]	[0.002]	
Ln(Size)	0.037	0.076	1.079	0.132**	0.146**	1.157**
	[0.076]	[0.084]		[0.067]	[0.063]	
Growth Rate	0.666[a]	0.541*	1.718*	0.382	0.441*	1.555*
	[0.411]	[0.328]		[0.260]	[0.263]	
Invest. Bank Reput.	0.576***	0.604***	1.830***	-0.141	-0.074	0.929
	[0.195]	[0.195]		[0.201]	[0.203]	
Insider Ownership	-0.006*	-0.007**	0.993**	-0.002	0.000	1.000
	[0.004]	[0.003]		[0.005]	[0.004]	
Venture Capital	0.230			-0.573**		
	[0.244]			[0.243]		
VC Share		-0.014**	0.986**		-0.010*	0.990*
		[0.007]			[0.006]	
VC Experience		0.140	1.150		-0.352	0.703
		[0.217]			[0.266]	
VC Reputation		-0.881***	0.414***		0.307	1.360
		[0.316]			[0.261]	
Pre-IPO Duration		0.016***	1.016***		0.001	1.001
		[0.005]			[0.004]	
Intangibles/Assets	-1.406***	-1.465***	0.231***	0.747	1.126	3.085
	[0.461]	[0.437]		[0.721]	[0.771]	
Ln(Patent)	0.798***	0.896***	2.449***	0.073	0.051	1.053
	[0.223]	[0.192]		[0.148]	[0.144]	
Constant	3.267**	2.834**		2.762**	2.255*	
	[1.278]	[1.222]		[1.400]	[1.265]	
Observations	105	104		106	105	
Exit	30	30		49	49	
Log Likelihood	-52.085	-44.960		-94.070	-92.319	
Wald Chi2	102.82***	121.70***		25.51**	30.04**	

Notes : ***, **, * significant at the 1%, 5%, 10% levels respectively. Robust standard errors in brackets. All duration models include a full vector of sector dummy variables, not reported here for clarity. The sample is divided into two sub-samples: the normal period (1996-1997/2001-2006) (Models 1 and 2) and the hot market period (1998-2000) (Models 3 and 4). All the models show the results for exits treated as a homogeneous event. The variables are defined in Section 3.
(a): p-value= 0.105.

Table 5: Competing and single risk estimates (Cox PH model)

Exit	(1) All Exit	(2) M&A	(3) Liquidation
VARIABLES	Coeff	Coeff	Coeff
Age	-0.072*	0.004	-0.182*
	[0.039]	[0.059]	[0.095]
(Age)^2	0.002***	-0.000	0.004**
	[0.001]	[0.002]	[0.002]
Ln(Size)	-0.180	-0.118	-0.283
	[0.118]	[0.137]	[0.229]
Growth Rate	-0.722**	-0.522	-1.484*
	[0.346]	[0.397]	[0.839]
Invest.Bank Reput.	-0.182	0.041	-0.429
	[0.267]	[0.368]	[0.405]
Insider Ownership	0.010**	0.008	0.016*
	[0.005]	[0.007]	[0.008]
VC Share	0.019**	0.018*	0.023
	[0.008]	[0.010]	[0.020]
VC Experience	0.313	0.441	0.791
	[0.334]	[0.463]	[0.579]
VC Reputation	-0.216	0.330	-0.910
	[0.380]	[0.514]	[0.557]
Pre-IPO Duration	-0.012[a]	-0.018[b]	-0.007
	[0.007]	[0.011]	[0.011]
Intangibles/Assets	0.673	2.550**	-3.819*
	[0.975]	[1.011]	[2.231]
Ln(Patent)	-0.287	-0.886**	0.397
	[0.235]	[0.429]	[0.321]
Year 1998	0.599*	0.098	1.130**
	[0.347]	[0.472]	[0.546]
Year 1999	0.513	0.650	0.026
	[0.395]	[0.489]	[0.639]
Year 2000	0.312	0.398	0.073
	[0.422]	[0.525]	[0.828]
Observations	209	209	209
Exit	79	48	31
Log Likelihood	-372.355	-218.941	-131.082
WaldChi2	65.89***	34.75**	1012.04***

Notes : ***, **, * significant at the 1%, 5%, 10% levels respectively. Robust standard errors in brackets. All duration models include a full vector of sector dummy variables, not reported here for brevity. If the estimated coefficient is higher than 0, then this variable increases the hazard ratio and, thus, decreases the expected duration, and vice versa. Variables are defined in Section 3.

(a): p-value= 0.115

(b): p-value= 0.109