**Structure, imprinting and survival
of venture capital firms**

B.L. King, R. Legoux,
M. Fredette

G–2015–113

October 2015

Structure, imprinting and survival of venture capital firms

Brian L. King [a]

Renaud Legoux [a]

Marc Fredette [b]

[a] HEC Montréal, Montréal (Québec) Canada, H3T 2A7

[b] GERAD & HEC Montréal, Montréal (Québec) Canada, H3T 2A7

brian.king@hec.ca
renaud.legoux@hec.ca
marc.fredette@hec.ca

October 2015

Abstract: This longitudinal quantitative study investigates how organizational structure and the external environment impact VC firm survival. It examines how macroeconomic conditions may influence independent (IVC) firms and corporate (CVC) units differently. Results suggest CVCs and IVCs exhibit similar lifespans but add an important subtlety: for the first few years of their lives CVC units show higher mortality, but afterwards are longer-lived. They also show an imprinting effect, whereby all VC firms born in more difficult macroeconomic conditions show a higher long-run survival rate, contradicting prior studies of general firms. Finally, this imprinting effect is initially more pronounced in CVC firms.

Résumé : Cette étude quantitative longitudinale examine comment la structure organisationnelle et l'environnement externe influencent la survie des firmes de capital de risque (des « VC »). Plus précisément, elle examine comment les conditions macroéconomiques influencent de façon différente les VCs indépendantes (les « IVC ») et corporatives (les « CVC »). Les résultats suggèrent que les CVC et IVC présentent des durées de vie similaires, mais ajoutent une subtilité importante : pour les premières années de leur vie, les unités CVC montrent une mortalité plus élevée, mais par la suite montrent une survie plus longue. Elles montrent également un effet d'impression (« imprinting ») de sorte que toutes les firmes de VC nées dans des conditions macroéconomiques plus difficiles montrent un taux de survie à long terme plus élevé, qui n'est pas cohérent avec des études précédentes des firmes de type générales. Enfin, cet effet d'impression est initialement plus prononcé dans les entreprises CVC.

Introduction

This paper investigates the impact of the external environment and organizational structure on the survival of venture capital (VC) firms. Not all VC firms are structured the same way: the two dominant organizational forms of VC in the United States are independent firms (IVC) and corporate venture capital (CVC) subsidiaries of large companies (Dushnitsky & Shaver, 2009). Each has a distinctive governance and organizational structure: IVCs have long-term funding commitments (Gompers, 2001), whereas CVCs are more subject to day-to-day financial scrutiny by their parent organization (Dushnitsky, 2006). Better understanding how VC works is important, given the crucial role of these organizations in funding and developing entrepreneurial businesses (Walske & Zacharakis, 2009).

While qualitative studies (Dushnitsky & Lenox, 2006; Hill & Birkinshaw, 2012) describe the distinctions between CVCs and IVCs, there are relatively few quantitative studies exploring the outcomes that are triggered by those differences (Maula, 2007). This paper examines the impact of the organizational structure of VC firms on their survival, and theorizes that IVC units show better survival characteristics during their first few years than do CVC units due to *time-bounded buffering*, the fact that IVC firms are buffered (Thompson, 1967) from the financial markets for a contractual period. This study also investigates how boom and bust periods impact the two dominant forms of VC suppliers: IVCs and CVCs. VC is a highly cyclical business (Lerner, 2002), whereby boom times lead to more firms being founded, and difficult macroeconomic conditions lead to firm exits from the market (Dushnitsky, 2006). This macroenvironment affects survival through another mechanism: *imprinting*, the economic conditions at firm founding (Marquis & Tilcsik, 2013; Stinchcombe, 1965) may have an impact on firm survival. This is similar to Walske and Zacharakis (2009) that investigates the influence of the initial partners' background, another important founding condition for VC firms.

Survival is an important performance measure for VC firms, as it is closely related to financial performance (Richard, Devinney, Yip, & Johnson, 2009). Hill and Birkenshaw (2012) notes that given the multiple and varying objectives of CVC units, survival is the only common measurable performance objective. And while financial return is the stated primary goal of IVCs, Gompers (1996) finds that young IVC firms often sacrifice financial returns in order to secure follow-on funding so as to increase their chances of survival, an effect also observed in French firms (Chahine, Filatotchev, & Wright, 2007).

This longitudinal study investigates three questions. First, does firm structure influence survival? Second, is there an imprinting effect on survival? And finally, will firm structure influence the effect of imprinting on survival? Hypotheses are developed and tested using Cox's (1972) well-known proportional hazard model, using historical data of 1,476 VC firms from 1987 through 2008. The results of this model lead to three findings. First, during the first seven years of their lives CVC units show higher mortality, but afterwards they are longer-lived than IVC firms. Second, there is an economic imprinting effect (Marquis & Tilcsik, 2013), whereby all VC firms born in more difficult macroeconomic conditions (that are *born tough*) show a higher long-run survival rate. And finally, this imprinting effect is more pronounced in CVC firms than IVC firms.

This study makes three contributions. First, it adds to our understanding of VC firms, in that it documents empirically that contractual underpinning has an important influence on their survival rate. Second, it demonstrates that economic imprinting has an important impact on all VC firms, but even more so on corporate firms. Finally, it raises a more general question about economic imprinting and firm type, as these *born tough* results are not consistent a study of more general firms by Geroski, Mata and Portugal (2010).

VC background

The venture capital (VC) industry in the United States is important. Studies have shown that it has had a significant impact both on innovation, where it has been shown to increase the quantity and quality of patents in start-up firms (Kortum & Lerner, 2000), and on economic growth, as companies funded by VC firms have been estimated to contribute $1.1 trillion to the U.S. economy, or 11% of annual GDP (Bruton, Fried, & Manigart, 2005). VC firms are also important boundary-spanning organizations (Basu, Phelps, &

Kotha, 2011). One of their key roles it to mediate between the fast changing technology environment and the more conservative banking and corporate worlds. CVC organizations also offer a window for corporations to innovation developed by smaller firms (Dushnitsky & Shapira, 2010).

Venture capital can be defined as "independent, professionally managed, dedicated pools of capital that focus on equity or equity-linked investments in privately held, high growth companies" (Gompers, 2001, 2). There is no particular organizational form suggested by this definition—capital may be provided by a bank, a wealthy individual angel, a corporation, a government agency or a partnership. This study examines the two dominant organizational forms of VC suppliers, IVCs and CVCs (Dushnitsky & Shaver, 2009), that each have a distinct practice approach (Dokko & Gaba, 2012). Independent VC firms raise a series of sequential *funds*, each accounted for separately, that are limited in both capital and time, from *limited partners*, either wealthy individuals or institutions (typically university endowments or pension funds) so named because their liability is limited to the amount of capital that they contribute. Here, the IVC firm acts as the general partner, and the limited partners are restricted from actively participating in the management of the fund. Each fund is capped at a maximum capital contribution, with each limited partner agreeing to provide its share of capital up to their pro rata share of the maximum. The fund is limited in time to ten years, with the first five years focused on investing the capital and the latter years spent harvesting the portfolio and converting the investments back to cash through the sale of the start-up companies to established firms or by taking them public (Gompers, 2001). Once the funds are returned this could, in theory, mean the end of an IVC. But in practice these firms raise sequential funds and are highly focused on their own survival, even sacrificing potential profit in order to facilitate raising follow-on funds (Gompers, 1996).

This study uses Dushnitsky's definition of corporate venture capital as: "a minority equity investment by an established corporation in a privately-held entrepreneurial venture" (2006, 388). A history by Dushnitsky (2006) suggests that CVC tends to follow the pack; a rising market attracts entrants, but a crash tends to cause them to exit the marketplace. Gaba suggests that corporations that don't found CVC units for "purely faddish reasons are less likely to abandon it" (2006, 34). Burgelman and Valïkangas (2005) find CVC units are under short-term financial pressure. Hill and Birkenshaw (2012) concur and denote a particular challenge for CVC units: the typical time required for them to show a yield on their investments exceeds the average CEO tenure, putting a CVC unit at particular risk during its early years. CVC programs often lack autonomy from the corporate treasury and are sometimes sacrificed should the firm run into financial difficulties (Dushnitsky, 2006). Hill, Maula, Birkinshaw and Murray (Hill, Maula, Birkinshaw, & Murray, 2009) find that CVC units that adopt the venture capital model of independent firms increase their longevity. This research complements other studies of survival of corporate firms (Vibha Gaba & Bhattacharya, 2012; Hill et al., 2009), but there is much still to learn about CVC (Dushnitsky, 2006; Maula, 2007).

Corporate venture capital organizations are different from independent firms in that, in addition to having a financial goal, to make money, they also have strategic motivation, to identify opportunities of potential benefit to their parent company (Park & Steensma, 2012). All VC firms use *staged investment* – whereby they contribute cash periodically to the start-up, typically upon the accomplishment of a key milestone. IVC firms request cash from the limited partners only once they need funds; this allows them to maximize returns by keeping capital investment as low as possible. But cash management is different for corporate VCs as they are less autonomous (Dushnitsky, 2006); they are still part of a the corporate structure and therefore beholden to the corporate treasury.

Theory and hypotheses

The structural differences between independent and corporate VCs can be expected to have an influence on their behavior and their survival. The contractual commitments of IVCs are unusual in that limited partners commit capital to the fund in advance of the actual need. Only once the VC firm finds an interesting opportunity do they then request capital from the limited partners, who are contractually committed to supply these funds. Independent firms can invest over the length of their 10-year contractual commitment, and can seek opportunities regardless of the state of the capital markets (Lerner, 2002). These contracts are a form of *buffering* that recalls the work of Thompson (1967) on how organizations interface between rational

(closed) systems and complex (open) systems. Thompson (1967) maintained that buffering was an important mechanism to protect the *technical core* of firms from the changing outside environment. In contrast, for CVC units, the source of the funds for these investments are, in most cases, the corporate treasury (Lerner, 2001). If a start-up backed by a CVC needs more funds, and the CVC wishes to invest, there is no guarantee that the corporate parent will be willing or able to supply the funds at that specific time. History also shows that when the technology stock market goes down, many CVCs exit the market (Dushnitsky, 2006).

This contractual difference is expected to be important in the context of changing financial markets. As noted, VC organizations serve as a bridge between organizations that seek stability—pension funds and corporations—and the fast-changing innovation marketplace. Unlike IVCs, CVCs are more directly coupled to the corporate treasury department and are more likely to experience short-term financial pressure. This suggests that the IVCs should survive longer than CVCs, as they are more buffered from the financial markets.

What is unusual in this context is that the buffering of IVC firms is time-bounded. IVCs raise a fund that invests over an initial five to seven years, and soon after seek to raise an additional fund if the market is favorable and their early investment results are promising. They are at risk of dying, however, should their original fund run short of capital while they have yet to raise an additional fund from their limited partners. It is expected that these firms will exhibit what this study calls *time-bounded buffering*, buffering that is only valid for a certain period of time. This leads to the following hypothesis:

Hypothesis 1: IVCs will initially have a smaller risk of dying than CVCs, but this effect will disappear over time.

This hypothesis explores a topic that's already been explored qualitatively by Dushnitsky that finds "the lifespan of CVC programmes is no longer than that of independent VC funds" (2006, 422). It seeks to confirm if indeed these two organizational forms have, overall, similar or different survival prospects.

This study also examines the impact of the environment on firm survival. Both IVC and CVC firms are subject to many boom and bust cycles (Lerner, 2002) that lead to firm foundings and exits from the market (Dushnitsky, 2006). But the environment not only influences current conditions—founding conditions can leave an imprinting effect (Stinchcombe, 1965), whereby the initial conditions when an enterprise is started have an important impact on the subsequent performance of the firm. Marquis and Tilcsik (2013) review the various forms of imprinting, labeling *economic imprinting* the enduring impact of the macroeconomic conditions at firm founding. Geroski, Mata and Portugal (2010) specifically examines the impact of economic imprinting on firm mortality, positing that during difficult times, there are more unemployed people with a higher propensity to found firms, but ones with a lower survival rate. Their study finds that the macroeconomic conditions have an direct influence on long-term survival, in that: "firms that are born in a boom seem to have almost permanently high survival rates" (2010, 526). If indeed VC firms behave like these firms, this suggests that VC firms born in difficult macroeconomic conditions should survive less long than do firms born in good times.

Of course, it is not clear that VC firms are like other firms. First, Dimov and De Clercq (2006) find that VC firms that have more initial expertise perform better. During difficult times, it would be expected that VCs with more expertise would be better at attracting capital. As fundraising is highly tied to individual and firm reputations (Gompers, 1996), firms that are able to raise their initial capital in difficult times are probably more seasoned and go through a more thorough vetting process by their capital suppliers. This may be an indication of superior potential of survival. Support for this line of reasoning is seen in Stinchcombe (1965, 152) that notes that "the level of organizational experience of a population is a main determinant of their capacity to form new organizations." Second, VC firms operate in a highly variable environment, with booms and busts (Lerner, 2002). There maybe a timing effect, whereby the best investment opportunities may be during difficult times for firms that have capital available. For these two reasons, it can be expected that imprinting for VC firms will play out as follows:

Hypothesis 2: VC firms born in difficult macroeconomic conditions will have a smaller risk of dying than firms born in good times.

This study also examines the influence of organizational form on this imprinting. CVC units are unlike independent firms in that they have both financial incentives, to make money, as well as strategic goals, to identify opportunities of potential benefit to their parent company (Dushnitsky, 2006). Maula (2007) notes that the strategic motivations for CVC activity are heterogeneous, listing several different possible strategic reasons but concluding that the financial rationale is homogeneous. Nonetheless, this strategic motivation differentiates the CVC from an independent firm. As shown in the historical review, CVC units are usually founded during good times when the financial prospects are better. If a CVC firm is founded during difficult times, then it can be inferred that their strategic motivations are much stronger, as the financial incentives would be muted. This suggests a higher level of commitment by the parent firm, which in turn leads to the inference that CVC units born in difficult times should be longer-lived than their independent counterparts. Stated as a hypothesis:

Hypothesis 3: This effect, that VC firms born in difficult macroeconomic conditions will have a smaller risk of dying, will be more pronounced in corporate units than in independent firms.

Data and methods

Data

Dow Jones *VentureSource* provided a custom report detailing all United States VC transactions by firms with five or more investments from 1987 through 2008. This resulted in 94,219 transactions by 1,867 firms. Of these, 1,485 firms (85,016 transactions) are independent firms, while the balance (9,203 transactions) are made by the 382 corporate firms. While corporate entities make up 20% of the firms, they make only 9% of the total number of investments.

Variables

For each firm, the number of transactions in a given year as well as the number of first-round (initial) investments in new firms were totaled. Firms were considered to be founded based on the date of their initial investment. As detailed by Rider and Swaminathan (2012), venture capital firms cease operations when they are no longer able to secure new funds, but can remain as *walking dead*, continuing to make follow-on investments but no longer funding new firms. So a similar methodology to Rider and Swaminathan (2012) was adopted, whereby a firm was considered to be dead when it ceased to make any new investments. Because their true age was unknown, 391 firms that existed prior to 1987 were eliminated, leaving 1,476 firms in the sample. For right-censoring issues, consistent with prior studies (Vibha Gaba & Bhattacharya, 2012; Rider & Swaminathan, 2012), firms were considered dead if they had not made any investments in the last 4 years. So firms that last invested in 2005, 2006 and 2007 were considered to be still alive and thus right-censored.

The yearly change in GDP, as in Geroski et al. (2010), was taken as an indicator of the external environment.[1] Geographic control variables were created. Here they are listed with the percentage of firms headquartered in a particular region, such as: Silicon Valley (26%), New York (10%), Massachusetts (8%). 56% of firms were outside of these areas and were combined into a fourth category. Silicon Valley serves as the reference category.

Model

The 1,476 firms were analyzed based on their being corporate or not (independent), and based on their being classified as alive or dead for each year from 1987 through 2008. Similar to de Jong and Marsili (2013), analysis was made using Cox's (1972) proportional hazard model. This model allows the effect of explanatory variables to be assessed without having to specify a distribution function for the survival of firms. Let the risk function $h(t; x)$ measures the probability that a firm with covariates x will die in a small time interval

---

[1] Initial models that used NASDAQ variation as an indicator of the external environment lead to similar results.

after t given that the firm was still at risk of dying at that time, divided by the length of this small interval, Cox's regression model is given by.

$$h(t; x) = h_o(t)exp\{x'\beta\},$$

where $h_o(t)$ is the (unestimated) baseline risk function of a firm where all the covariates are set to zero. A positive β_i indicates a positive association with the ith covariate x_i and the risk of dying. This model assumes that the covariates have a proportional effect on the risk function (i.e. that the regression coefficients β do not depend on time). Therefore, this assumption will also have to be tested as suggested by Grambsch and Therneau (1994).

Results

The first set of analyses test Hypothesis 1. As shown in Table 1, the first model assesses if corporate VC firms have an overall different survival pattern when compared to independent VC firms. The risk of dying for coporate firms is 15% higher but the difference is not significant; $\chi^2(1) = 2.07$, $p > 0.10$. However, the test of proportionnality is rejected ($\rho = -0.09$, p-value $= 2.6\%$). This means that the effect of *corporate* is not the same throughout time. The plot of the standardized Schoenfeld's residuals suggests a linear trend.

Table 1: Survival of VC firms

	Model 1			Model 2			
Parameters	Beta	(SE)	Hazard ratio	Beta	(SE)		Hazard ratio
Corporate	0.14	(0.09)	1.15	0.44	(0.17)	*	1.55
Corporate (linear trend)	—	—	—	−0.06	(0.03)	*	0.94
Massachusetts	−0.07	(0.18)	0.93	−0.07	(0.18)		0.93
New York	0.32	(0.15) *	1.37	0.32	(0.15)	*	1.38
Other regions[1]	0.27	(0.10) *	1.30	0.27	(0.10)	*	1.30

[1] Silicon Valley is the reference category

* $p < 0.05$

Model 2 takes into account this linear trend in the regression model. Instead of using $\beta_1 x_1$ where x_1 is a dummy variable indicating a CVC firm, we used $(\beta_{1,1} + \beta_{1,2} * t) * x_1$. The risk ratio for CVC firms is thus given by $\exp(\beta_{1,1} + \beta_{1,2} * t)$. For a given time t, a risk ratio greater (smaller) than one indicates that a CVC firm has a greater (smaller) risk of dying at time t than a IVC firm. A risk ratio of exactly one indicates that both types of firm have the same risk of dying. Results in Table 2 shows that both parameters are significant; $\chi^2(1) = 6.95$ and 4.54, $p < 0.01$ and $p < 0.05$ for $\beta_{1,1}$ and $\beta_{1,2}$ respectively.

Figure 1 illustrates this estimated risk ratio as a function of time. At first the risk of dying of corporate firm is significantly higher and this risk ratio is estimated at 1.55, which means that the risk of dying is 55% higher for corporate firms relative to independent firms. This risk decreases significantly over time to catch independent firms after approximately 7 years, after which the risk of dying of corporate firms becomes smaller than for independent firms. This result supports Hypothesis 1 and suggests independent firms appear to benefit from time-bounded buffering.

The second set of analyses test Hypotheses 2 and 3. Again, a linear trend had to be used to model the risk ratio for GDP change, *i.e.* we added $(\beta_{2,1} + \beta_{2,2} * t) * x_2$ in the previous Cox's regression model where x_2 represents the GDP change. Model 3 from Table 2 shows that the estimated initial effect of GDP change $(\beta_{2,1})$ is significant; $\chi^2(1) = 38.95$, $p < 0.01$. Firms born during difficult times have at first a smaller risk of dying but this effect is significantly smaller and smaller as time goes by $(\beta_{2,2})$; $\chi^2(1) = 7.46$, $p < 0.01$. At first, the estimated hazard ratio is 1.65 meaning that when the GDP at birth increases by one percent, the risk of dying is increased by 65%. After that, the risk ratio decreases by a factor of 2% each year as the estimated risk ratio for $\beta_{2,2}$ is 0.98. Even though it is decreasing over time, the overall effect is persistent in that the effect of GDP change in the year of birth is estimated to last 17 years (the first year where the risk ratio of $\exp(0.50 - 0.03 * t)$ is below one at 0.99). This result confirms Hypothesis 2, that a general imprinting effect is present.
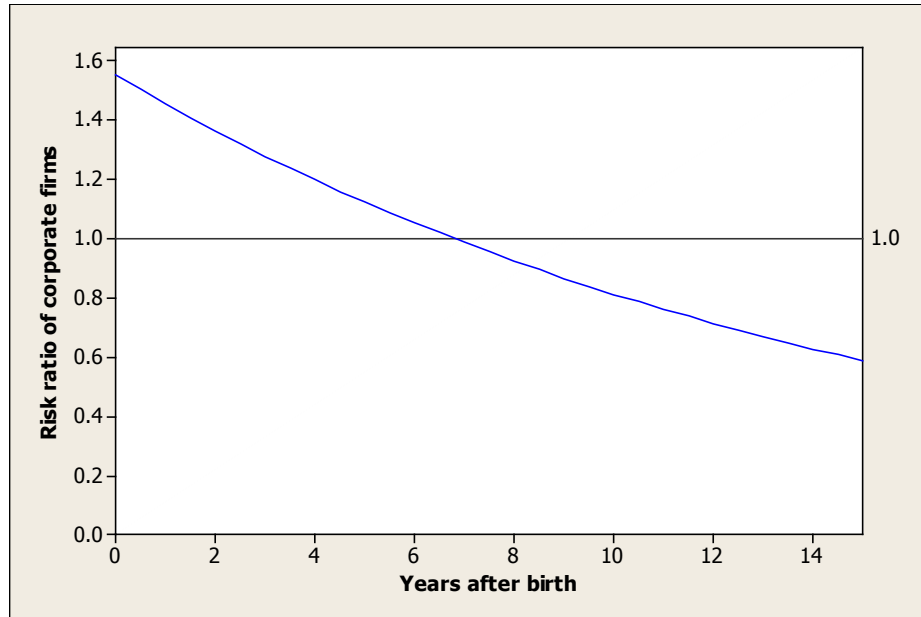
Figure 1: Risk ratio of corporate VC units compared to independent firms

Table 2: Survival of VC firms and GDP change

	Model 3				Model 4			
Parameters	Beta	(SE)		Hazard ratio	Beta	(SE)		Hazard ratio
GDP change	0.50	(0.08)	**	1.65	0.39	(0.09)	**	1.47
GDP change (linear trend)	−0.03	(0.01)	**	0.97	-0.02	(0.01)		0.98
Corporate	—	—		—	-1.33	(0.75)		0.26
Corporate (linear trend)	—	—		—	0.15	(0.09)		1.16
Corporate x GDP change	—	—		—	0.45	(0.18)	*	1.57
Corporate x GDP change (Linear trend)	—	—		—	−0.06	(0.02)	*	0.95
Massachusetts	−0.07	(0.18)		0.93	−0.06	(0.18)		0.94
New York	0.32	(0.15)	*	1.38	0.29	(0.15)		1.34
Other regions[1]	0.28	(0.10)	**	1.33	0.28	(0.10)	**	1.33

[1] Silicon Valley is the reference category

* $p < 0.05$

** $p < 0.01$

Model 4 presents the interaction terms of corporate with the GDP change. From Model 3, we added the two parameters $(\beta_{3,1} + \beta_{3,2} * t) * x_1 * x_2$ to account for the possible interaction between the two variables. Both new terms are significant; $p < \chi^2(1) = 6.27$ and 4.92, $p < 0.05$ and $p < 0.05$ for $\beta_{3,1}$ and $\beta_{3,2}$ respectively. In the first years, both estimated risk ratios are greater than one but the effect of GDP is significantly higher for corporate firms. This effect is illustrated in Figure 2, whereby the risk of dying for both independent and corporate firms born in an environment with one percent GDP growth are contrasted with the baseline stable time. At first, a one-percent increase of GDP during the birth year increases the risk of dying of 47% for independent firms and 131% for CVC firms. This result partially supports Hypothesis 3 in that the imprinting effect is stronger for CVC firms, but that it dissipates more quickly. As shown in Figure 2, after 8 years, the residual imprinting effect becomes stronger in independent firms.
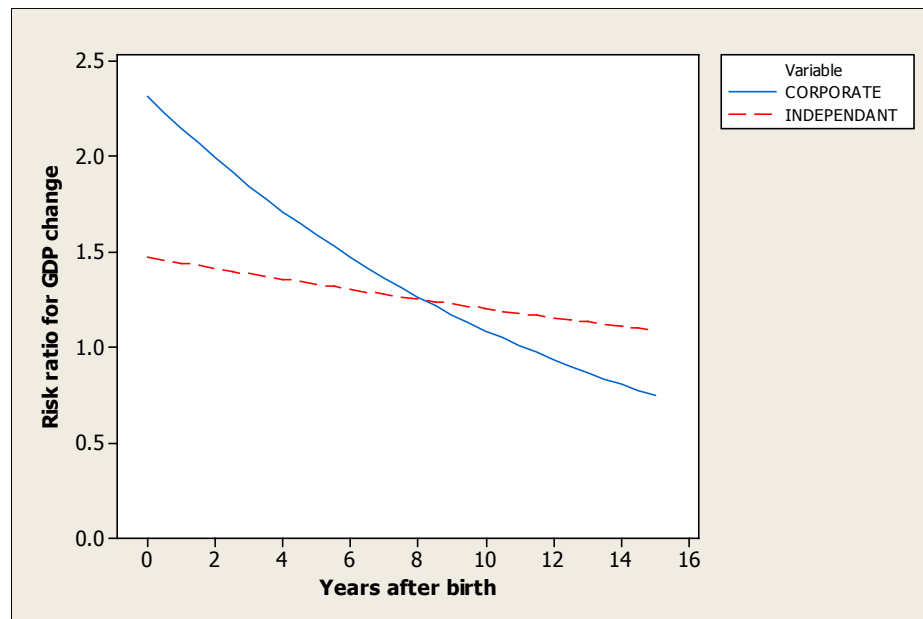
Figure 2: Risk ratio of VC firms in a growth environment (+1% GDP change)

Discussion and conclusions

This simple quantitative study of VC firm survival confirms many observations made by prior qualitative studies, yet adds some additional subtleties to our understanding of both CVC and IVC firms. Indeed, the overall lack of difference in survival between the two types of VC firms confirms Dushnitsky's observation that CVCs programs last no longer than independent VCs (2006). IVC and CVCs not only operate using similar business models, but they also have approximately the same longevity. Yet the results for Hypothesis 1 extend our knowledge by showing the influence of the contractual arrangement on firm survival patterns. When an independent VC firm is founded, it has a 10-year funding commitment, where the bulk of the initial investments is typically made in the first five years. This means that the firm will stop making initial investments—the criteria used to indicate a firm is still in existence—unless it manages to raise a follow-on fund. This appears to be a critical juncture for most independent firms. Conversely, corporate entities have no such time-bounded buffer. So their odds of survival, while slightly lower than independent firms overall, are initially lower than independent firms, but become higher over time. These results are consistent with the observations of Hill and Birkenshaw (2012) about a particular challenge of CVC: the time required to show a positive return exceeds the average CEO's tenure. These results suggest that if a CVC is still in business after their first 7 years, they may be at a point of showing positive returns, enhancing their survival prospects when compared with an IVC of the same age. These results are also consistent with Hill et al.'s (2009) findings that firms that adopt the venture capital model of independent firms show greater survival.

The results of Hypothesis 2 are not consistent with the findings of Geroski et al. (2010). Rather than firms that are born in difficult macroeconomic conditions dying sooner, as found by this study of more general firms, it appears that both corporate and independent VC firms born in difficult conditions survive longer. There are a few possible explanations for why VC firms have a different reaction to economic imprinting. First, firms that do their fundraising during difficult macroeconomic conditions need to be more skilled than those that are born in better times. Second, there may be better economic opportunities for VC firms during difficult times; as investors with liquidity they face less competition and can therefore negotiate more favorable terms for their transactions.

The partial support for Hypothesis 3 again emphasizes the difference between corporate and independent firms. Corporate firms that are born during difficult times are those that would, in theory, enjoy the strongest level of commitment from their parent company because of their potential strategic contributions. This is

consistent with Gaba's (2006) observation that CVC units founded for faddish reasons show shorter longevity. However, while the stronger initial imprinting in CVC firms can possibly be attributed to their higher strategic motivation when launched in difficult times, less generous compensation in many CVC units relative to independent firms (Hill et al., 2009) may lead to higher personnel turnover that could explain why this effect dissipates more quickly than for independent VC firms.

This study makes three contributions. The first two add to our understanding of VC firms. First, while it confirms that there is relatively little overall difference between the survival of independent and corporate firms, it confirms that the pattern of survival differs. Initially, independent firms show greater survival due to their contractual commitments. However, once a corporate firm survives seven years, it will then outlive independent firms of the same age. The second contribution is to show that VC firms display a distinct imprinting effect, whereby firms born in difficult times have a significantly stronger chance of survival than firms born in other conditions, and that this effect is stronger in corporate firms. The third contribution of this study is to add to our knowledge of imprinting, showing that these specialized VC firms show different effects of economic imprinting than do more general firms.

In conclusion, the results of this study show that the macroeconomic conditions at founding influence VC firms, whereby VC firms born during tough times survive longer, an effect that is even stronger for corporate firms. It also shows that while companies may encourage their venture capital subsidiaries to behave like independent firms, they are not willing to mimic their underlying contractual structure. This results in a differing survival pattern, whereby CVC units initially face more difficult survival odds, but after seven years they show better survival prospects. Given the changing financial markets, the long-term funding arrangements of independent firms help promote their survival, at least initially.

Limitations and future work

While there are many limitations to this study, three are worth highlighting. The first is that VC firms die, to use the words of T.S. Elliot: "not with a bang but a whimper," so the demise of a firm has to be inferred by the lack of activity. While this approximate date inferred by this study using the approach taken by Rider and Swaminathan (2012) can be used to examine longevity, it does not permit us to investigate factors relating to the actual demise of the firm, such as the impact of specific macroeconomic conditions in the period immediately prior to the demise. Second, the anonymous nature of the data, whereby firms are identified with a code, precludes further investigation of firms to find a precise date of the cessation of activities, as well as the reason behind it. Third, the study does not have access to data showing when VC firms raise new funds, which would be expected to be a vital predictor of firm survival. This is equally true for CVC firms that raise outside funds. So while much is learned from this study, clearly follow-on work with more specific data would help to clarify the external and internal influences for the demise of a firm. While external influences are vital, the internal influences may also be important. While one might presume that a firm might break up because of poor performance, it is also possible that partners might simply disagree and choose to go off and form new partnerships; this might be particularly the case in a good fundraising environment. More work is also needed to clarify the impact of economic imprinting: is the *born tough* tendency of VC firms related to their being a finance-type firm? A multi-context study of imprinting would help to resolve this inconsistency.

Implications for practice

This study may be of interest to practitioners, both finance executives involved in venture capital as well as entrepreneurs.

For finance executives, this study offers empirical support for Warren Buffett's adage to "be fearful when others are greedy and greedy when others are fearful." Those that seek to invest in, or found IVC or CVC firms in difficult times can take solace in this study's finding that such firms may survive longer. It also suggests that corporations founding CVC units need to be patient, as there appears to be a learning curve in developing a successful venture capital investment system. These results may also inspire founders of CVC

units to raise outside financing, even a relatively small amount. Outside capital, staged in according to a legal contract, could provide CVC units with a time-bounded buffer to allow them sufficient time to find their footing. It may also protect them should there be a change in corporate management that might want to discontinue their venture capital efforts in order to pursue other priorities.

For entrepreneurs, the longevity crossover point between IVCs and CVCs at less than 10 years may also be of interest. Since an initial fund is 10 years, with the initial five years spent investing and the latter time spent harvesting and raising the next fund, the fact that many IVCs survive less long than CVC firms shows the fragility of the multiple fund model, whereby many IVC firms fail to raise a second fund. This suggests intense pressure on new IVC firms to hit home runs from the start, biasing their investments towards higher risk and also short timeframe investments, which will lead either to great success, enabling follow-on fund, or cataclysmic failure. So entrepreneurs seeking funding may want to avoid the pressure of taking capital from a new IVC firm, which may push them into unwise decisions in order to serve the fundraising needs of that firm. They may, however, be able to moderate this pressure by also soliciting capital from a CVC or more established IVCs.

References

Basu, S., Phelps, C., & Kotha, S. (2011). Towards understanding who makes corporate venture capital investments and why. Journal of Business Venturing, 26(2), 153–171.

Bruton, G.D., Fried, V.H., & Manigart, S. (2005). Institutional influences on the worldwide expansion of venture capital. Entrepreneurship Theory and Practice, 29(6), 737–760.

Burgelman, R., & Valikangas, L. (2005). Venturing cycles. MIT Sloan Management Review, 46(4), 26.

Chahine, S., Filatotchev, I., & Wright, M. (2007). Venture capitalists, business angels, and performance of entrepreneurial IPOs in the UK and France. Journal of Business Finance & Accounting, 34(3–4), 505–528.

Cox, D.R. (1972). Regression models and life-tables. Journal of the Royal Statistical Society. Series B (Methodological), 187–220.

de Jong, J.P., & Marsili, O. (2013). Founding a business inspired by close entrepreneurial ties: does it matter for survival? Entrepreneurship Theory and Practice, doi: 10.1111/etap.12086.

Dimov, D., & De Clercq, D. (2006). Venture capital investment strategy and portfolio failure rate: A longitudinal study. Entrepreneurship Theory and Practice, 30(2), 207–223.

Dokko, G., & Gaba, V. (2012). Venturing into new territory: Career experiences of corporate venture capital managers and practice variation. Academy of Management Journal, 55(3), 563–583.

Dushnitsky, G. (2006). Corporate venture capital: past evidence and future directions. In M. Casson (Ed.), The Oxford handbook of entrepreneurship (pp. 387–431). Oxford; New York: Oxford University Press.

Dushnitsky, G., & Lenox, M.J. (2006). When does corporate venture capital investment create firm value? Journal of Business Venturing, 21(6), 753–772.

Dushnitsky, G., & Shapira, Z. (2010). Entrepreneurial finance meets organizational reality: Comparing investment practices and performance of corporate and independent venture capitalists. Strategic Management Journal, 31(9), 990–1017.

Dushnitsky, G., & Shaver, J. (2009). Limitations to interorganizational knowledge acquisition: The paradox of corporate venture capital. Strategic Management Journal, 30(10), 1045–1064.

Gaba, V. (2006). Learning while innovating: The abandonment of corporate venture capital programs. Paper presented at the 2nd Smith Entrepreneurship Conference, University of Maryland.

Gaba, V., & Bhattacharya, S. (2012). Aspirations, innovation, and corporate venture capital: A behavioral perspective. Strategic Entrepreneurship Journal, 6(2), 178–199.

Geroski, P.A., Mata, J., & Portugal, P. (2010). Founding conditions and the survival of new firms. Strategic Management Journal, 31(5), 510–529.

Gompers, P. (1996). Grandstanding in the venture capital industry. Journal of Financial Economics, 42(1), 133–157.

Gompers, P. (2001). A note on the venture capital industry. Harvard Business School (Note 295–065).

Grambsch, P.M., & Therneau, T.M. (1994). Proportional hazards tests and diagnostics based on weighted residuals. Biometrika, 81(3), 515–526.

Hill, S.A., & Birkinshaw, J. (2012). Ambidexterity and survival in corporate venture units. Journal of Management, DOI: 10.1177/0149206312445925.

Hill, S.A., Maula, M.V., Birkinshaw, J.M., & Murray, G.C. (2009). Transferability of the venture capital model to the corporate context: Implications for the performance of corporate venture units. Strategic Entrepreneurship Journal, 3(1), 3–27.

Kortum, S., & Lerner, J. (2000). Assessing the contribution of venture capital to innovation. Rand Journal of Economics, 31(4), 674–692.

Lerner, J. (2001). A note on corporate venture capital. Harvard Business School, Boston, MA.

Lerner, J. (2002). Boom and bust in the venture capital industry and the impact on innovation. Economic Review – Federal Reserve Bank of Atlanta, 87(4), 25–39.

Marquis, C., & Tilcsik, A. (2013). Imprinting: Toward a multilevel theory. The Academy of Management Annals, 7(1), 193–243.

Maula, M.V.J. (2007). Corporate venture capital as a strategic tool for corporations. In H. Landström (Ed.), Handbook of research on venture capital (pp. 371–392.). Cheltenham: Edward Elgar.

Park, H.D., & Steensma, H.K. (2012). When does corporate venture capital add value for new ventures? Strategic Management Journal, 33(1), 1–22.

Richard, P.J., Devinney, T.M., Yip, G.S., & Johnson, G. (2009). Measuring organizational performance: Towards methodological best practice. Journal of Management, 35(3), 718–804.

Rider, C., & Swaminathan, A. (2012). They just fade away: Mortality in the US venture capital industry. Industrial and Corporate Change, 21(1), 151–185.

Stinchcombe, A.L. (1965). Social structure and organizations. In J. G. March (Ed.), Handbook of organizations (pp. 142–193). Chicago, IL: Rand McNally & Company.

Thompson, J.D. (1967). Organizations in Action: Social Science Bases of Administrative Theory. New York, NY: McGraw-Hill.

Walske, J.M., & Zacharakis, A. (2009). Genetically engineered: Why some venture capital firms are more successful than others. Entrepreneurship Theory and Practice, 33(1), 297–318.