The Exit behavior of Venture Capital firms

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Abstract

This study examines the exit behaviour of UK venture capital (VC) firms from their portfolio companies. We model the time to exit parametrically using frailty model and non-parametrically by applying life time distribution function. The results show that UK VCs prefer IPO exits followed by M&A and other exit routes. VCs' preference of exiting through an IPO route is driven by the fact that an IPO route provides VCs the fastest time to exit their portfolio firms as compared to that of other exit routes such as M&A and liquidations. We find that experienced VCs hold their portfolio companies much longer than young VCs so there is support for Gompers's (1996) grandstanding hypothesis. VC syndication systematically reduces the time to exit. Portfolio companies based in North America are exited quicker than portfolios companies in Europe and the rest of the world.

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I. INTRODUTION

Over the last two decades, the Private Equity industry has emerged as an important area of finance and has attracted the attention of academic researchers and practitioners alike. Although various studies have looked at venture capital investments, the focus has been on risk and return in different financing stages (e.g. Cochrane 2005, Woodward and Hall 2003), performance of venture backed IPO companies (e.g. Jain and Kini 2000; Gompers and Lerner 1999) and venture capital syndication (Lerner 1994a, Brander, Amit and Antweiler 2002). Most of these studies are conducted on US markets while countries like the UK have received little academic attention. In this study we examine the exits of UK Venture capitalists from their portfolio companies. Studying the behaviour of UK venture capital exits is important for two reasons. First, the UK venture capital industry is the second largest in the world, next to the US in terms of Private Equity investments and accounts for 57 percent of total European Private Equity investments (BVCA 2006). Second, past studies of the UK venture capital industry investigate the performance of venture and non-venture backed companies post IPO, performance of MBOs, exit strategies for MBO investments and venture capital syndication (Arberk ,Filatotchev, and Wright 2006; Lockett and Wright 2001; Coakley, Hadass and Wood 2007; Jelic, Saadouni & Wright 2005; Jelic 2008 and Filatotchev 2006). The issue of how UK venture capital firms exit their investments has received no attention. The exit prospect is a critical issue in the venture capital industry as investment decisions are partly determined by the exit possibility (Pearce and Barner 2006). Gompers and Lerner (2001) state that venture capital exits are the most important aspect of the industry's survival and growth. This is due to the fact that venture firms invest in companies that do not pay dividends to equity holders and hence exits allow them to realize their returns (Cumming 2008).

The evidence on exit behaviour for US and European venture capital firms is mixed. For instance, Schwienbacher (2005) compares the exits of US and European VCs and concludes that European venture firms prefer to exit via

the M&A route. In contrast, studies in the US (Cumming and MacIntosh 2003; Black and Gilson 1998) find that the IPO exit is a preferred route for US VCs and the attraction is because of an active capital market, which facilitates the IPO route. Giot and Schwienbacher (2007) investigate the exit options for the US VCs and find that the IPO exit is a popular exit route relative to other exit methods. Moreover, venture capital firms exit through M&A only if an IPO exit is not possible. In the light of these results, the interesting issue is to question how UK venture capital firms behave when exiting their portfolio companies provided that UK industry is the largest in Europe and second next to the US.

In this study, we investigate the exits of UK venture capital firms from their investee companies. The usual exit routes are M&A, IPOs, Liquidation and LBO.[1] The analyzed data consists of 5,059 investments in portfolio companies across the globe. The analysis in this study extends the analyses considered in some of the previous studies of venture capital exits by investigating both successful (i.e. IPO and M&A) and unsuccessful exits (Liquidation). The assessment of successful exits alone does not fully capture the exit behaviour. Isaksson (2007) investigates venture capital exits from 1998 to 2001, but the study focuses only on IPO and M&A exits. Other studies (Giot and Schwienbacher 2007) do not consider how exit behaviour changes when a portfolio company is not in UK or Europe. Over the last decade, venture capital firms have been investing in US Europe and the rest of the world. Hence, making inferences on exit behaviours require analyses across many countries as opposed to a single country. For instance, venture capital firms may prefer exits through the IPO route, but taking a company public in some countries might be more time consuming compared to other countries. Therefore, venture capital firms are likely to exit their portfolio companies through different routes for different countries. So, analysis that is based on

[1] VCs also exit through a sale to another Private Equity firm, sale to Financial institutions, repayment preference shares/loan among other exits. We focus only on IPO, M&A, LBO and Liquidation exits. The time to exit is measured as the difference between a venture capital investment date and the date of exit from an investment. Sometimes VCs only partially exit at the time of the IPO. We treat such cases as an IPO exit.

US or Europe cannot generalize venture capital exit behaviour. We provide analyses of exits for the complete class of main exit routes and examine the impact of Venture capitalist (VCs) and investee companies' characteristics on time to exit. The results show that within three years of investment, the time to exit through an IPO is much shorter than exit through any other route. Beyond this three year period, the time to exit through M&A is relatively short. Further, VCs are likely to exit via Liquidation for investments held over 7 years due to the fact that the prospect of exits via IPO/M&A decreases beyond the 7 year period. Regardless of the exit methods, experienced VCs hold their portfolio companies for much longer than inexperienced ones. This suggests that young VCs are keen to exit their investments quickly, to maximize the opportunity of future fund raising. For IPO exits, young venture capital firms appear to exit their investments faster than those of established venture capital firms consistent with the grandstanding hypothesis proposed by Gompers (1996). Venture capital syndication systematically reduces the time to exit, especially for IPO and M&A exits. This reflects the fact that syndication allows VCs to compare their thinking, add value to the backed company and enhance networking by minimizing the time to exit from an investment. We find strong evidence that the time to exit through IPO is short when the size of investment in a portfolio company is large. Young portfolio companies are exited faster irrespective of the exit route. Portfolio companies in North America are exited quicker than their European counterparts. This could be because of highly developed exit markets in North America. On average, buyout investments are held much longer than early, expansion and later stage investments. The industry analysis shows that the time to exit for Liquidation and LBO are shorter for the Internet industry than for other industries.

The rest of the paper is organized as follow: Section II provides a brief overview of the exit role in venture capital industry. Section III reviews the literature on venture capitalist exits in Europe and the US. Section IV describes the data sources and the methodology applied in our study.

Empirical findings are discussed in Section V, while the conclusion is presented in Section VI.

II. THE ROLE OF EXITS IN VENTURE CAPITAL INDUSTRY

The success of the venture capital industry depends heavily on the exit process. The structure of the venture capital industry is unique in that venture capital firms are involved in start-up financing and are engaged in their backed companies for only a limited period of time. The exit opportunity is a key part of the venture capital cycle and allows the quantitative assessments of venture capital firms' performance (Schwienbacher 2005). The issue of how venture capital firms exit their backed companies interests various parties. For instance, fund providers such as Limited Partners (LP) invest in venture capital firms and are not directly involved in the decision to invest in a portfolio company. Venture capital firms manage the fund on their behalf with a typical life of 10 years and invest in a number of portfolio companies (Pearce and Barner 2006). They only realize returns from their investments at the time of exit and their backed companies do not pay any dividends. As a consequence, venture capital returns are directly linked to the exit from an investment. Entrepreneurs are also interested in venture capital exits, especially an exit through the IPO route as it allows them the opportunity to regain control of their companies.

Figure 1 illustrates the role of exit in the venture capital industry and its importance to industry growth. Venture capital firms raise funds from Pension funds, Banks, Insurance companies and individuals. They invest the funds in portfolio companies in exchange for equity shares. They enter into a contract with entrepreneurial companies, defining the possible exit route for their investments (Clercq, Fried, Lehtonen, and Sapienza, 2006). In some cases, VCs include a clause in the contract requiring entrepreneurs to buy out their shares, if an IPO or M&A has not occurred within a certain time frame (Pearce and Barner 2006). Nonetheless, the buyback method is less profitable for VCs as there is no new capital coming into the company. Upon exit from

the investments, VCs pay back the fund providers, prior to signing for a new fund. Therefore, a shorter time to exit allows VCs to raise additional funds from fund providers and allows entrepreneurs to control the company if the exit is via IPO. A quick exit from a portfolio company encourages a venture capital firm to make new investments contributing to industry growth. Policy makers are concerned with the survival of venture capital industry due to its role on economic growth. If VC investments are held for longer periods of time, the VC industry is likely to exhibit slower growth. Therefore, the cycle of venture capital financings is driven by both the presence of an exit opportunity and by a short time to exit from a portfolio company.

[FIGURE 1 HERE]

III. LITERATURE REVIEW

There is a theoretical and empirical literature that explores how VCs screen, select, finance, syndicate, monitor and advise their portfolio companies (Hellmann 1998; Bergemann and Hege 1998; Cumming and MacIntosh 2003 and Gompers and Lerner 1999; Lockett and Wright 2001). The behaviour of venture capital exits remains an unexplored area in the study of venture capital firms, despite its importance for industry survival and economic growth. Schonfeld (2008) reports that venture capital investments have decreased significantly during the credit crunch crises, due to low IPO and M&A exits.

Cumming and MacIntosh (2003) investigate the choice of full and partial exits of US and Canadian VCs. Using a sample of 246 venture capital exits, of which 112 are US exits and 134 are Canadian exits. They find that the exit choices depend on the degree of information asymmetry between seller and buyer of venture capital investments. They argue that the legal and institutional environments between the two countries contribute to the difference between US and Canadian venture capital exits. Schwienbacher (2005) compares US and European venture capital exits from their portfolio companies during the months of June through November 2001. He finds numerous similarities (e.g. monitoring intensity) and important differences

(e.g. the use of convertible securities) between US and European venture capital exits. Schwienbacher (2005) concludes that the difference between the exits is due to the fact that Europe has fewer liquid markets as compared to the US.

Cumming, Fleming and Schwienbacher (2006) examine the impact of the legal environment on venture capital exits through IPO, M&A and other exit methods. They use a sample of 468 backed companies from 12 countries in the Asia-Pacific region: Australia, China, Hong Kong, India Indonesia, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan and Thailand. Using multinomial-logit, they find that a high legality index increases the likelihood of IPO exit. They also find that an active stock market and the quality of the legal environment facilitate exit via IPO.

Nils and Norbert (2007) examine exits of start up and large biotech companies via IPO and M&A. From 1986 to 2005, they find that start-up biotech companies were increasingly choosing M&A exits over IPO exits. They also find that M&A exits offer successful small biotech companies higher returns than IPO exits in a shorter period of time. Isaksson (2007) investigates exit strategies in Sweden from 1998 to 2001. He finds that venture capital firms with an M&A strategy have higher exit activities compared to other exit strategies including IPOs. Isaksson (2007) concludes that the decision to exit via IPO or M&A is an entrepreneurial strategy rather than a venture capital firm strategy. This is due to the fact that exit decision is made by the board of directors of the portfolio company in which the entrepreneur has the majority votes.

Giot and Schwienbacher (2007) examine exit options for US VCs using IPO, M&A and Liquidation routes between 1980 and 2003. They find that the probability of IPO exit increases and then decreases over time, suggesting that IPO candidates are selected relatively quickly. Moreover, exits through M&A are more universal than IPO exits. They conclude that venture capital exits are sequential in that they only exit via M&A as the time to take a portfolio company public lengthens. Cumming and Johan (2007) investigate the exits of Canadian VCs through IPO, M&A, Secondary sale, Buyback and

Liquidations. They examine 518 exits, of which there are 32 IPO exits, 197 acquisitions, 66 secondary sale, 116 buybacks and 107 Liquidations. They find that the investment holding period is lower for companies exited via IPO compared to those exited through M&A and other exit methods. Further, exits are influenced by the characteristics of venture capital firms and portfolio companies.

Elisabete, Cesaltina and Mohamed (2008) examine exit decision in the European venture capital market through M&A, IPOs and Liquidations. From 2004 to 2005, they find that European VCs dealing with Financial companies have higher exit rates than those associated with non-Financial companies. They find that M&A exits are faster than IPO and Liquidation exits, but the characteristics of venture capital firms and investee companies influence the time to exit via any route. Cumming (2008) examines the relationship between venture capital contracts and exits for 11 European countries excluding the UK. Cumming finds that from 1995 to 2002 VCs with strong contractual rights are likely to exit through acquisitions, while those with weak contractual rights are likely to exit through IPO or other exit routes.

Cumming and Johan (2008) investigate the associations between pre-planned exits and the structure of venture capital contracts. Evaluating 223 entrepreneurial companies from 11 continental European countries, they find that VCs often pre-plan their exits, either through IPO or M&A. They also find that pre-planned acquisition exits increase the likelihood of using convertible securities and decrease the probability of using common equity. Experienced entrepreneurs are likely to be financed with common equity and unlikely to be financed with convertible equity. On the other hand, experienced entrepreneurs are likely to use convertible equity and less likely to use common equity.

Prior studies of exits report that exit choices are determined by information asymmetry between the seller and buyer of venture capital investments, a country's legal environment, market liquidity and the sector of a portfolio company (Cumming and MacIntosh 2003; Cumming et al. 2005; Cumming et al. 2006; Elisabete et al. 2008 and Cumming 2008). Some studies in Europe

find that exits through M&A are more likely than through IPO exits, while in the US exits through IPO are more likely than via M&A route (Nils and Norbert 2007; Isaksson 2007; Cumming and Johan 2007; Giot and Schwienbacher 2007). Nonetheless, exit behaviour remains unexplored for portfolio companies that are not in Europe and the US. Hence, exit behaviour analysed across the globe reflects the general behaviour of VCs exits more than analyses that is based on US and Europe alone. To the best of our knowledge this is the first study that examines exit behaviours of venture capital firms for portfolio companies that are in the US, Europe and the rest of the world. The objective is to evaluate how venture capital firms exit their backed companies in different countries.

IV. DATA AND METHODOLOGY

Data

The data used in this study are collected from VentureXpert and cover the period between 1990 and 2006. We examine venture capital exits from their investments through IPO, M&A, LBO and Liquidation. The data is filtered to eliminate investments where the exit date, size of investments and portfolio company founding dates are missing. We exclude 234 investment rounds for which information on the founding date of investee firms or size of investments is missing. This filtration leads to a sample of 5,059 investments in portfolio companies for 290 venture capital firms.[2] We classify factors that influence the time to exit into venture capital and portfolio company's related variables. Venture capital related variables are age, number of VCs syndicated in financing a backed company, size of investment and stage of financing. Age is expected to influence the time to exit from a portfolio company. For example, experienced VCs, might have flexibility to hold their investments longer than inexperienced ones. Age can be positively or negatively related to the time to exit. The size of investments is expected to decrease the time to exit from a portfolio company. Venture capital firms are

[2] We include these rounds in the non-parametric estimation and the results are similar to filtered data. Therefore, We focus on the filtered data.

unlikely to commit a large investment for a long period of time since their investments are illiquid relative to stock market securities. Therefore, the likelihood of large capital commitments is only possible for a short period of time. Hence, the larger the size of investments, the more likely VCs will exit their investments quickly. VCs syndicate to diversify the risk of their investments, and the number of venture capital syndications increases as the portfolio company develops and requires a greater amount of capital. Previous studies (Megginson and Weiss 1991; Lerner 1994 and Brander et al. 2002) report that larger syndicates should make exit easier; hence the number of VCs involved in financing a portfolio company is expected to decrease the time to exit.

The portfolio company related variables include age, industry and the portfolio company's country of incorporation. Young companies have more growth opportunities than mature ones and hence VCs are likely to benefit more by taking a young company public than a mature company with low growth opportunities. As a consequence, the time to exit via M&A is expected to be shorter than IPO exit when a portfolio company is mature. The time to exit is expected to vary across industries and expected to be short or long based on industry characteristics. Developed countries are likely to provide venture capital firms quicker exits than developing countries (Black and Gilson 1998). Hence, time to exit is expected to be short for some portfolio companies based on their location.

In this study, we concentrate solely on the UK venture capital industry and examine all venture capital investments including buyout financing. Buyout financings involve investments in established companies operating in mature industries. This is also known as institutional buyout. This study investigates the time to exit of venture capital firms from their investments in Europe, North America and the rest of the world. UK venture capital firms invest heavily in Europe and North America; so investments outside Europe and North America are classified as rest of the world investments.

Methodology

The analysis of modelling venture capital exit behaviour via different routes relies on survival/duration analysis. This method allows to measure the time elapsed between the date at which investments are made and the date on which venture capital firms exit the investments. Duration analysis in economics or sociology is referred to as survival analysis and it is a statistical technique applied to examine the occurrence of some event (Hensler et al 1997; Jain and Kini 2000). The technique is different from other regression analysis due to its ability to correct censored observations. Censoring refers to incomplete observation and results in a situation where the event of interest has not yet occurred. For instance, venture capital firms are unlikely to exit all investments within a study time period (1990-2006); hence assessing the likelihood of future exit in a case of censored observations is challenging using a static model (i.e. probit/logit models). Survival/duration analysis incorporates both censored and uncensored observations to provide consistent estimators (Allison 2000). Shumway (2001) finds that survival models are theoretically and empirically better than static models in terms of out of sample forecasts.

In the analysis, we apply a lifetime distribution function to estimate non-parametrically cumulative exit rates. The lifetime distribution function is defined as the complement of the survival function.

$$F(t) = \Pr(T \le t) = 1 - S(t)$$

or

$$\hat{F}(t) = \sum_{j=1}^{s} \left(\frac{E_j}{n_j} \right) \tag{1}$$

where E_j is the number of investments exited by VCs from 1990 to 2006, and n_j is the total number of investments in portfolio companies. Equation (1) is

applied to compute cumulative exit rates for VCs by country of portfolio company and exit methods. [3]

To examine factors that accelerate or decelerate the time to exit from a portfolio company, we apply a parametric model under the assumption that the exit of individual VCs is Weibull distributed. The Weibull distribution is monotonic and is an appropriate distribution for modelling firms' exits. Since venture capital firms invest with the intention to exit in the future, so exits are constantly rising, using a distribution that assumes individual exit increases at first, then decreases (lognormal) is not suitable. However, the standard Weibull model assumes homogeneity between individual and population exit.[4] This assumption is violated if individuals are heterogeneous, which is a common case among venture capital population, as some are more experienced than others. Typically some venture capital firms have better skills, expertise and experience than others, allowing them to exit their investments quicker.

We fit a frailty model to account for heterogeneity, which is similar to regression models that account for heterogeneity or fixed effect models. The model provides a useful alternative to a standard survival model when the standard model fails to account for heterogeneity. In the frailty model there is a distinction between individual and population time to exit. The population time to exit can fall while individual time to exit rises due to a heterogeneous effect. Therefore, the population exits decline over time regardless of the exit shape an individual venture capital firm is facing (Gutierrez 2002). For instance, the time to exit is likely to vary between individual VCs, reflecting their ability to exit an investment. But the population time to exit at a given point of time reflects both exited and non-exited investments leading to a non-monotonic distribution. This justifies our choice of gamma distribution to model the population heterogeneity. The gamma-Weibull mixture

[3] The cumulative exit rate is computed using Stata, the data are arranged in years from 1990 to 2006 and the probability of exit is evaluated at each year interval taking into account investments that have not been exited at the end of sample period.

[4] Population exit refer to the exit of all venture capital firms irrespective of their experience or expertise.

distribution is popular in the econometric literature due to it is convenient properties (Lancaster 1979).

Finally, we estimate four mutually exclusive exit choices using a gamma frailty model to account for heterogeneity among venture capital firms. We assume that the time to exit is a distinct observation, but does not necessarily mean they are uncorrelated across or within groups.

$$\begin{aligned}\mathrm{Ln}(t_{\mathrm{IPO}}) &= \alpha_0 + \alpha_1 \mathrm{SqrtVCage} + \alpha_2 \mathrm{LnSizeInvs} + \alpha_3 \mathrm{Synd} + \alpha_4 \mathrm{SqrtPortfolioage} \\ &+ \sum_{i=1}^{4} \delta \mathrm{Stage}_i + \sum_{j=1}^{6} \gamma \mathrm{Industry}_j + \sum_{k=1}^{2} \beta \mathrm{Country}_k + \varepsilon_{\mathrm{IPO}}\end{aligned} \tag{2}$$

$$\begin{aligned}\mathrm{Ln}(t_{\mathrm{M\&A}}) &= \alpha_0 + \alpha_1 \mathrm{SqrtVCage} + \alpha_2 \mathrm{LnSizeInvs} + \alpha_3 \mathrm{Synd} + \alpha_4 \mathrm{SqrtPortfolioage} \\ &+ \sum_{i=1}^{4} \delta \mathrm{Stage}_i + \sum_{j=1}^{6} \gamma \mathrm{Industry}_j + \sum_{k=1}^{2} \beta \mathrm{Country}_k + \varepsilon_{\mathrm{M\&A}}\end{aligned} \tag{3}$$

$$\begin{aligned}\mathrm{Ln}(t_{\mathrm{Liquidation}}) &= \alpha_0 + \alpha_1 \mathrm{SqrtVCage} + \alpha_2 \mathrm{LnSizeInvs} + \alpha_3 \mathrm{Synd} + \alpha_4 \mathrm{SqrtPortfolioage} \\ &+ \sum_{i=1}^{4} \delta \mathrm{Stage}_i + \sum_{j=1}^{6} \gamma \mathrm{Industry}_j + \sum_{k=1}^{2} \beta \mathrm{Country}_k + \varepsilon_{\mathrm{Liquidation}}\end{aligned} \tag{4}$$

$$\begin{aligned}\mathrm{Ln}(t_{\mathrm{LBO}}) &= \alpha_0 + \alpha_1 \mathrm{SqrtVCage} + \alpha_2 \mathrm{LnSizeInvs} + \alpha_3 \mathrm{Synd} + \alpha_4 \mathrm{SqrtPortfolioage} \\ &+ \sum_{i=1}^{4} \delta \mathrm{Stage}_i + \sum_{j=1}^{6} \gamma \mathrm{Industry}_j + \sum_{k=1}^{2} \beta \mathrm{Country}_k + \varepsilon_{\mathrm{LBO}}\end{aligned} \tag{5}$$

Ln (t_j) is the duration between the investment date and the date of exit, and SqrtVCage is the square root of venture capital age measured as the difference between the founding date and the date of investments. LnSizeInvs is the natural logarithm of the amount invested in a portfolio company. Synd is the number of VCs syndicated in financing rounds. SqrtPortfolioage is the square root of age of portfolio companies, measured as the difference between the founding date and date of first financing round. Variable transformations (SqrtVCage, LnSizeInvs and SqrtPortfolioage) are based on close resemblance to a normal distribution. ∑δStage is a dummy variable taking a value of 1 for a given stage and 0 otherwise. ∑γIndustry is an industry dummy variable taking a value of 1 or 0 based on the industry of a portfolio company. These industries include Communication and media, Computer hardware and

software, Consumer related, Internet, Medical health and Other product industries. ∑βCountry is a dummy variable taking a value of 1 or 0 based on the country in which venture capital funds are committed.[5]

It is also possible to estimate equations (2)–(5) using traditional ordinary least squares. The problem with using OLS to analyse survival data is related to the assumed distribution of the error terms. In a linear regression, for inference purposes the error term is assumed to be normally distributed, but normality is an unreasonable assumption for duration analysis. For instance, VCs invest with a view to exit their investments; hence the time to exit from an investment is constantly decreasing. Then the distribution of time would follow an exponential or weibull distribution. The other problem is that the time to exit is positive and censored to the extent that not all investments are exited during the sample period. Hence, making inferences on investments that have not been exited is challenging using a linear regression model. Typically, survival analysis can be seen as a model that substitutes the OLS normality assumption with something more appropriate for the problem in hand (Cleves, Gould, and Gutierrez 2004).

V. Results and analysis

Descriptive statistics

Table 1 describes the sample and shows median, quartiles, maximum, minimum and means of the control variables for the full sample during 1990 through 2006. The exited investments are partitioned into M&A, IPO, Liquidation, LBO and other exits. The average age of venture capital firms is 24 years, twice the average age of a portfolio company. The median age is 19 years, three times higher than the median age of a portfolio company. The maximum age of venture capital firms in the sample is 72 years, compared to 37 years for the portfolio company. The average size of investment in a

[5] The error terms from equation (2)-(5) are Weibull-gamma mixture distributed, allowing for heterogeneity among venture capital firms. The time to exit of individual VCs is assumed to follow a Weibull distribution, while the population time to exit is assumed to follow a gamma distribution. The log likelihood ratio for the Weibull-gamma distribution is higher than exponential-gamma distribution, revealing the better fit of Weibull-gamma distribution for the data.

portfolio company across the globe is £4.7 million, while the median is £1 million and the maximum size of investment is £32.6 millions (Table 1 Panel A). The results show that on average venture capital firms do not syndicate in financing a venture, except for those companies which are exited through the IPO route. The maximum number of syndications is 7 and only 5 percent of investments have more than four syndicated investors (i.e. quantile 95). It is possible to infer from the data that this is due to the time to exit through the IPO route, which is significantly shorter on average than through other routes and statistically significant at a level of 1 percent. Further, syndication should make exit easier as it enhances certification, which may lead to less under-pricing. This also supports Bienz's (2005) view that IPO candidates are more profitable than non-IPO candidates. A short time to exit from an investment allows VCs to realize the return early and make new investments. The exit time via Liquidation is approximately identical to the LBO, but statistically different from the IPO or M&A exits. This suggests that venture capital firms exit through Liquidation or LBO if M&A or IPO does not occur.

The number of investments exited through M&A for all industries is higher than the remaining exit methods (Table 1 Panel B). Exits for Internet companies are high, reflecting the level of uncertainty associated with Internet companies. Failure to exit Internet companies quickly may force venture capital firms to liquidate, which was the case during the Internet bubble when venture capital firms could no longer exit through IPO or M&A (Giot and Schwienbacher 2007). It can be inferred from Table 1 (Panel B), that Computer hardware & software and Other products industries are highly targeted sectors for investments by venture capital firms. Nonetheless, a large fraction of investments in these sectors are successfully exited through IPO or M&A.

The size of funds committed in the expansion and buyout stages are larger compared to early and later stage rounds (Table 1 panel C). This is because backed companies require a large capital commitment in their expansion, unlike the later stage round where the capital requirement is small (Lerner 1994). Irrespective of financing stages, the fraction of venture capital investments exited through M&A is higher than IPO and other exit methods.

Early stage investments are often liquidated due the level of risk, while most buyout investments are exited through LBO (Table 1 Panel C). Panel C in Table 1 shows that exited investments by country of a portfolio company. It is evident from the Table that exit through M&A is higher than through any other route for Europe and North America portfolio companies, but not for the rest of the world portfolios. UK venture capital firms are mature on average and their time to exit from a portfolio company is shorter for IPO route relative to other exit methods. It is evident that the Internet sector provides VCs faster exits than any other sector. The exits for North American portfolios are quicker than those of Europe and the rest of the world.

[TABLE 1 HERE]

Table 2 shows the breakdown of venture capital investments by industry, stage of financing, country of a portfolio company and the number of venture capital firms syndicated in financing from 1990 to 2006. The Table shows that venture capital firms have been investing in many industries since 1990, except for the Internet sector, where the investments started only in 1995. Nonetheless, venture capital investments in the Internet industry have been rising from 1998 and reached their peak in 2000. During the year 2000 (bubble period), 32 percent of total venture capital funds were invested in the Internet industry, while only 68 percent were invested in the remaining sectors (Table 2 Panel A). Nonetheless, post 2002, the Internet sector has become the least attractive sector for UK VCs and hence the size of investments in the Internet sector is reduced by approximately 84 percent. It is evident from Table 2 (Panel B) that only small funds were committed to the UK venture capital industry in the early 1990s. From 1990 to 1997, UK VCs invested proportionally across financing stages. However, since 1998, the size of investments in expansion stage has doubled and continued in this trend to the end of 2006. This exhibits shifts in the investment behaviour from early and later stages to expansion and buyout stages. The investments ratio between Europe and North America was 1:2 until 1994. By 1996, the investment

patterns changed considerably resulting in a ratio of 4:1 between Europe and North America respectively. This is due to expansion of the European venture capital industry during the late 1990s. Panel D in Table 2 shows weak evidence suggesting that UK VCs merely syndicate in financing a venture.

[TABLE 2 HERE]

Table 3 Panel A, shows the breakdown of venture capital investments in Europe, North America and the rest of the world. The average investment committed in portfolios across the globe ranges between £2.4 million and £5.1 million. UK venture capital investments are higher in Europe and the rest of the world than in North American countries. Perhaps, in North America, a company that is seeking substantial capital is more likely to raise capital from US venture capital firms. The sizes of investments are small for the early stage rounds relative to all other financing rounds (Panel B). Nonetheless, buyout investments are more than four times the size of investments in any round including the expansion stage. The fact that investments in the buyout stage are high is consistent with the literature (Giot and Schwienbacher 2007). Further, venture capital firms are reluctant to commit substantial capital at the start of the venture capital process. The level of venture capital funds invested in industries varies, but Consumer related and other product industries attract more venture capital funding compared to Other sectors. This reflects the fact that most buyout investments originate from Consumer related and other product industries. There is little evidence suggesting that venture firms syndicate in early, expansion and later stage financing. This is interesting evidence and suggests that VCs syndicate in the risky rounds and the need of syndication is trivial for buyout stage, which involves investments in established companies. From 1990 to 2006, the time to exit through M&A route is shorter for the rest of the world portfolios than for European and North American portfolios. For IPO exits, the time to exit for North America and the rest of the world is shorter than for Europe (Panel A). The evidence from the data shows that VCs are likely to exit through the IPO route first,

and then M&A followed by either Liquidation or LBO exits. Venture capital firms are slow to exit buyout and early stage investments for all exit routes (Panel B). Time to exit for later stage financings is shorter than for expansion stage with marginal differences. The average industry's time to exit is approximately identical except for IPO exits, where the exit duration is short especially for the Internet and Communication & media sectors. This might be the effect of the bubble period, during which many Internet companies were taken public prematurely and resulting in shorter time to exit relative to other sectors.

[TABLE 3 HERE]

To sum up, the results show that UK VCs rarely syndicate in venture capital financing except for investments that are exited through the IPO route. It is evident from the data that the time to exit through liquidation is approximately equal to the time to exit through LBO. This does not necessarily mean that venture firms are not wary of exiting either through liquidation or LBO, but rather indicates that the time to exit is similar when venture capital firms choose to exit through either route. Most Computer hardware & software and other product industries are successfully exited either through IPO or M&A. The data show that early stage investments are liquidated more often than expansion, later and buyout stages. VCs are likely to exit through the IPO route, then M&A, followed by liquidation or LBO. There is clear evidence that exits for portfolios in North America are quicker than in Europe and the rest of the world.

Results

Table 4 shows the cumulative exit estimated non-parametrically using the cumulative distribution function (E.q 1). Table 4 shows the cumulative exit estimated non-parametrically using the cumulative distribution function (E.q 1). Table 4, shows that during the first 5 years post investment, the minimum cumulative exit rate is 21 percent for European portfolio companies via LBO and the maximum is 59.3 percent for North America portfolios through the IPO route. Exit through the IPO route is higher for North American portfolio

companies than for Europe and the rest of the world portfolios. For instance, the cumulative exit rate for IPO exit, 5 years post investment is 59.3 percent for North American portfolios compared to 42.6 percent for Europe and 51.2 percent for the rest of the world portfolios. Hence, the role of the active market facilitating venture capital exits as noted by Black and Gilson (1998) is supported by the data. During the same time interval, exit via M&A is also high but lower than for IPO exit. It seems that when the market is active the time to exit from a portfolio company is short for either the IPO or M&A routes. Cumulative exits via M&A are slightly higher than IPO exits 7 years post investments (Table 4) for North America, Europe and the rest of the world portfolios. The cumulative exit through Liquidation is high over the same time interval, suggesting that VCs are likely to adopt the Liquidation exit if an IPO or M&A did not occur. It is also evident that over 7 year period, the cumulative exit rate is higher for Liquidation route than LBO route, irrespective of location of a portfolio company. This is interpreted as the fact that VCs are likely to choose Liquidation exit over LBO exit for investments held more than 7 years. This is hardly surprising, provided the fact that VCs invest in young companies with growth opportunities and borrowing money for these companies to buy back venture capital stakes might be a challenge. A buyback often involves considerable borrowing and debt providers might hesitate to provide debt, especially if VCs are attempting to exit, unless their views are widely divergent from VCs (Cumming and MacIntosh 2003; Isaksson 2007). Over 10 years interval, the average cumulative exit rates across all routes are 86.3 percent for M&A, 78.6 for IPO, 75.3 for Liquidation and 59.1 percent for LBO route. This suggests that the likelihood of venture capital investors not exiting their investments beyond 10 years following the investments is 13.7 percent for M&A route, 21.4 percent for IPO, 24.7 for Liquidation and 40.9 percent for LBO route. Stated differently, the proportion of investments that remain un-exited is relatively small beyond the 10 year period. This exit behaviour is consistent throughout portfolios in Europe, North America and the rest of the world.

[TABLE 4 HERE]

Table 5 shows the parametric results for all exits, M&A, IPO, Liquidation and LBO. The table has two Panels: Panel A presents the estimation results for venture capital related variables, while Panel B shows the outputs for the portfolio company related variables. The results for all exits show that the age of VCs increases the time to exit, suggesting that longer established VCs hold their investments longer than young ones. This is consistent with the literature suggesting that experienced venture capital firms, as measured by age, have the ability to raise funds quickly from LPs, which allows them to exit their investments in a timely manner (Pearce and Barnes 2006). The size of investment in a portfolio company and the number of venture capital syndications irrespective of the exit method significantly decrease the time to exit. Buyout investments are slow to exit compared to early, expansion and later stage rounds. For instance, early, expansion and later stage investments are exited a year earlier than buyout investments.[6] Similarly, later stage rounds are the fastest investments exited by UK venture capital firms. Time to exit across all routes (Panel B All exits) is shorter for Internet companies compared to Medical health companies as exhibited by negative and positive significant coefficients. The time to exit for the Communication & media, Computer hardware & software and Other product industries are statistically identical. However, as far as location of a portfolio company is concerned, there is statistical evidence that time to exit in North America are shorter than in Europe and the rest of the world.

Regarding M&A exits, there is strong statistical evidence that the age of venture capital firms and size of syndication decelerate the time to exit significantly. This evidence indicates that old VCs are able to exit through M&A quicker than young ones. Typically, old venture capital firms have industry expertise and are likely to identify potential buyers for their portfolio companies. Similarly, investments made in early, expansion and later stage rounds are exited quicker than buyout investments, but the difference is

[6]This is computed by dividing the exponentiated coefficient of the early stage round, estimated from the gamma frailty model by the exponentiated coefficient of the buyout stage. A similar approach is used for the expansion and later stage investments (i.e. $e^{0.2513}/e^{0.3537}=1$, $e^{0.2130}/e^{0.3537}=1$ and $e^{0.1381}/e^{0.3537}=0.81$).

statistically insignificant. The results also show that the age of a portfolio company decreases the time to exit, indicating that VCs are likely to exit mature companies through M&A. There is weak evidence suggesting that the time to exit via M&A is shorter for North American investments relative to investments in Europe and the rest of the world.

For IPO exits, syndication and size of investments are statistically significant, while the age of venture capital firms does not affect the time to exit through an IPO exit. The magnitude of the size and syndication coefficients is higher for IPO exits than for M&A exits. This suggests that within IPO exit, size shorten the time to exit, but within M&A exit, it has no effect. The time to exit for buyout investments is significantly higher than for early, expansion and later stage rounds. The age of a portfolio company influences the behaviour to exit via IPO. The results show that the time to exit is shorter through IPO and longer through M&A route, when a portfolio company is young. This reveals that venture capital firms exit via IPO young portfolio companies and through M&A mature portfolio companies. The evidence is statistically significant at conventional levels. More often, VCs invest a large proportion of their funds in technology companies. The likelihood of taking these companies public decreases past a certain time interval. Computer hardware & software companies have the highest time to exit, and are followed by Consumer related companies. IPO exits are high for North American investments, supporting the findings of a previous study that an active market facilitates IPO exits (Black and Gilson 1998).

Exits through Liquidation provide evidence that mature VCs are slow to liquidate their portfolio companies. The results also reveal that time to exit for buyout investments are longer through Liquidation than early, expansion and later stage. This is due to the fact that the buyout stage involves large investments in mature companies, where the default risk is minimal. Internet companies are liquidated quicker than other companies due to the level of uncertainty associated with Internet companies. Time to exit via Liquidation is short for the Internet companies and statistically significant at a level of 1 percent. This provides evidence that Internet companies are liquidated more

often than any other companies. Regarding the country of portfolio companies, it is evident from the Table that the time to exit is shorter for all routes, when a portfolio company is located in North America. The evidence is statistically significant between 10 and 5 percent conventional level.

Young venture capital firms tend to pursue the LBO exits more often than mature venture capital firms. There is no statistical evidence that the size of investments, syndication, financing stages or age of a portfolio company have an effect on the time to exit through LBO exits. For LBO exit, there is no significant difference in the time to exit across all sectors, except for Internet sector, where the time to exit is significantly short. This is interesting and points out that venture capital firms are able to exit Internet companies either through Liquidation or LBO more quickly than any other companies. There is evidence that time to exit through LBO route is shorter for Europe and North America portfolio companies, relative to the rest of the world portfolios.

[TABLE 5 HERE]

To summarize, the parametric results reveal that the time to exit through M&A is short than IPO exit for experienced venture capital firms. Time to exit for buyout investments are longer than time to exit for early, expansion and later stage investments. The age of a portfolio company influences the behaviour of venture capital exits. The evidence from the results shows that the time to exit via M&A is short for mature backed companies, while the time to exit through IPO is short for young companies. The analysis of country of a portfolio company shows that the time to exits is shorter for North American portfolios than Europe and the rest of the world portfolios.

Figure 2 compares the exit routes through M&A, IPO, Liquidation and LBO exits by holding the explanatory variables at their means. The empirical results indicate that the time to exit via IPO is shorter than through M&A, LBO and Liquidation exits over 3 years post investments. It is clear from the Figure that the first targeted exit route by UK venture capital firms is the IPO followed by M&A. Nonetheless, in the 3 year period following the

investments, the M&A exit is more likely than the IPO exit. Despite both M&A and IPO exits being available routes for VCs, it seems that venture capital firms are likely to exit via IPO in the short run (i.e. 3 year period). Generally, VCs rely on M&A exits for mature companies or companies that failed to go public quickly. The results support the findings of a previous study (Cumming and MacIntosh 2003) that the IPO exit is the preferred route for VCs in the short run. Another attractive feature of the IPO exit route is that it yields higher returns than other exit routes. Companies that are exited via the IPO route tend to be high quality (Bienz 2005; Cumming 2008). IPO exits also allow entrepreneurs to maintain some control over the firm post venture capital exit. VCs are more likely to exit their investments via Liquidation than through IPO or M&A exits 7 years following the investment. This reflects the fact that the probability of successful IPO and M&A exits diminishes as the investment holding period increases. Subsequently, venture capital firms exit their investments either through Liquidation or LBO.

[FIGURE 2 HERE]

Sensitivity analysis results

Table 6 shows the sensitivity analysis results, for four continuous variables based on the Weibull frailty model. The sensitivity analysis shows the impact on time to exit of changes in a continuous variable from their median values, holding the remaining variables constant. Panel A shows changes in size of investments from its median value up to £10 million. Panel B presents changes in age of venture capital firms up to 10 years from the median value. Changes in age of portfolio companies to 9 years from their median values are presented in Panel C. Panel D shows the effect of changes in the number of syndicated investors up to 9 from the median value. Changes in the investment size have an impact on time to exit through M&A, IPO and LBO. For instance, the expected time to exit is likely to decrease by 3 percent from the median time to exit; if the size of investment increases by £9 million (i.e.

median size is £1 million). Similarly, the expected time to exit decreases by 10 percent through IPO and 2 percent through LBO for the same increase in size. It is evident that venture capital firms are less likely to exit through liquidation the larger the size of investments. This is shown by a 5 percent increase in the expected time to exit for an increase in size from £1m to £10m. Panel B, shows that the expected time to exit is influenced by changes in the age of venture capital firms and varies across exit routes. For M&A and LBO exits, the expected time to exit decreases by 5 and 3 percent respectively as age changes by 10 years from the median. For IPO and liquidation exits, the expected time to exit increases by 5 and 4 percent as the age of a venture capital firm changes from 19 to 29 years. This suggests that mature venture capital firms are more likely to pursue exit through M&A or LBO than through IPO or liquidation. The results also reveal that young venture capital investors are more likely than mature venture capital firms to exit quickly through IPO. Panel C provides evidence that the time to exit through IPO is 8 percent shorter than the median expected time to exit for young companies, and 3 percent longer than the median time to exit for mature companies. For M&A exit, the expected time to exit is 1 percent longer than the median expected time to exit for young companies and 6 percent shorter than the median time to exit for mature companies. This evidence indicates that mature portfolio companies are exited more quickly through M&A than through IPO. Further, the time to exit through liquidation is longer for mature companies than for young companies, perhaps due to the level of uncertainty associated with young companies (Panel C). Undoubtedly, syndication of venture capital firms accelerates exits through M&A and IPO. The impact of syndication is more pronounced for IPO exit than for M&A exit. For instance, as the number of syndicated investors increases from 1 to 9 investors, the expected time to exit decreases by 65 percent for the IPO route, compared to 29 percent for the M&A route (Panel D). This suggests that as the number of venture capital firms participating in financing a backed company increases, the time to exit decreases through IPO or M&A exit and increases through liquidation or LBO exit.

[TABLE 6 HERE]

By and large, IPO exits allow VCs a faster exit route than M&A, Liquidation or LBO. Despite, the importance of syndication in venture capital investments, the evidence shows that UK VCs do not syndicate on average. In terms of industry analysis Internet companies are exited more quickly than non-Internet companies. From 1990 to 1997, investments are balanced across different financing stages, but from 1998, venture capital firms have been investing heavily in expansion rounds. The non-parametric results show that VCs are keen to exit their investments over the 7 year post investment period. The parametric analysis highlights various issues: (i) experienced VCs are more likely to exit via M&A than through IPO, (ii) buyout investments are slower to exit than early, expansion and later stage rounds, (iii) mature VCs are likely to take public young portfolios and sell mature portfolios to another company, (iv) North American portfolios are exited faster in all routes than portfolios in Europe and the rest of the world.

VI. CONCLUSION

The aim of this study is to investigate the exit behaviour of UK VCs across the globe in a sample of 5,059 investment rounds from 1990 to 2006. The emphasis is on the time to exit through IPO, M&A, Liquidation and LBO exits. The exits of venture capital firms are estimated parametrically and non-parametrically. The parametric estimation involves evaluating the impact of VCs' and portfolio companies' characteristics on the time to exit using a frailty model. The non-parametric results show that venture capital exits through an IPO route are faster than M&A, Liquidation and LBO exits. Further, venture capital firms aim to exit their investments within 7 years after the investments. Nonetheless, if IPO or M&A exits do not occur, VCs are likely to take the Liquidation or LBO routes. The parametric analysis reveals that the time to exit from an investment is influenced by the size of investments, the number of venture capital firms syndicating in financing rounds, stage of financings (early, expansion, later or buyout stage), industry and country of a

portfolio company. We find that experienced venture capital firms, as measured by age, hold their investments much longer than inexperienced ones. VCs are likely to exit their investments quickly through an IPO, if the size of investments is large. Venture capital syndication is crucial in the exit process in that it facilitates the IPO and M&A exits. VCs have the tendency to exit mature backed companies through M&A and young companies via IPO. Venture capital exits for buyout investments are slower than early, expansion and later stage investments. The industrial analysis shows that VCs exit Internet companies faster than non-Internet companies. Venture capital firms are likely to exit their investments quickly if a backed company is in North America. The exits of portfolio companies in Europe and the rest of the world are slower than North America portfolios. Exit through IPO is a highly targeted route by venture capital firms within 3 to 4 years following the investments. Post 4 year interval, the likelihood of IPO exits decreases, while the probability of M&A exits increases. However, after failing to exit an investment within 7 years, VCs are more likely to take the Liquidation exit rather than the LBO route, based on shorter time to exit for Liquidation route than for LBO.

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FIGURE 1: Exits and venture capital industry

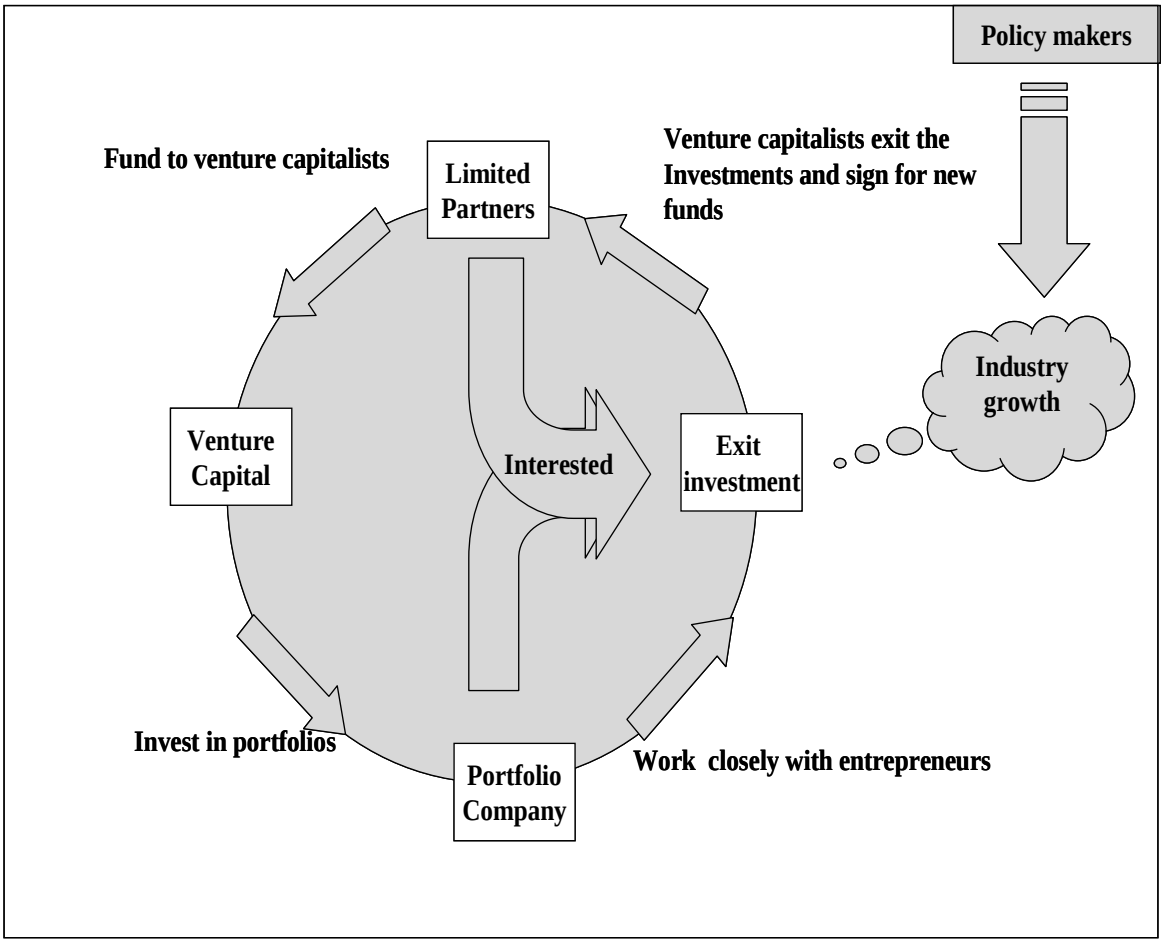

FIGURE 2: Comparison between exit routes

Figure 2 shows the exit rates of all routes by holding all covariates at their mean values

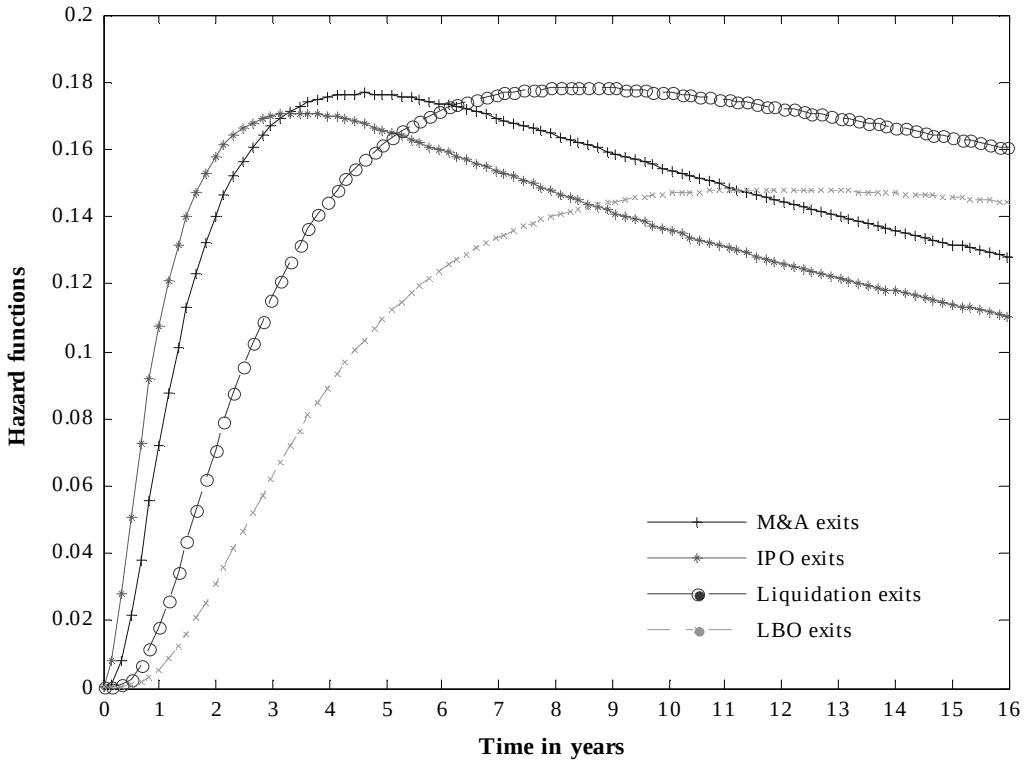

Table 1: Summary statistics of the means of the variables

The sample consists of 5,059 investments in portfolio companies and covers the period between 1990 and 2006. Other industries include Biotechnology, Semiconductor and Industry energy. The rest of the world includes African, Asian, Australian and South American countries. The time to exit is measured as the difference between the date of investment and the exit date. Table 1 Panel A shows Median, Quantile 75, Quantile 95, Max, Min and Mean of age of venture capital firms, size of investment in each portfolio company, number of venture firms involved in a deal syndication, time to exit from a portfolio company in years and age of a portfolio company at the time of investment. Panel B provides the characteristics of portfolio companies by industry. For instance, the number of financing rounds in Communication & Media sector is 462 rounds of these 365 are exited through M&A, IPO, Liquidation and LBO, while 97 rounds remained un-exited at the end of the study period (i.e. 2006). Panel C highlights financing stage and location of a portfolio company. The numbers of portfolio companies in each class are segmented into exited and non-exited portfolio companies.

Communication & Media	-	-	-	-	-	462	365	137	93	61	29	45	97

Variables		***Full sample***						***Exited portfolio companies***						***Non exited***
		Median	Quantile 75th	Quantile 95th	Max	Min	Mean	All exits	M&A exits	IPO exits	Liquidation exits	LBO exits	Others exits	
Panel A	*N*							4649	1594	1281	761	828	185	
VC firm characteristics														
Age (Years)	5059	19	33	60	72	10	24	22	22	22	22	28	18	30
Size of investments (000)	5054	1000	3000	18000	32600	10	4745	4534	4639	5122	2024	2532	2928	5570
Size of syndication (#)	5059	1	2	4	7	1	1	2	1	2	1	1	1	1
Time to exits (Years)	5059	6.18	9.02	15.47	15.95	2.42	7.26	5.38	5.32	4.55	5.95	6.12	5.77	-
Portfolio company characteristics														
Age (Years)	5059	6	12	35	37	1	12	12	12	14	7	20	2	14
Panel B	*5059*													
Industry														

Table 1 Summary statistics of the means of the variables continued

Table 1 continues

Computer hardware & software		-	-	-	-	-	962	777	328	149	148	63	89	185
Consumer related		-	-	-	-	-	589	456	148	112	61	103	32	133
Internet		-	-	-	-	-	772	697	219	102	160	50	166	75
Medical health		-	-	-	-	-	485	355	119	134	47	28	27	130
Other products		-	-	-	-	-	823	631	203	171	49	152	56	197
Other industry		-	-	-	-	-	961	746	264	248	91	93	50	215
Panel C	*5059*													
Stage finance														
Early stage		-	-	-	-	-	853	696	217	129	150	24	176	157
Expansion stage		-	-	-	-	-	2365	1907	707	490	351	128	231	458
Later stage		-	-	-	-	-	495	411	163	131	69	34	14	84
Buyout		-	-	-	-	-	1273	950	318	219	42	331	40	323
Other stage		-	-	-	-	-	73	63	13	40	5	1	4	10
Country of portfolio company														
Europe		-	-	-	-	-	3833	2979	963	733	418	473	392	854
North America		-	-	-	-	-	1027	900	410	211	190	30	59	127
Rest of the world		-	-	-	-	-	199	148	45	65	9	15	14	51

The average time to exit for IPO candidates is 4.55 years with standard error of 0.0922. For M&A, the time to exit is 5.32 years and the standard error is 0.0707. Therefore, the t-test for the two sub-samples is $4.7\left(\frac{5.32-4.55}{0.0922+0.0707}\right)$, significant at 1 % conventional level

Table 2 Summary statistics of venture capital investments (by year)

UK venture capital firms have been investing in the internet industry from 1995, while investments in other industries started in 1990. Investments outside Europe and North America started in 1992 and have increased significantly by 1999 due to economic growth.

	Venture capital investments by year																	Total
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	
Total	**49**	**29**	**42**	**28**	**49**	**81**	**195**	**147**	**305**	**437**	**989**	**766**	**357**	**367**	**472**	**446**	**300**	**5059**
Panel A: Breakdown by industry																		
Communication & Media	2	3	6	7	5	9	8	17	21	34	91	65	38	38	50	35	33	462
Computer hardware & software	9	4	13	1	8	13	34	18	51	75	198	181	72	80	89	73	43	962
Consumer related	5	11	3	5	4	14	47	24	55	54	70	68	57	47	50	43	32	589
Internet	-	-	-	-	-	4	6	7	20	95	316	190	30	25	28	30	21	772
Medical health	12	2	10	3	11	8	24	19	17	26	50	57	47	27	60	66	46	485
Other products	9	4	2	4	6	13	32	29	88	85	118	109	47	61	85	81	55	828
Other industry	12	5	8	8	15	20	44	33	53	68	146	96	66	89	110	118	70	961
Panel B: Breakdown by stage of finance																		
Early stage	8	8	11	7	13	17	23	23	36	63	238	129	47	55	83	50	42	853
Expansion stage	24	11	14	10	16	34	92	48	94	199	499	435	196	174	172	210	137	2365
Later stage	5	4	13	6	10	12	15	22	38	18	85	54	16	35	68	60	34	495
Buyout	12	5	3	4	10	17	64	53	134	153	158	137	91	99	134	118	81	1273
Other stage	-	1	1	1	-	1	1	1	3	4	9	11	7	4	15	8	6	73
Panel C: Breakdown by country of portfolio company																		
Europe	17	15	12	11	23	49	162	102	235	330	764	588	274	285	369	373	224	3833
North America	32	14	29	16	25	31	32	39	61	87	186	157	69	62	75	59	53	1027
Rest of the world	-	-	1	1	1	1	1	6	9	20	39	21	14	20	28	14	23	199
Panel D: Break down by size of syndication																		
Size of syndication (#)	1	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	

Table 3 Descriptive statistics of exit routes

Panel A shows the average amount invested in thousand by country of a portfolio company and the number of venture capital firms syndicated in the financing. Panel B shows the breakdown by financing stages, while Panel C shows the breakdown by industry of a portfolio company. The last four columns in Table 3, indicate the average time to exit in years through M&A, IPO, Liquidation and LBO.

Variables	***N***	**Amount**	**Syndication**	**Duration (in years)**			
		(000)	(#)	M&A	IPO	Liquidation	LBO
Panel A: Breakdown by country of portfolio company							
Europe	2979	5161	2	5.43	4.71	6.04	6.19
North America	900	2410	1	5.11	4.11	5.71	5.35
Rest of the world	148	4871	1	4.98	4.15	6.33	6.25
Panel B: Breakdown by stage of financings							
Early stage	696	1489	2	5.39	4.76	5.88	5.45
Expansion stage	1907	2277	2	5.18	4.41	6.01	5.42
Later stage	411	2313	2	5.02	3.46	5.25	5.16
Buyout	950	12264	1	5.77	5.48	6.89	6.54
Other stage	63	4044	1	4.35	4.15	5.23	3.38
Panel C: Breakdown by industry.							
Communication & Media	365	4246	2	5.23	4.25	6.07	5.18
Computer hardware & software	777	2081	2	5.16	4.93	5.77	5.83
Consumer related	456	9808	1	5.91	5.78	7.35	6.10
Internet	697	2120	1	5.25	4.48	5.47	5.52
Medical health	355	2660	2	5.26	4.13	6.14	5.94
Other products	631	8450	1	5.67	4.75	6.47	6.44
Other industry	746	3830	2	5.05	4.01	5.66	6.48

Table 4. Non-parametric estimation of exit rates

The cumulative exit rate is estimated using a non-parametric cumulative distribution function. The probability of exit as measured by cumulative distribution function is approximated over sixteen years (i.e. 1990 to 2006) by exit route and country of a portfolio company.

$$\hat{F}(t) = \sum_{j=1}^{s} \left(\frac{E_j}{n_j} \right)$$

Exit time (years)	**M&A**			**IPO**			**Liquidation**			**LBO**		
	Europe	N.America	R.world	Europe	N.America	R.world	Europe	N.America	R.world	Europe	N.America	R.world
1	0.044	0.078	0.057	0.097	0.165	0.143	0.016	0.054	0.000	0.011	0.000	0.000
2	0.105	0.162	0.113	0.184	0.299	0.250	0.048	0.126	0.000	0.027	0.055	0.000
3	0.177	0.230	0.208	0.251	0.407	0.310	0.101	0.179	0.077	0.064	0.091	0.040
4	0.272	0.340	0.302	0.332	0.494	0.417	0.165	0.251	0.154	0.126	0.200	0.160
5	0.412	0.480	0.377	0.426	0.593	0.512	0.275	0.336	0.231	0.210	0.309	0.280
6	0.555	0.672	0.566	0.537	0.688	0.571	0.415	0.511	0.231	0.320	0.418	0.400
7	0.689	0.798	0.717	0.636	0.779	0.619	0.599	0.650	0.462	0.467	0.473	0.440
8	0.765	0.872	0.793	0.693	0.849	0.738	0.704	0.718	0.615	0.554	0.564	0.520
9	0.803	0.905	0.830	0.724	0.879	0.750	0.738	0.762	0.615	0.604	0.582	0.560
10	0.838	0.931	0.830	0.738	0.883	0.750	0.769	0.807	0.692	0.631	0.582	0.560
11	0.851	0.941	0.830	0.744	0.891	0.750	0.782	0.825	0.692	0.637	0.582	0.560
12	0.858	0.943	0.830	0.749	0.891	0.750	0.800	0.834	0.692	0.639	0.582	0.560
13	0.863	0.953	0.830	0.751	0.891	0.761	0.800	0.838	0.692	0.639	0.582	0.560
14	0.883	0.964	0.849	0.7815	0.917	0.809	0.831	0.870	0.846	0.679	0.709	0.760
15	0.915	0.967	0.887	0.878	0.943	0.845	0.891	0.919	0.923	0.801	0.782	0.760
16	0.935	0.972	0.943	0.914	0.956	0.904	0.928	0.955	0.923	0.859	0.909	0.800
No. obs	**1111**	**429**	**54**	**962**	**236**	**83**	**521**	**224**	**16**	**748**	**55**	**25**

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Table 5: Parametric estimation of time to exit using frailty model

The other stage financings, other industries and the rest of the world are used as the base variables for the dummies. The values in the brackets are clustered standard errors correcting for within group correlations. The coefficients are estimated through maximum likelihood estimation under Weibull-Gamma distribution. The following equation is used to estimate the results of Table 4.5.2.7, for All exits, M&A exit, IPO exit, Liquidation and LBO exits.

$$\mathrm{Ln}(t_m) = \alpha_0 + \alpha_1 \mathrm{SqrtVCage} + \alpha_2 \mathrm{LnSizeInvs} + \alpha_3 \mathrm{Synd} + \alpha_4 \mathrm{SqrtPortfolioage} + \sum_{i=1}^{4} \delta \mathrm{Stage}_i + \sum_{j=1}^{6} \gamma \mathrm{Industry}_j + \sum_{k=1}^{2} \beta \mathrm{Country}_k + \varepsilon_m$$

m = All exits, M&A, IPO, Liquidation and LBO exits.

Variables	Predicted	Exits				
	Signs	All exits	M&A	IPO	Liquidation	LBO
Panel A: VC related variables						
Constant	+/-	1.8887***	2.2874***	1.6396***	1.9446***	2.1324
		(0.1510)	(0.2898)	(0.2392)	(0.2237)	(1.9569)
Age (Sqrt)	+/-	0.0032***	-0.0020***	0.0011	0.0052***	0.0052***
		(0.0005)	(0.0007)	(0.0012)	(0.0007)	(0.0010)
Size (logarithm)	-	-0.0185**	-0.0115	-0.0507**	-0.0250*	-0.0086
		(0.0086)	(0.0129)	(0.0203)	(0.0150)	(0.0140)
Syndication (#)	-	-0.0550***	-0.0536***	-0.1358***	0.0403	0.0136
		(0.0118)	(0.0185)	(0.0285)	(0.0289)	(0.0267)
Early stage	+/-	0.2513**	-0.1172	0.2402	0.2593*	0.0148
		(0.1192)	(0.2363)	(0.1822)	(0.1582)	(1.9737)
Expansion stage	+/-	0.2130*	-0.1751	0.2682	0.2623*	0.0991
		(0.1208)	(0.2317)	(0.1839)	(0.1542)	(1.9228)
Later stage	+/-	0.1381	-0.2113	0.0416	0.3687**	-0.1626
		(0.1340)	(0.2376)	(0.2078)	(0.1630)	(1.9216)
Buyout	+	0.3537**	-0.0832	0.3848**	0.4455***	0.1701
		(0.1207)	(0.2347)	(0.1884)	(0.1682)	(1.9524)
Panel B: Portfolio related variables						
Age (Sqrt)	+/-	0.0085	-0.0209**	0.0820***	0.0335	0.0053
		(0.0066)	(0.0105)	(0.0172)	(0.0241)	(0.0115)
Communication & Media	+/-	0.0563	0.0661	0.1552	-0.0009	0.0897
		(0.0430)	(0.0731)	(0.1038)	(0.0756)	(0.1037)
Computer hardware & software	+/-	0.0178	0.0004	0.2779***	-0.1090	-0.0949
		(0.0402)	(0.0589)	(0.0941)	(0.0846)	(0.0745)
Consumer related	+/-	0.0788**	0.0839	0.3534***	-0.0053	-0.1122
		(0.0345)	(0.0624)	(0.0821)	(0.0987)	(0.0721)
Internet		-0.1002**	-0.0304	0.1258	-0.2631***	-0.2160***
		(0.0413)	(0.0569)	(0.0954)	(0.0756)	(0.0647)
Medical health	+/-	0.0921**	0.1196	0.1271	0.0302	0.1165
		(0.0432)	(0.0779)	(0.0914)	(0.0916)	(0.0823)
Other products	+/-	0.0441	0.0753	0.0633	0.0809	-0.0891
		(0.0394)	(0.0691)	(0.0742)	(0.0857)	(0.0636)
Europe	+/-	0.0061	0.0221	0.1398	-0.1304	-0.2061**
		(0.0480)	(0.1043)	(0.0778)	(0.0835)	(0.1059)
North America	-	-0.1616***	-0.1918*	-0.0919*	-0.1789**	-0.1324*
		(0.0528)	(0.1124)	(0.0524)	(0.0921)	(0.0856)
Pseudo R^2		0.11	0.21	0.116	0.06	0.249
No. obs		**5054**	**1592**	**1223**	**758**	**825**

***, ** and * indicate significance at 1%, 5% and 10% respectively.

Table 6: Sensitivity analysis of the continuous variables for the Weibull frailty model

The expected time to exit at median is 68 months for M&A exit, 66 months for IPO exit, 86 months for Liquidation and 104 months for LBO exits. Changes in the variables are evaluated relative to their median values (see Table 6 for median values of the variables). The analysis was carried out in Stata using 'mfx' command following the 'streg' command

Variables	**M&A**				**IPO**				**Liquidation**				**LBO**			
Panel A **Size (000)**	**£3m**	**£6m**	**£9m**	**£10m**	**£3m**	**£6m**	**£9m**	**£10m**	**£3m**	**£6m**	**£9m**	**£10m**	**£3m**	**£6m**	**£9m**	**£10m**
Expected time to exit (Months)	69	68	67	66	67	67	62	59	83	88	89	90	105	106	103	102
Absolute change (Months)	1	0	-1	-2	2	2	-3	-6	-3	2	3	4	1	2	-1	-2
Percentage change	1%	0%	-1%	-3%	3%	3%	-4%	-10%	-4%	2%	3%	5%	1%	2%	-1%	-2%
Panel B																
Age VC firm (years)	**3 yrs**	**6 yrs**	**9 yrs**	**10 yrs**	**3 yrs**	**6 yrs**	**9 yrs**	**10 yrs**	**3 yrs**	**6 yrs**	**9 yrs**	**10 yrs**	**3 yrs**	**6 yrs**	**9 yrs**	**10 yrs**
Expected time to exit (Months)	67	66	66	65	66	67	68	68	82	84	89	89	96	98	100	101
Absolute change (Months)	-1	-2	-2	-3	1	2	3	3	-4	-2	3	3	-8	-6	-4	-3
Percentage change	-1%	-3%	-3%	-5%	1%	3%	5%	5%	-5%	-2%	3%	4%	-8%	-5%	-4%	-3%
Panel C **Age portfolio company** (years).	**3 yrs**	**5 yrs**	**7 yrs**	**9 yrs**	**3 yrs**	**5 yrs**	**7 yrs**	**9 yrs**	**3 yrs**	**5 yrs**	**7 yrs**	**9 yrs**	**3yrs**	**5 yrs**	**7 yrs**	**9 yrs**
Expected time to exit (Months)	69	68	67	64	60	62	66	67	85	86	88	90	104	104	104	104
Absolute change (Months)	0	0	-1	-4	-5	-3	1	2	-1	0	2	4	0	0	0	0
Percentage change	1%	0%	-2%	-6%	-8%	-4%	2%	3%	-1%	0%	2%	5%	0%	0%	0%	0%
Panel D **Syndication (#)**	**3 VCs**	**5 VCs**	**7 VCs**	**9 VCs**	**3 VCs**	**5 VCs**	**7 VCs**	**9 VCs**	**3 VCs**	**5 VCs**	**7 VCs**	**9 VCs**	**3 VCs**	**5 VCs**	**7 VCs**	**9 VCs**
Expected time to exit (Months)	62	58	54	48	48	36	29	23	96	106	116	128	103	102	102	102
Absolute change (Months)	-6	-10	-14	-20	-17	-29	-36	-42	10	20	30	42	-1	-2	-2	-2
Percentage change	-8%	-15%	-21%	-29%	-26%	-45%	-56%	-65%	12%	23%	35%	49%	-1%	-2%	-2%	-2%