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Fund Size and the Success of Venture Capital Exits

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Abstract

This work argues that the efficacy of a region's venture capital sector depends critically on the distribution of VC fund sizes: that too many small funds can distort syndication patterns, compromise successful exits and increase likelihood of foreign fund entry. Empirically, this work reports results consistent with the hypothesis that if relatively few large VC funds are present in a community, foreign venture capital funds are more likely to be engaged, especially in later stage investments. The sizes of incumbent investor syndicates were significantly associated with the likelihood of adding new investors to a deal. Incremental syndication was found to be more likely when the incumbent syndicate has been comprised of small funds rather than when large venture capitalists were present. Moreover, the number of incumbent investors was insignificantly associated with syndicate expansion, suggesting that what matters is not the number of investors in the syndicate but rather the quantum of funding. Finally, the work found that successful exits were less likely when early investors comprised small funds and the presence of one or more foreign investors in the incumbent syndicate significantly reduced the odds of new investor addition.

Keywords: *venture capital, syndication patterns, cross-border venture capital investment, venture capital exits*

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INTRODUCTION

Haltiwanger, Jarmin, and Miranda (2013) report that a disproportionate share of national economic welfare and job creation is attributable to young firms that grow rapidly. Substantive growth, however, requires financial capital to acquire the incremental real and human assets associated with growth. Such financing is typically the province of so-called "classic" venture capital (VC): investments in early stage growth-oriented small- and medium-sized enterprises (SMEs). In recognition of the critical role of venture capital, many governments have intervened in the financial markets and in a variety

of ways, for better or worse (Cumming, 2011). Indeed, Lerner, Moore and Sheperd (2005) commented to the effect that governments have played a pivotal role in the development of most venture capital sectors. Hindsight, however, has shown that government policy must tread carefully in this matter. This paper considers one aspect that is often a consequence of government intervention: the need to maintain a balance across the size distribution of venture capital firms.

Specifically, this paper argues that the structure of a nation's venture capital sector—the balance between large funds and small ones—holds substantive implications on the likelihood of successful exits by venture capital (VC) investors. This work examines the implications of a venture capital sector that is distorted such that the distribution of differing fund sizes is skewed, with many small funds but few large domestic VC funds (a structure that resulted from well-meaning but ultimately questionable government intervention). For example, one-sixth of all U.S. VC funds hold more than $1 billion under management; in Canada, however, the vast majority of VC funds are small (almost 50 per cent of all funds hold less than $50 million under management) and large funds are relatively rare with fewer than one fund in 25 holding more than $1 billion.

This work argues, conceptually and empirically, that a VC sector in which small funds predominate and large funds are rare is problematic—for entrepreneurial firms, for the VC funds themselves and for the economy. This research maintains that a preponderance of small funds can lead to excessive syndication, fewer successful exits, low returns (especially to domestic investors) and to foreign acquisitions of the most successful of the new ventures.

This discussion is informed by the recent experience of Canada. While this research focuses on the Canadian context, this is more than a hypothetical question because the issues considered here are common to many regions beyond the U.S. This is an issue of importance to those involved in the design of public policy. Policy makers understand that the growth of young firms contributes disproportionately to commercialization of innovation (Kortum and Lerner, 2000) as well as to economic welfare: therefore they are often under pressure to intervene to facilitate capital formation. Perceiving a "gap" at the early stages of venture formation, government remediation has historically focused on establishment of early-stage small funds as opposed to encouraging larger funds. If the thesis of this research is confirmed, a policy emphasis on early-stage small funds might inadvertently exacerbate the challenge of developing, domestically, successful growing ventures.

To develop these ideas, the work continues with a review of the salient literature that forms the basis for the articulation of testable hypotheses. The empirical analysis follows and the work concludes with a discussion of implications, limitations and suggestions for further research.

PREVIOUS RESEARCH

Seminal work by Bygrave (1988) and Gompers (1995) helped establish researchers' understanding of the venture capital process. Based on the U.S. experience, Gompers' widely-held model posits that VCs tend to specialize by lifecycle stage: angels and seed VC investors invest alongside founders in early stage firms and as portfolio firms grow, successful enterprises are backed by syndications comprised of early, A and B round, investors. Usually, small VC funds are the most active at the early stages of firm development. With further growth, firms are then syndicated with (larger) C and D round investors who then steer the firms towards an exit. Large VC funds may also invest at early stages and their greater scale affords them the option of forgoing syndication (although funds may syndicate in order to benefit from specific expertise or to diversify risk). Typically, later—and larger—investment rounds require new investors with deeper pockets. Hence, funding of later stage rounds may reflect the strategic choices of investors. This model works, in large part, because of the scope and depth of the U.S. venture capital industry: for any given stage there are many active venture capital funds.

Small VC funds are arguably disadvantaged compared with large ones. Murray and Marriott (1998) list disadvantages of small funds to include: the high fixed costs of reducing information asymmetries; high levels of support and guidance re-

quired by early-stage investees; the skewed risk/return profile prompting the inevitable need for substantial success by one or more investee companies in the VC portfolio; the limited ability to attenuate project risks by fully diversifying the venture capital fund; the long development cycle and its implications on fund structure and performance; the limited ability to provide follow-on financing or large amounts of investment in a successful investee firm; and the danger of excessive dilution of ownership.

In their simulation model Murray and Marriott (1998) demonstrated that fixed costs have a severe effect on the net performance of small VC funds and that the impact of fixed costs falls on the general partner. Consistent with these expectations, Dimov and Murray (2006) found that the top five performing American seed capital venture capital investors are large funds, with an average of 92 seed investments and an average of funds under management of nearly $4 billion US. Likewise, Söderblom and Wiklund (2005) reported an association between large fund sizes and successful equity investments. This work argues that these problems are further exacerbated when small funds dominate the size distribution of a regional or national VC sector.

In the research literature, syndication is usually regarded as a useful activity. It provides for risk sharing (Lockett and Wright. 2001; Bruining, Verwaal, Lockett, Wright, and Manigart, 2006, among others), diversification (Gompers and Lerner, 1999, among others) and pooling of expertise and knowledge (Lockett and Wright, 1999, 2001, among others). Syndication may also mitigate trade-offs between portfolio diversification and dilution of human capital (Jääskeläinen, Maula, and Seppä, 2006) or between diversification and portfolio specialization (Hopp and Rieder, 2006). Another reason for syndication arises from the need for additional financing (Lockett and Wright, 1999; Nitani and Riding, 2013). As portfolio firms prosper, later (and larger) rounds of capital are normally required, which small funds might not be able to provide. This type of financing constraint faced by small funds might be managed by syndication with one or two large VCs; hence syndication may be driven by the financial necessity of supplying the financing needs of growing, successful, portfolio firms.

However, in the context of a market distorted such that there are relatively few large funds, syndication with large funds may not be possible. In this situation, one or more of the following outcomes may obtain.

1. Growing firms may simply remain undercapitalized, compromising the performance of the firm and the returns to investors.
2. The number of syndicate members may become large such that syndicates become unwieldy as successive financing needs get met by engaging additional small VCs.
3. Small numbers of large VCs become much sought after as syndicate partners, resulting in larger VCs holding many portfolio firms, stretching their ability to provide non-financial value added.
4. Large, later stage, investor(s) may take undue advantage—"cramming down"—of the incumbent, capital-constrained early-stage investor(s) and founders.

CONCEPTUAL ARGUMENTS

To the extent that small funds are constrained in their ability to allocate sufficient financing, founders and incumbent investors are obliged to seek additional sources of syndication. To this point, Lockett and Wright (1999) find that, in the United Kingdom context, the need for additional financing is an important motive for syndicating and that deal size is a factor. Consistent with Lockett and Wright, Nitani and Riding (2013) have shown empirically that syndicates comprised of small VC funds are more likely to add new investors than syndicates that include one or more large VC funds. Not surprisingly, they also confirm that syndication frequency increases as investee firms grow.

On the one hand, since maturity requires large capital infusions, (additional) syndication is necessary to provide the large sums of money. On the other hand, as the portfolio company grows, maturity reduces informational asymmetry, uncertainty about future prospects, and the need for assistance and monitoring from VCs (Lockett and Wright, 1999, 2001; Hopp and Rieder, 2006), implying less

need for syndication. Accordingly, if the goal of syndication is to mitigate informational problems, reduce risks, or provide better assistance to the investee, syndication activities will diminish with the growth of the investee. Thus, a positive association between venture growth and the probability of adding a new investor is expected.

There is also a geographic dimension to syndication because when (additional) syndication is necessary, the founders and incumbent VC investors are more likely to invite those from the same community than from foreign locations. Geographic clustering of venture capitalists enhances their ability to share information, make deals, and mobilize resources quickly (Gompers, Kovner, Lerner, and Scharfstein, 2006). Maintaining network ties and industry contacts is important to syndication among venture capitalists (Gompers et al., 2006) because VCs are repeat players, reducing uncertainty by exchanging information and introducing promising deals to each. It is to be expected that when a VC seeks to syndicate it prefers to do so from within its networked community. Likewise, Lockett and Wright (1999) had previously noted that partner selection is influenced by previous interactions and by partners' reputations for trustworthiness. Costs associated with searching for new syndicate partners are also arguably lower when venture capitalists syndicate within their community.

Moreover, offering an investment opportunity to a venture capitalist in the same community furthers the building of close ties (Hochberg, Ljungqvist, and Lu, 2007), minimizes the risk of conflicts of interests among investors, and reduces agency costs (Seppä and Jääskeläinen, 2002). Seppä and Jääskeläinen (2002) further argue that alliances among actors that have previously co-operated with each other can significantly reduce quality uncertainty about partners.

These arguments, however, beg the question of why venture capital funds ever syndicate from outside their communities? For example, Industry Canada (2014) documents that foreign investors (primarily from the US) are a significant and growing presence in the Canadian VC market and are more likely to invest in later stage deals than early-stage investments. (Specifically, during the 2015 calendar year, foreign investments by non-Canadian VC funds accounted for more than 40 per cent of the two billion dollars of VC investment, with the majority of this funding targeting late stage rounds.) This has contributed to the discussion, that whereas Canadian investors and founders shoulder early-stage risks, US investors purchase, indeed, "cherry-pick," control of the more successful growth firms that reach later-stages (Kong, Nitani and Riding, 2016). This outcome is also consistent with the thesis advanced here: that if the Canadian VC community is skewed towards small funds, it may be difficult to find a large domestic investors with sufficient depth of capital and expertise to take investee firms to a successful exit. This may oblige founders and early Canadian VC investors to seek sources of capital from beyond the community, especially for later (larger) rounds.

This may be reinforced if foreign investors (for example, those based in the United States) operate within an environment of a relatively plentiful supply of venture capital. Kanniainen and Keuschnigg (2003, 2004) and Cumming (2011) contend that an increase in capital available to the venture capital community (as in the US) may render VC firms human resource constrained. Given that a fund manager can effectively monitor only a given number of deals and serve on a limited number of boards, and if the supply of qualified VC fund managers is inelastic in the short-run, large U.S. VC funds may be pressured to make larger investments. This may intensify U.S. VCs' demand for promising later round investment opportunities both within the U.S. and in outsider (for example, Canada) communities.

In sum, small and financially constrained venture capitalists in a community with few large funds (such as that of Canada) may be obliged to seek deeper pockets internationally. Meanwhile, venture capitalists in a community with many large funds (such as the U.S.) may be under pressure to finance later stage companies. This arguably induces a flow of late stage venture capital between the two communities, from the latter to the former. Hence, the first hypothesis advanced is:

Hypothesis 1: In a VC community comprising relatively few large funds, foreign venture capital funds are more likely to participate (a)

when the incumbent VC syndicates are comprised of small funds and (b) in later stage investments.

It is also argued that a venture capital sector that is skewed towards an excess of small funds may hold negative implications for VC exits, for three reasons.

1. Small fund sizes may result in underinvestment if additional sources of capital are not found.
2. To the extent that small investors syndicate with other small investors, excessive syndication potentially hinders the growth of investee firms because time and energy are diverted from development of the firm to seeking out additional financing and arranging consensus or agreement among the many key players. Moreover, governance structures may become cumbersome and diverging interests among investors may be difficult to manage.
3. In the event that a large investor enters from outside of the incumbent VCs' community, dilution of incumbent investors' stakes may occur, reducing the motivation and efforts of the founding team. To this point, Manigart et al. (2004) confirm a positive relationship between the amounts of money an investor brings to the table and the investor's power in a syndicate. Alternatively, founders may be averse to the participation of large investors if they anticipate dilution or potentially dysfunctional conflicts.

In this case, capital formation would be limited to relatively small, more frequent, tranches of investment. This arguably limits investee firm's organic growth and increases the risk of the firm because of the greater uncertainty about the availability of follow-on rounds. At the extreme, early stage investors may rationally prefer to sell the investee firm at a premature stage of development, rather than possibly being "crammed down" by new entrants. According to Murray (1999: 360),

> *"[t]he parlous financial position of the original VC investor makes the negotiation over the pricing of equity to the follow-on co-investor potentially difficult. In an extreme case, the original investor may have to accept an aggressively low equity revaluation and thus a significant dilution of the seed fund's initial investment in order to persuade the necessary follow-on investor to participate in the deal."*

All of these outcomes potentially reduce the growth potential of the investee, placing the firm at a disadvantage with respect to better-funded competitors. A successful exit (defined here as either an IPO or an acquisition (Gompers and Lerner (1999) and Brander, Egan, and Hellmann (2008)) requires the firm to be of a relatively large size; hence restricted growth is likely to decrease the chance of successful exits and increase the likelihood of unsuccessful ones (write offs and buybacks). Hence, the second hypothesis is:

Hypothesis 2: Successful exits are less likely when early investors are small funds.

While both IPOs and M&As are usually regarded as successful exits, from the founders' perspective IPOs are arguably the preferred VC exit route (Cumming, 2008; Hellman, 2006). Founders are relatively more likely to maintain control rights and enjoy the private benefit of being the CEO of a publicly listed company (Cumming, 2008; Hellmann, 2006). An M&A exit might be viewed as the second best VC exit strategy—even when the M&A exit is financially superior to an IPO—because the founders usually lose ownership and control rights over the firm.

EMPIRICAL APPROACH, DATA AND METHODS

The estimation of multivariate models was used to examine the relationship between fund size, syndication patterns and exits. The following section outlines each approach, with each approach described more fully in the findings. First, multinomial logistic regression was employed to estimate the likelihood, as a function of incumbent VC size and control variables, of: adding no new investor(s) to a syndicate; adding a domestic investor; or adding a foreign investor (Hypothesis 1). Second, the effect of fund size on the likelihood of a successful exit (Hypothesis 2) was estimated using a proportional hazards model of time to exit. The work estimates models of the relationship between VC fund

size and the nature and incidence of successful exits.

DATA

Data on 2,315 investment deals in 1,240 companies from 1999 through 2011 was drawn from the Thomson Financial VCReporter database. These data focused on "classical" VC investments in the Canadian context. The data excluded financings of acquisitions, buyouts, turnarounds, and consolidations; investments for which all investors are unknown; investments made after the firm had exited; and investments in already-public companies. Almost three quarters of the investments were technology-based in life sciences, IT, and other technology sectors. The majority of deals (61.8 percent) were follow-on investments. Foreign VC funds participated in 521 of the deals (22.5 percent). Of the 373 Canadian VC funds that participated in the 2,315 deals, 202 funds (54.2 percent) were private independent limited partnerships, 69 (18.5 percent) were corporate-affiliated (institutional, corporate financial, or corporate industrial investors), and the balance were government or government-affiliated.

EMPIRICAL FINDINGS

Hypothesis 1: Likelihood of Foreign Fund Entry

The testing of Hypothesis 1 was undertaken using estimation of a logistic regression model of syndication outcomes. The dependent variable was defined as a three-level categorical variable corresponding to, at a given financing round:

(a) no new investor is added to the syndicate (reference category);
(b) a new domestic venture capitalist was added to the syndicate; and,
(c) a new venture capitalist was added to the syndicate and the entrant was a foreign investor.

Control variables include:

(a) the industry sector of the investee firm;
(b) the location of the deal (province in which the fund and the investee are located or the province in which majority of funds in the incumbent syndicate and the investee are located);
(c) the type of the fund/syndicate (type of the majority of the funds in the incumbent syndicate; if no "majority", it is coded as "other" (base category=private independent)); and,
(d) the level of experience of the fund/syndicate. Experience was measured by the age, the number of funds raised by, the number of companies invested in, or the number of successful exits attained by, the VC firm managing the fund. In case of syndication, the value of the most experienced fund, given the measure of experience, was used).

The key independent variable was the size of the incumbent VC syndicate. This was measured according to three alternative approaches. First, fund sizes were categorized into quintiles according to the amount of capital under management, as of the initial round of VC financing, as follows.

- very small (capital under management < $30 million CDN);
- small (capital under management ≥ 30 million, < 75 million);
- mid (capital under management ≥ 75 million, < 165 million),
- large (capital under management ≥ 165 million, < 500 million); and,
- very large (capital under management ≥ 500 million).

For deals with one incumbent VC the amount of capital under the fund's management at time of investment was used; for deals with more than one incumbent VC, this measure was defined as the amount of capital under management of the largest fund in the syndicate, again measured at the time the deal was made. To ensure robustness, two additional measures were used: presence of a foreign VC (a binomial variable equal to 1.0 if at least one foreign fund participated in the incumbent syndicate; 0.0 otherwise); and, the number of VCs (a categorical variable with three levels: one incumbent investor; two to four incumbents; five or more incumbents).

The investee firm's stage of development was measured three ways. The first was a categorical measure related to the number of financing rounds: second round; third round; fourth round; and, fifth

Table 1: Multinomial Logistic Regression: Probability of Entry of Foreign and Canadian Funds

		Coefficient estimate: Foreign v/s Canadian (base)	Coefficient estimate: No Entry v/s Canadian (base)
Intercept		-26.093 ***	1.297 **
ln ($Amount disbursed)		2.329 ***	-0.887 ***
Time since first Investment		0.060	-0.036 *
VC experience		-0.048 **	-0.028 ***
Industry	Life Sciences	17.551 ***	-0.188
	IT	17.858 ***	-0.361
	Other Tech	17.237	0.312
Round#	3rd	0.529	0.6 **
	4th	2.018 ***	0.889 ***
	5th or more	1.369 *	1.036 ***
Type	Corp. Affil.	-0.684	-0.17
	Govt. Affil.	-0.294	0.075
	Government	1.404	0.167
	Foreign	-0.485	-0.766 *
	Other	1.194 **	0.011
Location	BC	0.316	0.486
	QC	-0.246	-0.577 *
	Prairies/Atlantic	-20.319	0.739
	Other	-0.157	0.158
Size	Very Small	3.791 ***	-0.387
	Small	0.405	-0.851 **
	Large	0.277	-0.127
	Very Large	0.579	0.914 ***
Foreign Fund		-0.396	0.67 **
#Incumbents	2,3,4	-0.423	-0.378
	5 or more	-0.372	0.031
N		789	
	None Added	349	
	Canadian Added	383	
	Foreign Added	57	
-2 Log Likelihood		961.025	
Chi-Square		461.502	
df		50	
p-value		0.000	
Cox and Snell R-squared		0.443	
Nagelkerke R-squared		0.530	
McFadden R-squared		0.324	

**p-value<0.1; **p-value<0.05; ***p-value<0.01*

or later round. The second measure was time since the first venture capital investment and the third measure was the amount of capital required by the investee firm at the financing round (proxied by the amount of VC disbursed).

The findings with respect to estimation of the model are reported in Table 1. Note that in this specification, the age of the VC firm managing the fund is used. The results of specifications with other experience measures do not differ from the above, and are available upon request.

With respect to the correlates of the fund size distribution variable, the following findings were obtained.

First, the pattern of coefficient estimates was consistent with the hypothesis that entry of a foreign fund was more likely when syndicates comprise primarily small-funds (p-value<0.001). This is consistent with the idea that small Canadian funds face difficulty in accessing large funds within Canada as syndicate partners. This may oblige them to rely on foreign sources of capital.

Second, syndicates that include either a very large domestic fund or a foreign fund were significantly less likely to add an investor.

With respect to the investee firm's stage of development, as the amount required by the investee (proxied by the amount disbursed) increased; entry of a foreign fund was significantly more likely than entry of a Canadian fund (p-value <0.001), and Canadian funds were significantly more likely to enter as opposed to no fund (p-value <0.001), but the coefficient is much larger (in an absolute value) for the foreign fund entry than the Canadian fund entry and the Wald chi-square statistics indicates that the difference is significant (p-value = 0.000). The converse is also likely, however, that is: the entry of a foreign fund enables a larger capital infusion. Moreover, foreign funds were significantly more likely to enter at later financing rounds while entry of Canadian funds was more likely in second round financings.

Other observations include that:

- In the "Canadian fund entry versus no fund entry" specification, the "foreign" category of the fund type variable was weakly significant (p-value <0.1). That is, when foreign funds formed the majority of an incumbent syndicate, a Canadian fund was more likely to enter. This may be in order to mitigate problems associated with distance and foreign funds' unfamiliarity with the Canadian market.
- Regional differences were not substantive even though, with Quebec being the province in which the majority of large Canadian funds are located, it may be somewhat easier to find a large Canadian partner fund in Quebec.
- The more experienced the incumbent syndicate, the less likely was foreign fund entry (p-value <0.05) and the more likely was Canadian fund entry (p-value <0.01). This may be because the well-established network position of an experienced venture capitalist makes it easier to find a syndicate partner within Canada, diminishing the reliance on foreign funds' deeper pockets (Seppä and Jääskeläinen, 2002; among others).
- Life Science and IT firms appeared more likely to attract foreign investors than other firms.

These results suggest that large funds or syndicates, as well as syndicates that incorporate one or more foreign investors have relatively less need for additional sources of capital so they are less likely to add a new investor of any type (foreign or Canadian). The findings outlined above are collectively and individually consistent with Hypothesis 1.

Hypothesis 2: Exit Outcomes

The second hypothesis maintained that when early investors are small funds, successful exits are less likely than when early investors include a large fund. As noted, successful exits are defined as either IPOs or acquisitions (Gompers and Lerner, 1999; Gompers, Kovner, Lerner, and Scharfstein, 2006; Brander, Egan, and Hellmann, 2008; and many others). To test the second hypothesis a proportional hazards model of time to exit was employed, the dependent variable may be thought of as the time interval between initial investment and exit.

The estimation of the proportional hazards model may be interpreted to reflect the probability of a successful exit within a given time as well as the amount of time between investment and exit.

$$\frac{h_g(t)}{h_j(t)} = \exp(\beta_1(SIZE_g - SIZE_j) + \tilde{\beta}_2(\tilde{C}ONTROL_g - \tilde{C}ONTROL_j)\ldots(2)$$

where: $\frac{h_g(t)}{h_j(t)}$ = ratio of hazard functions (the hazard ratio) to a successful exit for firms *g* and *j*.

$\boldsymbol{SIZE}_f$ = A size measure of venture capital fund *i* or syndicate *k* backing entrepreneurial firm, $i \in g, j, k \in g, j$.

$\tilde{C}ONTROL_t$ = A vector of control variables as previously defined.

$h_i(t) = = \lambda_0(t)\exp(\beta_1 SIZE_i + \tilde{\beta}_2 CONTROL_i)$, where *hi(t)* = the hazard function for i and λ0(t) = the baseline hazard function.

The explanatory variables include the three alternative measures of size as used in the analyses of syndication. Control variables include the industry sector of the investee, the level of the investee's development (the amount of venture capital disbursed at, and the round number of, the latest financing round), the location of the deal, the type of the fund/syndicate, and the level of the experience of the fund/syndicate. There were 42 M&A exits and 12 IPO exits among 426 entrepreneurial firms that received venture capital investments during the period from January 1st, 2001 to December 31st, 2006. Entrepreneurial firms that received venture capital investments in or after 2007 were excluded as they were considered too premature to attain a successful exit by the time of the analysis (in fact, there was only one firm, among those firm in the usable sample, that had exited by December 31st, 2009).

The sample includes not only entrepreneurial firms exited via a successful exit but also those exited through a buyback or a write-off (the time to exit is unknown for these observations) as well as an unknown number of entrepreneurial firms that have a finite positive probability of a successful exit but have not yet exited (the latter are referred to as "censored observations"). The proportional hazards model allows for censoring (unlike static models, such as probit or logit) and incorporates information from both censored and uncensored observations to provide consistent parameter estimates (Morisson, 2003).

Hypothesis 2 predicts a positive association between the fund size and the hazard to a successful exit. Table 2 presents the results for M&A exits (there were too few IPO exits for reliability and these are therefore excluded from the analysis). The model was statistically significant (the Chi-square statistics were 59.533 and 70.307, respectively, for each of which the p-value was <0.001). Consistent with Table 1, in this specification, the age of the VC firm managing the fund is used. The results of specifications with other experience measures do not differ from the above, and are available upon request.

Table 2 reveals the fund size distribution variable was significant and consistent with Hypothesis 2. Entrepreneurial firms backed by syndicates with one or more "very large" or "large" funds were significantly more likely to attain a successful M&A exit over any given time, as compared to those backed by mid-sized or smaller venture capital funds (p-value<0.01 for the "very large" category and p-value<0.05 for the "large" category).

Second, the number of investors in the syndicate was significantly positively related to the likelihood of an M&A exit. The previous section (Table 1) revealed an insignificant relationship between the number of incumbent funds in a syndicate and the probability of a new investor entrance, implying that the incumbent syndicate's financial capacity depends not so much on the number of funds in the syndicate but whether the syndicate has one or more large funds. If so, the significant association between a larger number of funds in the syndicate and a shorter time to a successful exit may reflect more efficient value-adding services possible for such syndicates. That the significance level was

Table 2: Proportional Hazard Model on Time to Successful M&A Exit

	Coefficient Estimate	p-value
Industry		
Life Sciences	0.072	
IT	1.054	*
Other Technologies	-12.576	
ln ($AmountDisbursed)	0.200	
Round#		
2nd	0.110	
3rd	-0.115	
4th or more	-1.215	
Type		
Corporate Affiliated	0.119	
Government Affiliated	-0.290	
Government	-0.356	
Foreign	-14.735	
Other	-0.428	
Location		
British Columbia	-0.526	
Quebec	-0.905	*
Prairies & Atlantic	-0.401	
Other	-0.366	
VC experience	-0.052	**
Size		**
Very Small (x<30)	0.091	
Small (30<=x,75)	-0.235	
Large (165<=x<500)	1.205	**
Very Large (500<=x)	2.076	***
Presence of Foreign Fund	0.120	
#Syndicate Members		*
2 to 4	1.738	**
5 or more	1.835	*
N	426	
Successful Exit	42	
Censored	384	
-2 Log Likelihood	419.617	
Chi-square	70.307	
df	24	
Sig.	0.000	

**p-value<0.05; **p-value<0.01; ***p-value<0.001*

higher for syndicates with two to four members (p-value <0.05) than that for syndicates with five or more members (p-value <0.1) is consistent with this interpretation as an excessively large number of funds in a syndicate likely compromises the efficacy of value-adding services. The number of funds in the syndicate and the total amount of VC received by the investee company at the time of its exit (results of this analysis available upon request) were positively and significantly correlated. This suggests that larger infusions of capital are likely when many investors are involved, or when one or more large investors are in the syndicate, which, in turn, speeds an M&A exit.

These results are also consistent with previous studies that find a positive association between the number of investors in a syndicate and the investee's hazard of a successful exit (Giot and Schwienbacher, 2006) as well as between a syndicated (as opposed to a standalone) investment and the investee's growth (Hopp and Rieder, 2006).

Third, the presence or absence of a foreign fund in the syndicate, was insignificant. This may reflect that, while the presence of a foreign fund allows a large capital infusion in the investee company, it does not directly translate into a shorter time to a successful exit due to dysfunctional conflicts among investors brought on by the entry of a foreign fund to the syndicate.

Additional findings from this analysis include:

- Sector was weakly significant (p-value <0.1) with IT firms showing a faster time to exit.
- At a p-value<0.1 it was found that firms located in Quebec and funded by Quebec investors were relatively less likely to obtain a successful exit. Thus, while Quebec companies were more likely to receive a VC successful exits were less likely. This result may reflect the relatively large number of large funds particular to Quebec with social innovation objectives that are additional to profit motives.
- The level of experience (age) of the venture capital fund was significantly negatively related to the hazard of an M&A (p-value<0.05), that is, the less experienced the investor(s), the more likely the attainment of an M&A. This is contrary to expectations and may be

a product of multicollinearity between size and experience variables.

Overall, the results were consistent with Hypothesis 2: successful exits were less likely when early investors were small funds. The size and the number of investors in the syndicate were significantly and positively related to the hazard of an M&A exit.

SUMMARY, LIMITATIONS AND CONCLUSIONS

This work argues, conceptually and empirically, that the efficacy of a region's venture capital sector depends critically on the distribution of VC fund sizes: that too many small funds can distort syndication patterns, compromise successful exits and increase likelihood of foreign entry.

The size of the incumbent investor syndicate was found to have a significant impact on the likelihood of adding new investors to the deal. Incremental syndication was found to be more likely when the incumbent syndicate is comprised of small funds rather than when large venture capitalists are present. Moreover, the number of incumbent investors was insignificantly associated with syndicate expansion, suggesting that what matters is not the number of investors in the syndicate but rather the quantum of funding. In addition, the presence of one or more foreign investors in the incumbent syndicate significantly reduced the odds ratio of new investor addition. These results were as hypothesized.

The fund size distribution measure was statistically significant and the pattern of coefficient estimates was consistent with the hypothesis that entry of a foreign fund was relatively more likely for investments involving incumbent syndicates that comprised small funds. Firms backed by a syndicate with one or more "very large" or "large" funds were significantly more likely (quickly) to attain an M&A exit relative to those backed by mid-sized or smaller venture capital funds.

From a practical perspective, these findings infer that entrepreneurial firms are often underfinanced when backed by small funds. These findings are consistent with the view that small (typically early stage funds) syndicate because they are limited as to capital. A lack of financial resources in early-stage syndicates requires additional syndication, but in the absence of a large number of large funds in the VC community this obliges small early-stage funds to rely on foreign funds. The reliance on foreign funds may place early-stage funds and founders into a disadvantaged bargaining position while reducing the likelihood of successful exits. These factors drive down rates of return to small early-stage funds and founders even though they take the greatest risks. These diminished rates of return—in spite of high risks—discourage further private sector participation in the venture capital sector, thereby compromising the sustainability of the venture capital market.

From an academic viewpoint, this work confirms previous findings of a positive association between fund size and performance. However, previous studies have interpreted this association differently. For example, Kaplan and Schoar (2005) conclude reverse causality: that successful past performance enables venture capitalists to raise large funds. Laine and Torstila (2003) attribute the positive association to the idea that larger funds are better able to fund more attractive opportunities because they are exposed to a larger universe of investments. The findings of this study, however, are more in line with those of Murray and his colleagues (Murray, 1999, 2007; Murray and Marriott, 1998; and Dimov and Murray, 2006) who hypothesized that small funds are financially constrained and disadvantaged due to scale and scope economies. This work finds that the fund size itself—that is, the level of financial availability—significantly influences a fund's syndication behaviour and its exit outcomes.

Of course, there are potential limitations to this study. It is possible that control variables are incomplete or that they fail to capture all of the systemic factors that may also affect syndication and exits. However, the findings were robust to a variety of alternative measures of control and independent variables. The results are also specific to Canada and the context of venture capital sectors differs internationally. However, in view of Lerner et al.'s (2005) observation that government is central to development of the VC sectors in many countries, it seems likely that skewness of the fund size distri-

bution is not unusual.

Japan may be no exception. According to the Japan Venture Capital association (2012), the stock of the Japanese VC market in 2011 is approximately one-thirtieth that of the US market (the total capital under management was $6.5 billion in Japan; $199.3 billion in the US (NVCA, 2015)). In Japan the flow of VC investment in 2011 was $246,000,000 (to 349 companies), less than one percent of that in US ($30 billion to 3,377 companies). Average size of investment was $580,000 in Japan, while it was $5,030,000 in the US. To the extent that a yet more entrepreneurial society is to be fostered, further development of the Japanese VC market may be considered. This is further supported by the *Insead Innovation Index* which rates venture capital activity in Japan 34th out of 71 economies with a score of 9.1; Canada, the U.S., Ireland and Israel are tied for first with a score of 100. (https://www.globalinnovationindex.org/content.aspx?page=data-analysis). In considering interventions, this paper describes some of the potential unintended consequences of well-meaning public policies.

The empirical observations show that it is better for entrepreneurs to be backed by large funds if their businesses are to grow and be successful. However, this information is not useful when the market is out of balance and large funds are not available. Yet, the results of this study may help entrepreneurs to anticipate what might happen after they receive initial financing from small VC funds and might help prepare them for the limited availability of additional financing in later rounds. As their businesses grow successfully, they may have to spend much of their time and efforts searching for additional sources of financing while managing the company with a limited amount of human and financial capital. Entrepreneurial teams may also have to face a trade-off between accepting foreign funds' financing offers (perhaps with unfavorable conditions or lower valuations of the company) on the one hand, or selling their businesses prematurely to a large corporation on the other hand.

The results of this research are consistent with the view that in a venture capital marketplace characterized by an imbalance between small and large funds, investments made by small, typically early-stage, VC funds are disadvantaged with respect to attaining successful investment outcomes. Small early-stage investors, who discover, finance, and grow viable companies at the earliest stages of development while providing considerable non-financial value-added services, are necessary for the success of later-stage investments. Such VC funds make significant contributions to the entrepreneurial market, to the growth of high-potential firms and to job creation. Accordingly, policy directions should focus on levering small private sector VCs with public sector funding, possibly through lending to VC funds with capped interest rates. This approach, currently in use in the UK, warrants consideration and evaluation.

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