



Capital structure in venture finance[☆]

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Abstract

Prior research has argued that convertible preferred equity is the optimal form of venture capital (VC) finance, based on datasets with up to 213 observations from the United States, where unique tax biases exist in favor of convertible preferred. This paper introduces a comparable sample of 3083 Canadian corporate and limited partnership venture financing transactions spanning the years 1991–2000. The data indicate that a variety of securities are used, and convertible preferred equity has not been the most frequent. Empirical tests offer strong support for the proposition that the mix of financing instruments minimizes the costs arising from a set of agency problems.

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1. Introduction

Theoretical research in venture finance consistently repeats the proposition that convertible preferred equity is optimal.¹ Previous empirical research has considered up to 213 observations from US venture capital (VC) funds.² Gilson and Schizer (2003), however, show US tax law biases venture capitalist's and entrepreneur's incentives to use convertible preferred equity, and this tax bias is the only plausible explanation for the US VC industry's remarkable convergence on only one security. This tax bias has been shown to be absent in Canada (Sandler, 2001; see also Mintz, 1997). It is therefore worthwhile to revisit the question as to whether convertible preferred equity really is the optimal form of venture finance by exploring non-US empirical evidence (see Denis, 2004, for this view and a survey of the literature). This paper offers new evidence from a sample of 3083 Canadian venture capital financings.

Why might convertible preferred equity be optimal in venture finance in a setting absent US tax biases? Convertible preferred equity provides the venture capitalist with a stronger claim on the liquidation value of the company in the event of bankruptcy, thereby shifting the risk from the venture capitalist(s) to the entrepreneur. Relative to straight common equity, convertible preferred equity reduces the entrepreneur's dilution of ownership. Convertible preferred shares also enable a greater amount of funds to be raised relative to straight debt as the venture capitalist has some equity participation. In the context of staged financing, convertible preferred equity mitigates window dressing problems and ensures that most positive expected NPV projects continue to receive financing. Convertible preferred shares also facilitate the conversion of illiquid holdings into cash, and mitigate problems associated with selling the firm, particularly when the incentive effects of trilateral bargaining are considered (see references listed in Footnotes 1 and 2).

Why might securities other than convertible preferred equity be optimal in a setting absent US tax biases? One natural explanation could be that different types of entrepreneurs are in fact different in ways that give rise to different sets of agency problems. Because different entrepreneurial firms are staged with different frequency based on expected agency problems (Gompers, 1995), syndicated with different frequency depending on expected agency problems (Lerner, 1994), and monitored with different intensity via seats on boards of directors depending on expected agency problems (Gompers and Lerner, 1999), it would be rather surprising to expect the same security choice for all entrepreneurial firms regardless of expected agency problems. Nevertheless, all prior academic work in venture finance consistently repeats the proposition that only one security is optimal: convertible preferred equity. The venture finance literature is in

¹ For theoretical work, see Bascha and Walz (2001a), Berglöf (1994), Bergmann and Hege (1998), Casamatta (2003), Cestone (2000), Cornelli and Yosha (2003), Gompers (1998), Hellmann (2000), Marx (1998), Sahlman (1990), Schmidt (2003), Trester (1998), etc. Note, however, that a less well acknowledged literature exists in support of other securities in venture finance. Garmaise (2000), Yung (2002), Landier and Thesmar (2003), and DeBettignies (2003), for example, provide conditions under which straight common equity or straight debt could be optimal, and explicitly illustrate robustness to their underlying assumptions.

² For empirical work, see Gompers (1998) and Kaplan and Strömberg (2003); see also Bergmann and Hege (1998), and Sahlman (1990) for similar data.

fact a complete outlier in the broader scope of literature on capital structure generally. Since the seminal work of [Jensen and Meckling \(1976\)](#), all work on capital structure (outside the realm of the narrowly focused venture finance literature) is consistent with the view that capital structure choices adjust to changes in expected agency problems. It is surprising that the application of this idea to the context of venture finance is as novel as it appears next to all prior work on topic, particularly in view of the fact that agency problems are both very heterogeneous and very pronounced in venture finance.

This paper makes use of a new data set of 3083 Canadian corporate and limited partnership venture capitalist investments spanning 1991–2000. A variety of forms of finance are observed. As well, different types of entrepreneurs receive VC finance. We provide empirical tests that relate firm-specific characteristics to the security selected. We show that the empirical tests are quite robust to numerous alternative specifications.

Some of the notable results from the data and empirical tests are as follows. Common equity was used in 36.33% of the 3083 investments; followed by straight (nonconvertible) debt: 14.99%; convertible debt (including mixes of straight debt and warrants): 12.36%; convertible preferred equity (including mixes of straight preferred equity and warrants): 10.87%; mixes of straight debt and common equity: 10.67%; straight preferred equity: 7.27%. In addition, a variety of less frequently employed combinations of other securities, such as mixes of straight preferred equity and straight debt and other combinations, were used in 7.53% of the investments. The use of different securities does not depend on the definition of venture capital. In the multivariate tests, the data indicate seed stage firms are more likely to be financed with either common equity or straight preferred equity, and less likely to be financed with straight debt, convertible debt, or mixes of debt and common equity. We also find some evidence that life science and other types of high-tech firms are more likely to be financed with convertible preferred equity. In the empirics, we explicitly show the statistical and economic significance of these results by reporting the probability of use of each form of finance depending on the context and characteristics of the entrepreneurial firm.

This paper is organized as follows. Section 2 briefly describes the data. Section 3 outlines the hypotheses. The empirical tests are carried out in Section 4. Concluding remarks follow in Section 5.

2. Data

The proposition that convertible preferred equity is optimal is tested in this paper using a sample of 3083 Canadian corporate and limited partnership venture financing transactions spanning the years 1991–2000. The data are from Macdonald and Associates, Ltd. (Toronto) <http://www.canadavc.com>). The data are described in [Fig. 1a–d](#) and [Table 1A–D](#). Common equity was used in 36.33% of the 3083 investments; followed by straight (nonconvertible) debt: 14.99%; convertible debt (including mixes of straight debt and warrants): 12.36%; convertible preferred equity (including mixes of straight preferred equity and warrants): 10.87%; mixes of straight debt and common equity: 10.67%; straight preferred equity: 7.27%. In

addition, a variety of less frequently employed combinations of other securities, such as mixes of straight preferred equity and straight debt and other combinations, were used in 7.53% of the investments. US-based research has consistently argued convertible preferred equity is the optimal form of venture capital finance (see Footnotes 1 and 2). In this section, we investigate whether these results are due to differences between Canadian and US definitions of venture capital, and present all the data by type of venture capital firm (described in Subsection 2.1) and type of entrepreneurial firm (described in Subsection 2.2).

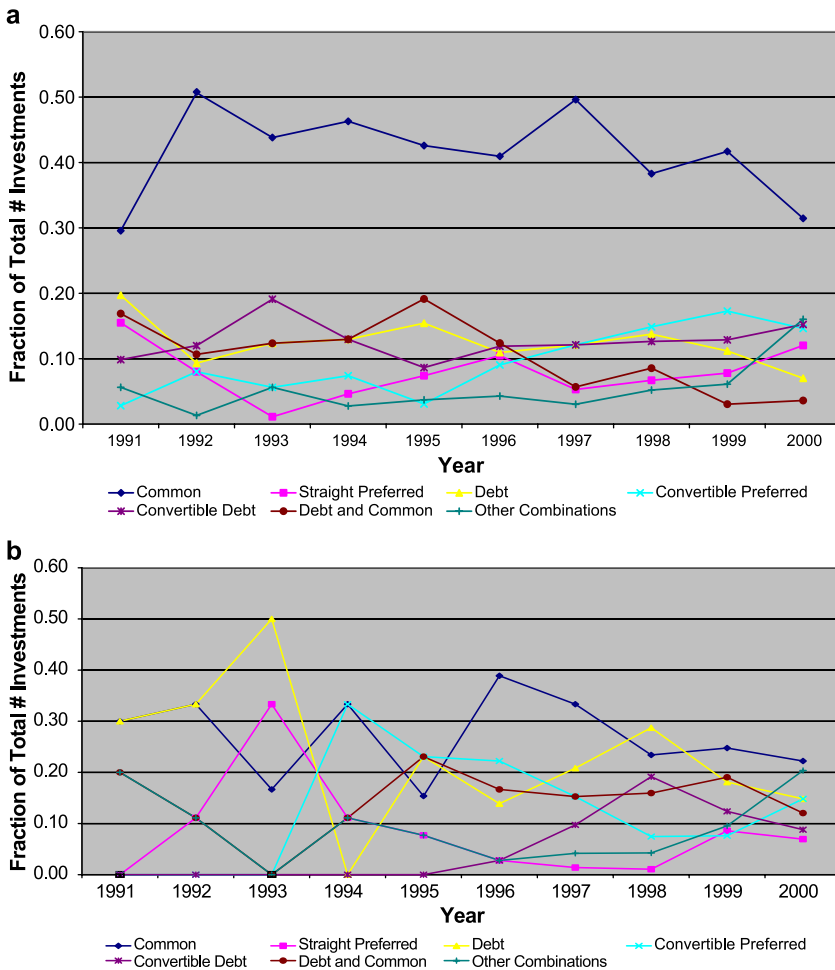


Fig. 1. (a) Securities used by Canadian Limited Partnership Venture Capitalists, 1991–2000, for Seed and Expansion Stage Entrepreneurial Firms only. (b) Securities used by Canadian Corporate Venture Capitalists, 1991–2000, for Seed and Expansion Stage Entrepreneurial Firms only. (c) Securities used by Canadian Limited Partnership Venture Capitalists, 1991–2000, for Late, Buyout and Turnaround Stage Entrepreneurial Firms only. (d) Securities used by Canadian Corporate Venture Capitalists, 1991–2000, for Late, Buyout and Turnaround Stage Entrepreneurial Firms only.

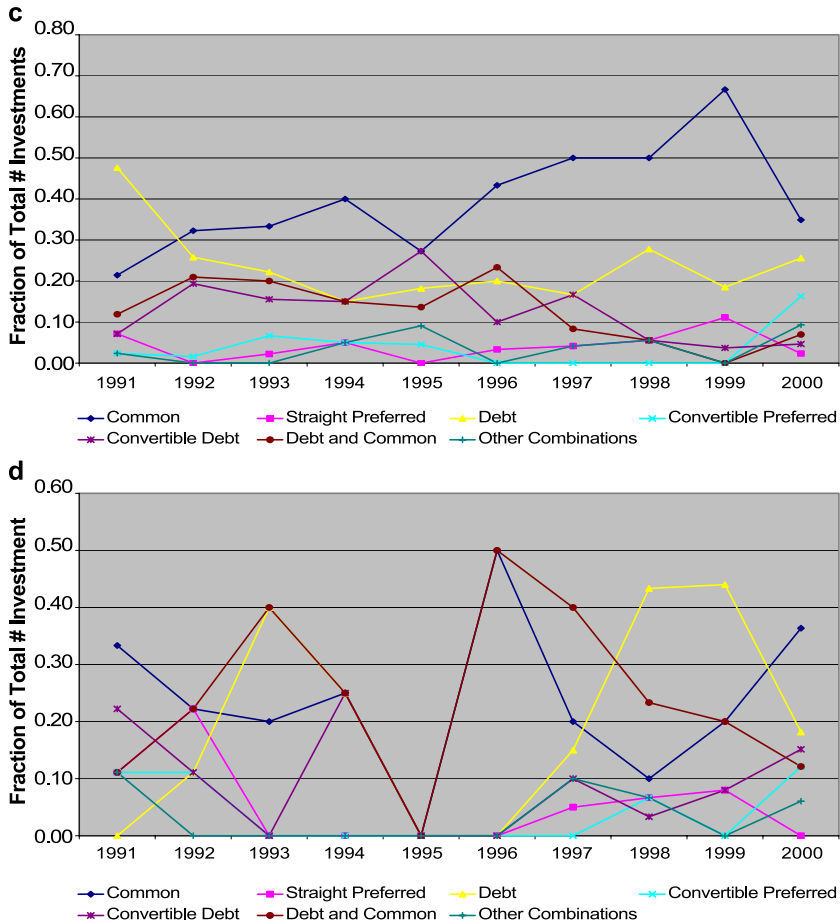


Fig. 1 (continued).

2.1. Types of venture capital funds in Canada

Prior research on topic (cited in note 2) has only presented information on venture capital contracts from limited partnerships. Table 1A–D provides data on limited partnerships and corporate venture capitalists.³ Gompers and Lerner (1996) have indicated that limited partnerships in the United States almost always face restrictions on

³ Other types of venture capital funds exist in Canada (government funds, labour-sponsored funds, and institutional funds). All of those other funds use very similar securities to corporate funds and limited partnerships. Only data from only corporate and limited partnership funds are considered in this paper, as these fund structures are the most similar to that which exists in other countries as well. See Cumming (2000) for the securities used by other types of funds in Canada. Note as well that there is significant heterogeneity within any particular VC fund of each type, including limited partners, etc. (Cumming, 2004).

the use of debt⁴ (among other things, such as the types of firms that may be financed). In Canada, based on the wide variety of firms financed and type of securities used (Table 1), we may infer such restrictions are relatively infrequent. Corporate funds may have different incentives and restrictions than limited partnership funds (Gompers and Lerner, 1996, 1999, 2001; Hellmann, 2002). However, based on the consistency of the data across corporate and limited partnership funds, we may infer that the data cannot be explained by fund structure alone; nevertheless, further research in the spirit of Gompers and Lerner (1996, 1999) could provide additional insight.

2.2. Types of entrepreneurial firms financed by venture capital funds in Canada

Canadian venture capital funds tend to finance entrepreneurial firms across a wide array of different stages of development. The conventional stages, as defined in the literature and used in industry in Canada, the United States, Europe and elsewhere, are as follows (Macdonald, 1992; see also the Canadian Venture Capital Association and European Venture Capital Association Annual Reports for consistent definitions and usage of these terms in practice):

- *Start-up stage*: The entrepreneurial firm may be based on a concept without a product or any marketing, or it may have a product being developed, but not yet sold commercially;
- *Expansion stage*: The entrepreneurial firm requires significant capital for plant expansion, marketing, and to initiate full commercial production and sales;
- *Late/mezzanine stage*: Late stage investments in established companies;
- *Acquisition/buyout stage* [hereafter “buyout stage”]: The operating management of the entrepreneurial firm acquires a product line, a division, or a company;
- *Turnaround stage*: The entrepreneurial firm that was once profitable but is now earning less than its cost of capital.

While these stages are mutually exclusive, note that all firms go through the start-up and expansion stage, but not all experience the buyout and turnaround stage in their life cycle. We consider buyouts and turnaround investments both together with and separately from the sample of the start-up and expansion stage investments herein, to check robustness of the empirical tests to the definition of the sample.⁵ Late/mezzanine firms (close to a going public transaction), acquisition/buyout firms (that need capital to acquire another firm or division) and turnaround firms (that are in financial distress and not earning their cost of capital) are reported separately in Table 1C and D

⁴ This restriction is on the fund's ability to borrow, which in turn could impact its interest to issue debt to investees (e.g., to match cashflows into and out of the fund).

⁵ While the sample could be defined in a variety of different ways (reported and otherwise), in no way are the results contingent on the definition of the sample. Alternative specifications not reported are available upon request. We report the data that are similar to comparable US data sets. We further extend prior US work by analyzing corporate VCs (not previously considered in any empirical contracting study), among other things discussed herein.

Table 1

Number of investments with alternative forms of finance in Canada (1991–2000)

Panel A. Private independent limited partnership VC investments in early and expansion stage entrepreneurial firms only

This table presents the number of limited partnership venture capitalist investments by various entrepreneurial firm characteristics including stage of development (seed and expansion; other stages for limited partnership VCs are reported separately in Panel C), amount invested, amount invested relative to other investors, contemporaneous syndication, life science firms, other types of high-tech firms, firms with fewer than 50 employees, and the investment round (round 1, rounds 2–5, and rounds 6–11). The few cases of warrants were added to the number of common equity contracts. Investment years are reported in Fig. 1a.

Form of finance	Total no. of investments	Seed	Expansion	\$ Invested < \$1 million	\$ Invested > \$1 million	\$ Invested / total capital <0.33	0.33 < \$ invested / total capital <0.66	\$ invested / total capital >0.66	Contemporaneous syndication	Life sciences	Other high- tech	Employees <50	Round 1	Rounds 2–5	Rounds 6–11
Common	817	530	287	628	189	216	155	446	395	247	422	500	300	418	93
Straight preferred	172	122	50	112	60	65	47	60	122	51	96	90	55	101	16
Debt	231	127	104	187	44	42	48	141	97	51	107	130	85	123	22
Convertible preferred	241	153	88	173	68	121	43	76	167	61	158	155	78	139	22
Convertible debt	266	149	117	209	57	68	50	148	121	63	154	150	100	130	35
Debt and common	167	83	84	133	34	30	44	93	82	20	93	102	74	85	8
Other combinations	148	88	60	101	47	64	29	55	100	29	103	71	59	63	23
Total	2042	1252	790	1543	499	606	416	1019	1084	522	1133	1198	751	1059	219

Panel B. Corporate VC investments in early and expansion stage entrepreneurial firms only

This table presents the number of corporate venture capitalist investments by various entrepreneurial firm characteristics including stage of development (seed and expansion; other stages for corporate VCs are reported separately in Panel D), amount invested, amount invested relative to other investors, contemporaneous syndication, life science firms, other types of high-tech firms, firms with fewer than 50 employees, and the investment round (round 1, rounds 2–5, and rounds 6–11). The few cases of warrants were added to the number of common equity contracts. Investment years are reported in Fig. 1b.

Form of finance	Total no. of investments	Seed	Expansion	\$ Invested < \$1 million	\$ Invested > \$1 million	\$ Invested / total capital < 0.33	0.33 < \$ invested / total capital < 0.66	\$ invested / total capital >0.66	Contemporaneous syndication	Life sciences	Other high- tech	Employees <50	Round 1	Rounds 2–5	Rounds 6–11
Common	146	71	75	88	58	45	43	58	96	36	81	79	53	80	12
Straight preferred	32	17	15	18	14	13	8	11	21	3	23	16	11	18	3
Debt	110	38	72	65	45	10	46	54	57	20	52	50	52	51	7
Convertible preferred	72	35	37	35	37	30	23	19	55	13	53	43	34	33	5
Convertible debt	58	26	32	42	16	23	17	18	40	9	40	31	19	26	13
Debt and common	85	30	55	57	28	23	28	34	52	9	49	42	35	46	4

Other combinations	67	33	34	49	18	42	9	16	52	7	50	23	22	27	18
Total	570	250	320	354	216	186	174	210	373	97	348	284	226	281	62

Panel C. Private independent limited partnership VC investments in late, turnaround and buyout stage firms only

This table presents the number of corporate venture capitalist investments by various entrepreneurial firm characteristics including stage of development (buyout and turnaround development stages; late/mezzanine stages can be determined by subtracting the buyout and turnaround stages from the totals; early and expansion stages are excluded from this panel), amount invested, amount invested relative to other investors, contemporaneous syndication, life science firms, other types of high-tech firms, firms with fewer than 50 employees, and the investment round (round 1, rounds 2–5, and rounds 6–11). The few cases of warrants were added to the number of common equity contracts. Investment years are reported in Fig. 1c.

Form of finance	Total no. of investments	Buyout	Turnaround	Public company	\$ Invested < \$1 million	\$ Invested > \$1 million	\$ Invested/ total capital < 0.33	0.33 < \$ Invested/ \$ total capital < 0.66	\$ invested/ total capital > 0.66	Contemporaneous syndication	Life sciences	Other high-tech	Employees < 50	Round 1	Round 2–5	Rounds 6–11
Common	125	51	23	149	80	45	23	20	82	48	24	30	43	42	67	13
Straight preferred	12	3	4	18	9	3	3	2	7	5	1	5	5	2	8	2
Debt	84	23	22	17	58	26	8	17	59	28	4	24	25	31	47	6
Convertible preferred	14	3	6	11	10	4	3	5	6	9	2	7	5	5	6	3
Convertible debt	42	15	11	32	23	19	6	6	30	14	4	9	15	18	20	4
Debt and common	46	17	10	13	33	13	7	12	27	20	0	10	18	18	27	1
Other combinations	10	5	5	8	7	3	3	1	6	4	1	4	3	5	5	0
Total	333	117	81	248	220	113	53	63	217	128	36	89	114	121	180	29

Panel D. Corporate VC investments in late, turnaround and buyout stage firms only

This table presents the number of corporate venture capitalist investments by various entrepreneurial firm characteristics including stage of development (buyout and turnaround development stages; late/mezzanine stages can be determined by subtracting the buyout and turnaround stages from the totals; early and expansion stages are excluded from this panel), amount invested, amount invested relative to other investors, contemporaneous syndication, life science firms, other types of high-tech firms, firms with fewer than 50 employees, and the investment round (round 1, rounds 2–5, and rounds 6–11). The few cases of warrants were added to the number of common equity contracts. Investment years are reported in Fig. 1d.

Form of finance	Total no. of investments	Buyout	Turnaround	Public company	\$ Invested < \$1 million	\$ Invested > \$1 million	\$ Invested/ total capital < 0.33	0.33 < \$ Invested/ \$ total capital < 0.66	\$ invested/ total capital > 0.66	Contemporaneous syndication	Life sciences	Other high-tech	Employees < 50	Round 1	Round 2–5	Rounds 6–11
Common	32	21	2	4	13	19	9	7	16	17	5	8	8	20	10	2
Straight preferred	8	6	2	1	4	4	4	1	3	5	1	2	1	5	3	0
Debt	37	26	5	3	17	20	17	0	20	19	2	16	8	25	12	0
Convertible preferred	8	3	1	1	8	0	3	3	2	6	0	7	3	2	5	1
Convertible debt	15	7	3	3	8	7	5	1	9	6	3	5	9	9	6	0
Debt and common	31	22	6	3	16	15	10	3	18	14	1	6	11	20	11	0
Other combinations	7	5	1	0	3	4	4	0	3	4	0	3	2	6	1	0
Total	138	90	20	15	69	69	52	15	71	71	12	47	42	87	48	3

because these investments fall outside the realm of the typical definition of ‘venture capital’ and are more appropriately classified as ‘private equity’.⁶ As well, note that early and expansion firms are not publicly listed, unlike a few of the turnaround and buyout firms in the data. Gompers and Lerner (1996, 1999) show US limited partnerships are often (not always) prohibited (by restrictive covenant agreements) from investing in publicly listed companies and buyouts and turnarounds. Likewise, the Canadian data are consistent with a small number of venture funds occasionally investing publicly listed companies, buyouts and turnarounds, but these investments comprise a small portion of the data. Below, we carry out tests with and without the presence of the late stage, publicly listed companies, buyouts and turnarounds. Their presence in the data in no way affects the analysis and conclusions herein. These transactions are provided primarily for reasons of comparison to the private early and expansion stage investments and the samples are separated in the empirics.

In addition to the mutually exclusive stages of development, entrepreneurial firms may also be defined by a number of nonmutually exclusive characteristics, including:

- *First-time investees*: Entrepreneurial firms that have not received prior venture capital finance (i.e., not follow-on financing by the same or another venture capital fund; note that “first-time” or “new” investees may be at any one of the above four mutually exclusive development stages—start-up, expansion, buyout, or turnaround). As well, note that the data indicate each of the financing rounds (up to 11 rounds are observed, as reported in Table 1A–D);
- *Technology firms*: Entrepreneurial firms in high-technology industries (e.g., biotechnology, communications, computer, electronics, energy, environmental technology, and medical) (we are able to distinguish between life science firms and other types of high-tech firms);
- *Few employees*: Entrepreneurial firms with fewer than 50 employees;
- *Contemporaneous syndication*: Entrepreneurial firms financed by more than one venture capitalist at the same time;
- *Deal size*: The amount of funds provided by the venture capitalist, as well as the amount of capital provided relative to the other capital raised by the entrepreneurial firm by the time of the investment.

The data (Table 1A–D) indicate that a variety of forms of finance are used across all types of entrepreneurial firms; the subsamples of start-up or expansion investments, the subsample of high-tech investments, the subsamples based on deal size, etc., all show convertible preferred equity is not used most frequently. It is further noteworthy that the data comprise details that are not present in US datasets. For example, the amount invested relative to other investors (at the time of the investment) is known, unlike other venture

⁶ The term ‘equity’ in ‘private equity’ is a misnomer because ‘private equity firms’ are not restricted from using debt. To exclude all transactions involving debt because such deals are not ‘equity’ deals would be tautological and inappropriate.

capital datasets in the United States. This variable is particularly important for explaining capital structure (see, e.g., [Noe and Rebello, 1996](#)).

The Canadian data do lack details on certain dimensions, such as the use of specific control rights (such as the right to replace the founding entrepreneur as CEO). Nevertheless, such details are not material to understanding the use of particular securities (i.e., they are not exogenous determinants of the security choice). As well, note that the use of different securities cannot be explained as being functional equivalents. For example, one could group the securities into three categories: ones that provide upside potential only (common equity), ones that provide a fixed claim only (straight preferred and straight debt), and ones that provided both a fixed claim with downside protection and upside potential (convertible preferred, convertible debt, and various mixes of debt and common equity). However, this grouping (or others) does not explain away the apparently puzzling use of various securities by VCs (i.e., not just convertible preferred equity). Related theoretical work and empirical evidence also shows that the use of specific control terms is complementary to the security choice, so that different securities are not functional equivalents.⁷ Below, we also provide a test of functional equivalence.

2.3. Summary of the extent to which we may infer contract differences between US and Canadian VCs

In net, differences in the definition of venture capital (by types of entrepreneurial firm or types of venture capital fund) across Canada and the United States cannot explain the observed use of a heterogeneous mix of forms of finance in Canada for the data that are available to date. As such, there appears to be a “puzzle” with regard to why venture capitalists in Canada do not use forms of finance more like those of their US counterparts. US data sets on topic indicate that venture capitalists almost always use convertible preferred equity (see references cited in Footnotes 1 and 2).

We stress that reporting errors does not explain the data. Macdonald and Associates, certifies the accuracy of the data. In support of this claim, almost all of the funds in the sample use a mix of different financing instruments. For example, numerous funds that employ convertible preferred securities also employ straight preferred securities. As such, the funds are clearly able to differentiate between straight and convertible preferred securities. It would be unwarranted to dismiss the

⁷ Theoretical research indicates that riskier claims are associated with less control. In [Cestone's \(2000\)](#) model, the intuition is based on the idea that formal control with common equity would turn into excessive real control (over interference) because VCs have greater incentives to intervene with riskier claims ([Cestone, 2000](#), p.15). [Cumming \(2002\)](#) shows that control terms (e.g., the right to replace the founding entrepreneur as CEO, veto rights over asset sales and asset purchases, etc.), are much more likely to be used with convertible preferred equity than common equity in a sample of European venture capitalist investments. [Kaplan and Strömberg \(2003\)](#) similarly show different control rights are complements, not substitutes, in the United States where convertible preferred equity is typically the selected security for tax reasons ([Gilson and Schizer, 2003](#)).

data by asserting reporting errors simply because they are inconsistent with US research on topic (see Footnotes 1 and 2 for references).⁸

In short, the use of securities by venture capitalists in Canada does in fact differ from the US market.⁹ It is therefore worthwhile to explain the heterogeneity in forms of finance used in Canada (Table 1A–D), particularly in view of the tax biases in favor of the use of convertibles in the United States (Gilson and Schizer, 2003) but not in Canada (Sandler, 2001).

3. Testable hypotheses

In Subsection 3.1, we broadly frame four hypotheses that can be considered with the Canadian data described in Section 2, with deference to the predominant view in the prior literature that convertible preferred equity is optimal in venture finance (see Footnotes 1 and 2). Subsection 3.2 considers specific agency cost hypotheses. Subsection 3.3 addresses the issue as to whether tax and other institutional factors could be more pronounced for different types of firms in the Canada.

3.1. Broadly framed hypotheses

H1. Tax/securities regulation. Although regulation variables are not pertinent herein due to the absence of material changes over 1991–2000 within Canada, we would expect regulation to account for cross-country differences (Gilson and Schizer, 2003; see also Sandler, 2001; Keuschnigg, *in press*; Keuschnigg and Nielsen, 2001, 2003a, *in press*(b,c), 2004). Subsection 3.3 considers in more detail the issue of whether regulatory considerations could be more important for certain types of entrepreneurial firms in Canada. Note that the empirics below (Section 4) employ year fixed effects, which would capture any regulatory changes (among other things) from one year to the next.

⁸ As well, note that an earlier paper (Cumming, 2000) reports other types of venture funds in Canada, which are mainly government and labour-sponsored funds. We exclude those funds from this sample for succinctness and to focus on funds most similar to those in other countries. Regardless, their exclusion/inclusion does not materially bias the analysis and/or results (consistent results are reported by Cumming, 2000). As with all prior data sets on capital structure and contracting in VC finance, this dataset does not comprise information regarding bank financing. We do not exclude debt financing provided by VCs from this data set, because it is part of the VCs' portfolios. It is noteworthy that VCs in Europe also use debt-like securities (Cumming, 2002), as do VCs in developing countries (Lerner and Schoar, 2003). Furthermore, note that Lerner and Schoar (2003) report the use of straight preferred shares by VCs. That VCs use straight preferred shares and various other securities is not unique to Canada.

⁹ Importantly, recent VC datasets from Europe (Bascha and Walz, 2001b, Schwienbacher, 2001, Cumming, 2002; Hege et al., 2003), Australia (Cumming et al., 2004a, *in press*), Asia (Songtao, 2000) and various developing countries (Lerner, 2000; Lerner and Schoar, 2003), and even US VCs financing Canadian entrepreneurial firms (Cumming, 2001), are very similar to the Canadian VC data herein, and very different from the US VC data reported in papers referenced in Footnote 2.

H2. (Neutral mutation). Different securities could be functionally equivalent (Merton, 1995), such as common equity and warrants, straight debt and straight preferred equity, and all other securities that resemble convertible preferred equity (with both downside protection and upside potential). If so, we would expect similar securities to be used with roughly the same intensity for different financing contexts. This is tested below.

H3. (Learning). Investors may become more sophisticated over time and more sophisticated in different regions (and hence use securities that more closely resemble convertible preferred equity, which is generally regarded as optimal; see Footnote 1) (see, e.g., Chan et al., 1990; Bergmann and Hege, 1998; see also Hsu, *in press*, and Kanninen and Keuschnigg, 2003, *in press*, for related research on investor quality). As indicated (H1), year fixed effects are employed to capture potential changes over time in the 1990s (consistent with Gompers and Lerner, 1999, 2000).

H4. (Firm and transaction-specific characteristics). Different agency problems (in the spirit of Jensen and Meckling, 1976) could be more pronounced among different types of entrepreneurial firms and for different types of transaction (e.g., at different stages of development, different industries, staging, syndication, etc.; see Gompers, 1995; Gompers and Lerner, 1999, 2001 for supporting empirical evidence). This could give rise to the selection of different selected securities to mitigate the particular agency problem(s) that are most pronounced in the particular context (see, e.g., Noe and Rebello, 1996). As well, certain securities could be inappropriate for certain firms (for example, debt would typically be inappropriate for firms without cash flows to pay interest on debt). We elaborate on this prediction in a number of subhypotheses immediately below.

3.2. Specific agency cost hypotheses pertaining to firm and transaction-specific characteristics

In this subsection, we conjecture various subhypotheses that fit within H4 (Subsection 3.1). Various predictions pertaining to security design are possible depending on which agency cost is stressed. In the following discussion, we hold constant all other agency problems when referring to any specific agency problem. We consider problems of moral hazard, bilateral moral hazard, free riding, trilateral bargaining, adverse selection, hold up, window dressing, underinvestment, risk shifting, asset stripping, and agency problems among syndicated investors, among other things.

H4a. (Moral hazard). In the presence of entrepreneurial moral hazard (entrepreneur qua agent, VC(s) qua principal), and in the absence of bilateral moral hazard, it is efficient for the residual claim to be in the hands of the entrepreneur (see, e.g., Tirole, 1998, p. 36). As such, straight debt or straight preferred equity would be used. For certain types of firms whereby entrepreneurial effort is more difficult to monitor, possibly firms in earlier stages of development, the use of securities that places the residual claim in the hands of the entrepreneur could be value-enhancing.

H4b. (Bilateral moral hazard). If the effort of the VC(s) also matters to the success of the entrepreneurial firm, the investor will be efficiently allocated a residual claim (e.g., possibly in the form of common equity, mixes of debt and common equity, and especially option contracts such as convertible preferred equity, etc.; see [Farmer and Winter, 1986](#)). For example, many high-tech entrepreneurs are regarded as having strong technical skills but poor management skills ([DeBettignies, 2003](#)). If so, it could be efficient to use convertible securities to provide incentives to the investor to add value.

H4c. (Trilateral bargaining). In order to lower the cost of capital, an entrepreneur may give up control of the firm to an outside 3rd party after the original VC provides capital. This entrepreneurial incentive is particularly pronounced around times of bankruptcy (the turnaround stage discussed in Section 2). An efficient solution to this problem is the use of convertible preferred equity or convertible debt ([Berglöf, 1994](#); see also [Aghion and Bolton, 1992](#)), because it provides a state-contingent allocation of control rights. The VC has control in bad states where the entrepreneur may otherwise want to give up control to an outside 3rd investor, but exchanges control for upside potential in good states of nature.

H4d. (Agency problems among syndicated investors). Most venture capital transactions are staged and syndicated. Early financing rounds typically involve fewer syndicated investors than follow-on rounds ([Lerner, 1994](#)). Early lead investors may misstate the price of securities and misstate capital requirements to follow-on outside investors, and/or induce outside investors to participate in negative expected NPV projects. [Admati and Pfleiderer \(1994\)](#) propose a solution to these problems: the inside investor uses a fixed fraction contract whereby a fixed portion of the entrepreneur's equity is held by the inside investor and the inside investor finances that portion of the company in all staged rounds. Unfortunately, the fixed fraction contract is not robust to problems of moral hazard (as recognized by Admati and Pfleiderer themselves; see also [Bergmann and Hege, 1998](#), and [Cumming, 2003](#)). An alternative contractual arrangement is proposed by [Cumming \(2003\)](#). Cumming derives conditions under which straight preferred equity is optimal when these agency problems among syndicated investors are determinative of the selected form of finance. The intuition is as follows. The follow-on venture capitalist has inferior information about the entrepreneur relative to the lead venture capitalist, and therefore relies on information provided by the lead venture capitalists in deciding whether to invest. If the lead venture capitalist is a residual claimant, s/he has an incentive to misrepresent information to the follow-on venture capitalist. If the lead venture capitalist is a fixed claimant then there is no incentive to misrepresent information to the follow-on venture capitalist. Either a straight preferred claim or a straight debt claim therefore mitigates the incentive to misrepresent. Cumming further shows that the outside VC will have priority over the inside VC; otherwise, the inside VC could induce the outside VC to finance a negative expected NPV project to transfer expected wealth from the outside VC to the inside VC. To the best of our knowledge, no other prior work has presented conditions under which the use of straight preferred shares is optimal.

H4e. (Window dressing). Pursuant to staged financing rounds, there is an agency problem that is sometimes colloquially referred to as “cooking the books”. That is, entrepreneurs may make the company look better than it really is in order to secure the next financing

round from the VCs. The entrepreneur's incentive to do this is mitigated when the VC holds a convertible debt or convertible preferred security (Cornelli and Yosha, 2003), because the VC may convert prior too early (from the perspective of that which would otherwise be optimal for the entrepreneurial firm) if the entrepreneur provides a biased signal of quality. Window dressing problems are typically considered to be more pronounced for informationally opaque firms (early stage and high-tech firms).

H4f. (Hold up). Failure to meet an interest payment would enable the investor to force bankruptcy upon the firm, and the investor could renegotiate the contractual arrangement with the entrepreneur. This is one type of hold-up problem (there are variants on the problem of hold up).¹⁰ Investor syndicates are widely regarded as being useful to mitigate investor hold up (Rajan, 1992; Houston and James, 1996). As well, entrepreneurial firms that are expected to be unable to pay interest on debt will of course typically not be financed with debt, as the potential for investor hold up and renegotiation is more pronounced.

H4g. (Other agency costs of debt). There are other widely known agency problems associated with debt, such as underinvestment, risk shifting and asset stripping (see, e.g., Green, 1984; Jensen and Meckling, 1976). If these problems are expected to be pronounced, then debt is less likely to be employed.

In short, the above sampling of possible agency problems could affect the selected security because different agency problems are likely more pronounced depending on the characteristics of the entrepreneurial firm, venture capital fund, and the nature of the transaction (including staging and syndication). We empirically assess the proposition that security design is context-dependent in Section 4.

3.3. Institutional and regulatory factors

Security regulation and taxation may affect the choice of financing instrument. This subsection addresses the question regarding the role of taxation and securities regulation in driving the choice of security in Canada, and provides a discussion of prior literature pertaining to the absence of such concerns pertinent to US financial contracting studies in the world of venture capital.

Most of the existing theoretical and empirical literature on venture capital contracts assumes that taxes play no role in the structure of contracts, but agency problems between investors and entrepreneurs do (see Footnotes 1 and 2). Gilson and Schizer (2003) explain:

[Venture capital] [p]ortfolio companies [in the U.S.] issue convertible preferred stock to achieve more favorable tax treatment for the entrepreneur and other portfolio company employees. The goal is to shield incentive compensation from current tax at ordinary income rates, so managers can enjoy tax deferral (until incentive compensation is sold,

¹⁰ As well, entrepreneurs may hold-up investors by threatening to walk away from the project. This type of hold up is mitigated through the use of specific contingency clauses in contracts that 'punish' the entrepreneur for walking away (see Gompers, 1998, Kaplan and Strömberg, 2003, and Cumming, 2002, for specific examples).

or longer) and a preferential tax rate. . . [by assigning an artificially low value to the entrepreneurs' common equity claim at the time of investment].

. . . our analysis suggests the difficulty of financial modeling for activities in which low-visibility, "practice"-level patterns are of first-order significance. Unless informed by institutional knowledge deep enough to reveal such patterns, models will miss a significant factor that is influencing behavior. (Gilson and Schizer, 2003, pp. 876–878).

Recent existing real world empirical VC contracting studies based on US data (see Footnote 2) do not refer to the possibility of a tax bias in favor of convertible preferred securities for VCs and entrepreneurs in the United States. Likewise, recent papers on laws, institutions and contracting across countries (e.g., Kaplan et al., 2003) that attempt to reconcile the prior literature on the apparent unique optimality of convertible preferred equity for all venture capital transactions (see Footnotes 1 and 2) with the fact that the United States is the only country around the world where convertible preferred equity is used most frequently by VCs (that is, of all the countries from which VC data have been collected; see Footnote 9 for a list of these countries) do not acknowledge the possibility of a tax bias towards the use of convertible securities in the United States. Furthermore, VC contracting papers that combine transactions across countries (e.g. Kaplan et al., 2003, consider 107 firms and 23 countries) tend to look to a variety of La Porta et al. (1997, 1998) legality variables to explain international differences (in the spirit of Jeng and Wells, 2000, in the VC literature; see also Black and Gilson, 1998), but cannot account for the heterogeneity in security design within any particular country (and/or within any particular VC fund), nor the fact that the United States is the only country where VCs have converged on a single security (although see Cumming et al., 2004b, for a sample of more than 3000 firms from 39 countries).¹¹

It is certainly worth addressing the issue as to whether there might be low-visibility practice level patterns that are important in Canada. First, note that there were no capital gains tax changes over the 1991–2000 period in Canada (changes occurred in 1990 and in mid 2000). As mentioned, we also use year fixed-effects regressions to pick up obscure changes in industry practices over time. Second, note that the US-style tax benefits to using convertible preferred equity do not appear to exist in Canada (on Canadian tax law, see Sandler, 2001 for an in-depth analysis of pertinent Canadian taxation issues; see also Mintz, 1997). For these reasons, we do not include tax variables in our analysis (as in, e.g., Gompers and Lerner, 1998). Nevertheless, note that if we are mistaken about existence of US-style tax benefits in Canada, then we might infer that tax considerations in Canada would be more pronounced for informationally opaque firms (seed firms, and possibly high-tech firms), whereby

¹¹ Again, this is regardless of the definition of venture capital by type of VC fund and/or type of entrepreneurial firm (see Section 2 and Footnote 9). The minor differences in legal indices (La Porta et al., 1997, 1998) across Canada and the US clearly do not do much to account for the massive differences in securities in VC financings in Canada and the US. The tax bias in the US (Gilson and Schizer, 2003) which is absent in Canada (Sandler, 2001) provides a much more plausible explanation. See Footnote 9 for a discussion of other countries.

artificially low values could be assigned to entrepreneurs' common equity claims to enhance entrepreneurial incentive compensation. Our empirical tests do comprise variables that proxy for informational opaqueness. If convertibles are in fact more often used for such firms, then one interpretation is the tax issue explained by [Gilson and Schizer \(2003\)](#).

Our discussions with various practitioners in Canada indicated that [Gilson and Schizer's \(2003\)](#) tax theory was indeed relevant in the United States, but not in Canada. For example, at a University of Alberta MBA lecture a Vice President of a Canadian seed fund focused in the biotechnology sector indicated "each of [their] deals has been different, sometimes involving the use of preferred shares, as well as common shares, options and convertible debentures".¹² This fund has done deals in both Canada and the United States, and indicated that they have seen the low valuations assigned to entrepreneur common shares in the United States. In one US financing, they noted valuations of entrepreneur common shares at US\$0.01 per share despite the venture capitalist shares being contemporaneously valued above US\$1.00. They have not seen such disparate valuations in Canada (as they believed Revenue Canada, the Canadian equivalent of the US Internal Revenue Service, would not tolerate such valuation practices). This example is consistent with the tax analyses provided by [Sandler \(2001\)](#) in Canada and [Gilson and Schizer \(2003\)](#) in the United States.

In addition to tax considerations, it is worthwhile to address the issue regarding the effect of security regulation on the use of different securities by venture capitalists. In Canada, hold periods (lock-up periods upon IPO) are longer for common equity than bonds and preferred equity ([MacIntosh, 1994](#)); therefore, we expect common equity to be used less frequently in Canada (which is very surprising because common equity is observed more frequently in Canada; see [Table 1A–D](#); [Fig. 1a–d](#)). As such, in the absence of a securities regulation bias in Canada, the differences observed in the Canadian data relative to the US data would be even more pronounced. But again, as mentioned, note that despite the absence of material regulatory changes over the 1991–2000 period covered by our sample, we nevertheless consider year fixed effects to capture any institutional changes over time.

It is noteworthy that there are other types of funds in Canada, such as Labour Sponsored Venture Capital Corporations (LSVCCs). An earlier paper ([Cumming, 2000](#)) reports the use of securities by all fund types, and shows similarities in security choice across funds for entrepreneurs of similar characteristics. It is unlikely that the existence of LSVCCs and other government fund structures has significantly distorted VC financial contracts in Canada for at least two reasons. First, the presence of funds other than limited partnerships and corporate fund cannot account for the heterogeneity in security design across different types of entrepreneurial firms and over time within Canada (as described in Section 2). Second, the Canadian VC financing data are remarkably similar to data sets from other countries around the world where funds like Canadian LSVCCs do not exist (see Footnote 9 for references). As indicated, the outlier country regarding VC security

¹² November 5, 2003, Foragen Technologies (www.foragen.com) lecture at the University of Alberta School of Business. The PowerPoint lecture is on file with the authors.

design based on the existing worldwide evidence is the United States, not Canada, and not any other country (see Footnotes 1, 2 and 9 for references).

Finally, note that if regulatory factors are important in favoring the use of a particular security, then that security would dominate the data (as in the United States, where remarkably, the industry appears to have converged on convertible preferred equity for tax reasons; see [Gilson and Schizer, 2003](#)). The heterogeneity in the data presented in [Table 1A–D](#), and the changes in the intensity of use of different forms of finance over time (absent concurrent changes in regulations) as presented in [Fig. 1a–d](#), are highly suggestive that something other than Canadian-specific regulations, such as agency problems (as discussed in Subsection 4.2), are important. It is therefore worthwhile to conduct empirical tests with consideration to numerous control variables to assess the determinants of security choice in an environment absent the constraint of the US tax bias.

4. Empirical tests

The empirical tests are based on the data described in Section 2. Subsection 4.1 provides summary test statistics to further describe the data. Subsection 4.2 provides regression analyses.

4.1. Summary statistics

Further to the summary of the data in [Table 1](#), we provide two additional sets of summary statistics: comparison of proportion and means tests ([Table 2](#)), and a correlation matrix ([Table 3](#)).

[Table 2](#) provides 14 comparison of proportion tests (labeled tests A–N) and two comparison of means tests (labeled tests O and P). The comparison of proportion tests considers whether the frequency of use of a particular security is the same for each listed characteristic. These tests are carried out for the subsample of seed and expansion stage entrepreneurial firms only (with the exception of tests C–F which provide comparisons to the other stages), in order to control for stage effects.¹³ Common equity is more frequently used by limited partnerships (test A), for seed than expansion stage firm (test B), more frequently over the 1990–1998 period than the 1999–2000 period (test J), more frequently for firms in the life sciences industry than other high-tech industries (test K), and less frequently among investments with contemporaneous syndication (test I), and less frequently in Ontario (tests M and N). Note that the result in Ontario is likely attributable to the fact that there are fewer life sciences industry investments in Ontario and more other high-tech investments in Ontario.¹⁴ The only other statistically significant comparison of proportion test is in regard to the use of straight debt securities. That is, straight debt is

¹³ The other tests for the late, buyout and turnaround stages were not altogether materially different and are therefore not presented for reasons of conciseness. Other comparison tests are available upon request.

¹⁴ Additional statistics in support of this statement were presented in an earlier draft and are available upon request.

used more often for firms in the late, buyout and turnaround stages than the seed and expansion stages (tests C and D), and used more often for firms in nonhigh-tech industries.

Tests O and P in [Table 2](#) provide comparison of means for amounts invested with each security, and amounts invested relative to the entrepreneur's other sources of capital at the time of VC investment. Larger investments are observed for straight preferred equity, and the category of "other combinations" of securities (including various combinations of debt, convertible debt, preferred, convertible preferred and common equity), whereas smaller investments are observed for common equity, convertible debt, and mixes of debt and common equity. In terms of the size of the VC's investment relative to other sources of finance, larger fractions are observed among common equity investments and straight debt investments, and smaller fractions are observed among straight preferred equity, convertible preferred equity and the category of "other combinations". It is noteworthy that these test statistics suggest the importance of, and provide some support for, [Noe and Rebello \(1996, Propositions 3 and 4\)](#). Noe and Rebello consider (in a different context) the use equity vs. debt for larger investments, subject to the relative magnitude of expected moral hazard vs. adverse selection costs. This proposition is discussed and analyzed further in the presentation of the regressions in Subsection 4.2.

The correlation matrix in [Table 3](#) complements and is supportive of the presentation of the summary test statistics in [Table 2](#). The correlations also provide guidance in regard to problems of collinearity in the explanatory variables considered in the regression analysis below. Correlations among other variables not presented in [Table 3](#) are available upon request.

4.2. Multinomial logit regressions

Multinomial logit regressions are used to study the impact of investment-specific characteristics on security choice. The dependent variables are the seven categories of different securities previously discussed.¹⁵ The explanatory variables include the following:

- A dummy variable for corporate funds. A dummy variable for limited partnerships is suppressed to avoid perfect collinearity.
- Stage of development dummy variables. The expansion stage variable is excluded to avoid near-perfect collinearity. A dummy variable for firms with fewer than 50 employees is also considered. Robustness checks are provided with consideration to correlations between the number of employees variable and the seed stage of development variable. For the regressions including the late, turnaround and buyout transactions, a dummy for a publicly listed company (some of these late stage firms were publicly listed, as indicated in [Table 1C and D](#)) was not used for reasons of collinearity with the stage dummy variables.

¹⁵ We also considered grouping different securities together; however, the estimates with groupings were much less robust to variations in the specifications of the right-hand side variables and for different subperiods within 1991–2000. As well, the evidence presented strongly indicates that different securities are not functionally equivalent, as they are used with different intensity for different types of firms. Results with categories of securities lumped together are also available upon request.

Table 2
Comparison of proportions and mean tests

Comparison of proportions	Common equity			Straight preferred equity			Straight debt		
	No.	Proportion	Proportion equal?	No.	Proportion	Proportion equal?	No.	Proportion	Proportion equal?
(A) All limited partnership vs. all corporate									
Limited partnership VC	817	0.40	3.30***	172	0.08	0.30	231	0.11	–1.42
Corporate VC	146	0.26		32	0.06		110	0.19	
(B) Seed stage vs. expansion									
Seed	601	0.40	2.30**	139	0.09	0.47	165	0.11	–0.93
Expansion	362	0.33		65	0.06		176	0.16	
(C) Seed and expansion vs. late, buyout and turnaround									
Seed and expansion	963	0.37	0.85	204	0.08	0.32	341	0.13	–2.48**
Late, buyout and turnaround	157	0.33		20	0.04		121	0.26	
(D) Seed vs. late									
Seed	601	0.40	0.48	139	0.09	0.28	165	0.11	–2.02**
Late	60	0.37		5	0.03		45	0.28	
(E) Seed vs. buyout									
Seed	601	0.40	0.86	139	0.09	0.29	165	0.11	–1.60
Buyout	72	0.35		9	0.04		49	0.24	
(F) Seed vs. turnaround									
Seed	601	0.40	1.53	139	0.09	0.16	165	0.11	–1.55
Turnaround	25	0.25		6	0.06		27	0.27	
(G) First round vs. all follow-on rounds									
First round	353	0.36	–0.37	66	0.07	–0.23	137	0.14	0.29
All follow-on rounds	610	0.37		138	0.08		204	0.12	
(H) <50 employees vs. >50 employees									
<50 employees	579	0.39	1.46	106	0.07	–0.24	180	0.12	–0.43
>50 employees	384	0.34		98	0.09		161	0.14	

(I) Contemporaneous syndication vs. nonsyndication									
Contemporaneous syndication	491	0.34	– 2.30**	143	0.10	0.61	154	0.11	– 1.07
Nonsyndication	472	0.41		61	0.05		187	0.16	
(J) 1990–1998 vs. 1999–2000									
1990–1998	609	0.40	2.63***	97	0.06	0.47	222	0.15	0.73
1999–2000	354	0.32		107	0.10		119	0.11	
(K) Life sciences vs. other high-tech									
Life sciences	283	0.46	3.26***	54	0.09	0.09	71	0.11	0.11
Other high-tech	503	0.34		119	0.08		159	0.11	
(L) Life sciences and other high-tech vs. nonhigh-tech									
Life sciences and other high-tech	786	0.37	0.71	173	0.08	0.23	230	0.11	– 1.92*
Nonhigh-tech	177	0.35		31	0.06		111	0.22	
(M) Ontario vs. rest of Canada (excluding Quebec)									
Ontario	272	0.30	– 1.80*	88	0.10	0.00	111	0.12	– 0.08
Rest of Canada (excluding Quebec)	284	0.37		74	0.10		97	0.13	
(N) Ontario vs. Quebec									
Ontario	272	0.30	– 3.92***	88	0.10	0.54	111	0.12	– 0.40
Quebec	407	0.44		42	0.05		133	0.15	
Comparisons of means relative to sample average	Mean	Standard deviation	Test statistics	Mean	Standard deviation	Test statistics	Mean	Standard deviation	Test statistics
(O) \$ Invested ('000) Sample average=1110.294 (Standard deviation=1979.153)	986.30 N=963	1543.19	– 1.97**	1421.46 N=204	2188.33	1.97**	1273.53 N=341	2866.54	1.02
(P) \$ Invested/\$ other capital Sample average=0.618 (Standard deviation=0.382)	0.66 N=963	0.37	2.26**	0.52 N=204	0.37	– 3.75***	0.73 N=341	0.33	5.61***

(continued on next page)

Table 2 (continued)

Comparison of proportion	Convertible preferred equity			Convertible debt			Debt+common			Other combinations		
	No.	Proportion	Proportion equal?	No.	Proportion	Proportion equal?	No.	Proportion	Proportion equal?	No.	Proportion	Proportion equal?
(A) All limited partnership vs. all corporate												
Limited partnership VC	241	0.12	−0.13	266	0.13	0.41	167	0.08	−1.04	148	0.07	−0.63
Corporate VC	72	0.13		58	0.10		85	0.15		67	0.12	
(B) Seed stage vs. expansion												
Seed	188	0.13	0.23	175	0.12	−0.33	113	0.08	−0.82	121	0.08	−0.06
Expansion	125	0.11		149	0.13		139	0.13		94	0.08	
(C) Seed and expansion vs. late, buyout and turnaround												
Seed and expansion	313	0.12	0.69	324	0.12	0.04	252	0.10	−1.07	215	0.08	0.38
Late, buyout and turnaround	22	0.05		57	0.12		77	0.16		17	0.04	
(D) Seed vs. late												
Seed	188	0.13	0.42	175	0.12	−0.11	113	0.08	−0.52	121	0.08	0.15
Late	9	0.06		21	0.13		22	0.13		1	0.01	
(E) Seed vs. buyout												
Seed	188	0.13	0.47	175	0.12	0.09	113	0.08	−1.25	121	0.08	0.20
Buyout	6	0.03		22	0.11		39	0.19		10	0.05	
(F) Seed vs. turnaround												
Seed	188	0.13	0.30	175	0.12	−0.16	113	0.08	−0.64	121	0.08	0.10
Turnaround	7	0.07		14	0.14		16	0.16		6	0.06	
(G) First round vs. all follow-on rounds												
First round	112	0.11	−0.15	119	0.12	−0.06	109	0.11	0.39	81	0.08	0.01
All follow-on rounds	201	0.12		205	0.13		143	0.09		134	0.08	
(H) <50 employees vs. >50 employees												
<50 employees	198	0.13	0.54	181	0.12	−0.11	133	0.09	−0.28	113	0.08	−0.23
>50 employees	115	0.10		143	0.13		119	0.11		102	0.09	
(I) Contemporaneous syndication vs. nonsyndication												
Contemporaneous syndication	222	0.15	1.22	161	0.11	−0.57	134	0.09	−0.17	152	0.10	0.69

Nonsyndication	91	0.08		163	0.14		118	0.10		63	0.05	
(J) 1990–1998 vs. 1999–2000												
1990–1998	149	0.10	−0.90	178	0.12	−0.25	179	0.12	0.79	71	0.05	−1.18
1999–2000	164	0.15		146	0.13		73	0.07		144	0.13	
(K) Life sciences vs. other high-tech												
Life sciences	74	0.12	−0.35	72	0.12	−0.22	29	0.05	−0.50	36	0.06	−0.50
Other high-tech	211	0.14		194	0.13		142	0.10		153	0.10	
(L) Life sciences and other high-tech vs. nonhigh-tech												
Life sciences and other high-tech	285	0.14	0.85	266	0.13	0.19	171	0.08	−1.18	189	0.09	0.39
Nonhigh-tech	28	0.05		58	0.11		81	0.16		26	0.05	
(M) Ontario vs. rest of Canada (excluding Quebec)												
Ontario	141	0.15	−0.10	129	0.14	0.38	77	0.08	0.16	104	0.11	0.56
Rest of Canada (excluding Quebec)	123	0.16		89	0.11		54	0.07		53	0.07	
(N) Ontario vs. Quebec												
Ontario	141	0.15	1.23	129	0.14	0.38	77	0.08	−0.69	104	0.11	0.62
Quebec	49	0.05		106	0.12		121	0.13		58	0.06	
Comparisons of means relative to sample average	Mean	Standard deviation	Test statistics	Mean	Standard deviation	Test statistics	Mean	Standard deviation	Test statistics	Mean	Standard deviation	Test statistics
(O) \$ Invested ('000)	1180.29	1631.18	0.70	943.01	1865.36	−1.51	943.05	1402.36	−1.73*	1457.73	2764.62	1.81*
Sample average=1110.294 (Standard deviation=1979.153)	N=313			N=324			N=252			N=215		
(P) \$ Invested/\$ other capital	0.47	0.37	−6.76***	0.66	0.38	1.51	0.66	0.36	1.37	0.45	0.43	−5.73***
Sample average=0.618 (Standard deviation=0.382)	N=313			N=324			N=252			N=215		

This table reports comparisons of proportions and means tests of the number of times securities were used as a proportion of the total number of financings for the listed characteristics of the venture capitalist (limited partnership, corporate), entrepreneur (technology, stage, revenues, employees, public/private, location), and financing arrangement (investment round, syndication, year, amount invested, and amount invested/deal size). The tests are based on the subsample of seed and expansion stage entrepreneurial firms only, with the exception of tests C–F where comparisons to other stages are carried out.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 3
Correlation coefficients

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 Common equity	1.00																					
2 Straight preferred equity	–0.21	1.00																				
3 Straight debt	–0.32	–0.12	1.00																			
4 Convertible preferred equity	–0.26	–0.10	–0.15	1.00																		
5 Convertible debt	–0.28	–0.11	–0.16	–0.13	1.00																	
6 Debt and common equity	–0.26	–0.10	–0.15	–0.12	–0.13	1.00																
7 Seed stage	0.07	0.07	–0.11	0.05	–0.02	–0.10	1.00															
8 Expansion stage	–0.06	–0.04	0.02	0.01	0.02	0.04	–0.73	1.00														
9 Turnaround	–0.04	–0.01	0.06	–0.02	0.01	0.03	–0.18	–0.14	1.00													
10 Buyout	–0.01	–0.03	0.07	–0.07	–0.01	0.07	–0.26	–0.20	–0.05	1.00												
11 Public	0.06	–0.02	–0.01	–0.04	0.02	–0.01	–0.15	–0.12	–0.12	0.19	1.00											
12 \$ Invested	–0.04	0.03	0.04	0.00	–0.03	–0.02	–0.10	0.05	–0.04	0.12	0.06	1.00										
13 \$ Invested/other capital raised	0.06	–0.08	0.12	–0.15	0.04	0.04	–0.12	0.03	0.02	0.07	0.04	0.07	1.00									
14 Round 1	–0.06	0.08	–0.09	0.12	–0.05	–0.02	0.12	–0.05	–0.01	–0.05	–0.05	0.00	–0.89	1.00								
15 High-tech (other than life sciences)	–0.02	–0.03	0.03	–0.02	0.00	0.04	0.04	–0.08	–0.08	0.17	–0.03	0.08	0.18	–0.13	1.00							
16 Life sciences industry	0.05	–0.02	–0.06	0.06	0.01	0.00	0.31	–0.19	–0.04	–0.16	–0.12	–0.19	–0.02	–0.03	–0.08	1.00						
17 Contemporaneous syndication	–0.06	0.02	–0.08	0.10	0.02	–0.03	0.07	0.07	–0.04	–0.14	–0.07	–0.01	–0.12	0.13	–0.06	–0.03	1.00					
18 Employees <50	0.11	0.02	–0.05	0.01	–0.01	–0.11	0.26	–0.18	–0.07	–0.09	0.02	–0.02	–0.16	0.13	–0.10	0.16	–0.55	1.00				
19 Invested in 1999	0.01	0.01	0.00	0.03	–0.01	–0.04	0.01	0.02	–0.05	0.02	0.02	0.03	–0.13	0.13	–0.01	–0.01	0.07	0.05	1.00	05		
20 Invested in 2000	–0.09	0.05	–0.07	0.07	0.01	–0.08	0.09	–0.02	–0.03	–0.08	–0.04	0.09	–0.20	0.18	–0.09	–0.06	0.16	0.06	–0.24	1.00		
21 Corporate VC	–0.13	–0.03	0.09	0.01	–0.03	0.10	–0.15	0.10	–0.01	0.13	–0.01	0.14	–0.07	0.10	0.06	–0.08	0.04	–0.08	0.06	0.12	1.00	
22 Limited partnership VC	0.13	0.03	–0.09	–0.01	0.03	–0.10	0.15	–0.10	0.01	–0.13	0.01	–0.14	0.07	–0.10	–0.06	0.08	–0.04	0.08	–0.06	–0.12	–1.00	1.00

This table presents correlation coefficients across securities used (common, preferred, debt, convertible preferred, convertible debt, debt and common, other combinations), investor characteristics (limited partnership or corporate), financing transaction characteristics (amounts invested, amounts invested/total capital, syndication, staged financing rounds, year of investment), and investee characteristics (stage of development, employees, industry, location). Correlations are based on all 3083 transactions of corporate and limited partnership venture capitalists and all types of entrepreneurial firms, as summarized in Table 1. (Correlations based on the subsample of seed and expansion stage investments are quite similar and therefore not reported.) Correlations greater than the absolute value of 0.04 are significant at the 5% level of significance.

- Size of investment (\$ Can '000), and size of invest divided by the amount provided by other sources of capital at the time of investment. A dummy variable for contemporaneous syndication is also considered (albeit, there exists collinearity with this variable and the \$ invested/\$ total capital variable as indicated in Table 3; therefore, robustness checks are provided).
- Dummy variables for the first round of investment and rounds 2–11. Other dummies (e.g., one for each round and other groupings) were considered, but were immaterial to the analysis and results. These dummies are collinear (see Table 3); therefore, we do not present the results with these variables together.
- Industry dummy variables for life science firms and other high-tech firms. A dummy for nonhigh tech firms was suppressed to avoid perfect collinearity.
- Provincial dummy variables (to control for regional differences). These dummy variables are included in the regressions based on the subsample of seed and expansions firms only, but excluded in the regressions based on the sample of all firm types (including late, buyout and turnaround) in order to mitigate problems of collinearity with the stage of development variables. The regressions in Table 4 include dummy variables for Quebec, Ontario and British Columbia; other jurisdictions are suppressed to avoid problems of collinearity with the other firm-specific characteristic variables. Similarly, Table 5 excludes the regional dummy variables to avoid collinearity with the entrepreneurial firm-specific variables.
- Year fixed effect dummy variables (to control for market changes, industry changes, regulatory changes, and 'learning' over time).
- Other variables were considered but were immaterial to the issues considered and results presented.

One could argue that there is a concern with respect to endogeneity. If offers of different forms of finance attract different types of entrepreneurial firms (in the spirit of adverse selection) then some of the right-hand side variables may be endogenous. Similarly, the syndication variable may be endogenous if the security selection comes before the decision to syndicate. An earlier draft of the paper used the location variables as instruments for a robustness check based on the premise that different types of firms are more prevalent in different regions, and that region is not directly related to the type of security.¹⁶ Those earlier results are very similar to the ones presented in this paper, and available upon request, but not presented herein for reasons of conciseness.¹⁷ The data thus suggest endogeneity concerns are not significant (to the extent they can be controlled for).

¹⁶ Quebec is one exception worth considering, as it is a civil law province, and the others are common law provinces. However, the data do not indicate significant differences in security choice in Quebec that are independent of the type of firms that are financed. The securities used in Quebec are quite similar to the rest of Canada (with the exception of Ontario for reasons attributable to the frequency of firms in different industries, as noted in Subsection 4.1; see also Table 2).

¹⁷ The use of alternative instruments did not materially affect the results. We also considered other specifications in which some of the right-hand side variables are jointly determined with the security. These alternatives did not materially change the results discussed below; therefore, they are not presented for reasons of conciseness, but are available upon request. As well, any and all additional details and specifications on the instruments used in the analysis are also available upon request.

Table 4

Multinomial logit estimates of the security choice

Panel A. Subsample of corporate and limited partnership investments in seed and expansion stage entrepreneurial firms only

2612 observations, Log likelihood: –4329.118, Chi-squared: 625.414***

	Common equity		Convertible preferred		Debt		Convertible debt		Debt and common		Other combinations		Straight preferred	
	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic
Year fixed effects?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Province dummy variables?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Corporate VC fund	–0.12	–4.34***	0.00	0.13	0.08	5.11***	–0.03	–1.50	0.07	5.88***	0.02	1.72*	–0.03	–2.09**
Seed stage	0.05	2.45**	–1.25e–03	–0.10	–0.02	–1.36	–0.03	–1.95*	–0.03	–2.74***	–0.01	–0.72	0.04	3.27***
High-tech and life science	0.03	1.01	0.05	2.36**	–0.07	–3.97***	0.01	0.67	–0.03	–1.91*	3.77e–03	0.24	3.97e–03	0.25
\$ Invested ('000)	1.87e–06	0.32	1.14e–06	0.36	3.13e–06	0.99	–9.75e–06	–1.97**	–5.43e–06	–1.40	3.30e–06	1.65*	5.72e–06	2.75***
\$ Invested/\$ total capital	0.08	2.79***	–0.08	–4.93***	0.09	4.55***	0.04	2.12**	–0.01	–0.76	–0.07	–5.25***	–0.04	–3.13***
Round 1	–0.03	–1.35	0.02	1.32	–0.01	–0.51	0.00	–0.06	0.01	1.05	0.02	2.05**	–0.01	–1.17

Panel B. Subsample of limited partnership investments in seed and expansion stage entrepreneurial firms only

2042 observations, Log likelihood: –3278.684, Chi-squared: 524.768***

	Common equity		Convertible preferred		Debt		Convertible debt		Debt and common		Other combinations		Straight preferred	
	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic
Year fixed effects?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Province dummy variables?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Seed stage	0.05	1.80*	0.005	0.34	–0.01	–0.72	–0.04	–2.25**	–0.03	–2.59***	–0.012	–1.10	0.04	3.35***
High-tech and life science	0.05	1.36	0.02	0.83	–0.07	–3.47***	0.01	0.45	–0.01	–0.48	0.00	0.16	–0.01	–0.30
\$ Invested ('000)	6.62e–06	0.77	9.83e–07	0.24	–2.07e–06	–0.37	–1.41e–05	–2.02**	–4.81e–06	–0.99	4.20e–06	1.46	9.19e–06	2.97***

\$ Invested/\$ total capital	0.08	2.43**	−0.08	−4.28***	0.05	2.49**	0.06	2.50**	−0.02	−1.32	−0.05	−3.26***	−0.05	−3.02***
Round 1	−0.02	−0.80	3.05e−03	0.22	−0.01	−0.84	0.01	0.43	0.01	1.27	0.02	2.22**	−0.02	−1.28

Panel C. Subsample of limited partnership investments in seed and expansion stage entrepreneurial firms only

2042 observations, Log likelihood: −3281.216, Chi-squared: 514.703***

	Common equity		Convertible preferred		Debt		Convertible debt		Debt and common		Other combinations		Straight preferred	
	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic
Year fixed effects?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Province dummy variables?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Seed stage	0.06	2.30**	0.01	0.52	−0.02	−1.56	−0.03	−2.00**	−0.03	−2.91***	−0.01	−1.16	0.04	3.15***
High-tech	−0.03	−1.26	0.02	1.34	−0.04	−2.45**	0.01	0.64	0.02	2.06**	0.02	1.96**	−0.01	−0.53
\$ Invested ('000)	9.87e−06	1.16	−9.74e−07	−0.23	−1.43e−06	−0.25	−1.22e−05	−1.76*	−6.01e−06	−1.23	2.82e−06	0.97	7.90e−06	2.57**
Syndication	−0.07	−2.65***	0.04	2.86***	−0.03	−2.04**	−0.04	−2.50**	0.02	2.22**	0.03	2.61***	0.05	3.68***
Rounds 2–11	0.02	0.70	2.68e−03	0.20	−0.01	0.46	−0.01	−0.34	−0.01	−1.33	−0.02	−2.20**	0.02	1.40

This table presents multinomial logit estimates of the determinants of the selected securities: common equity, warrants, straight preferred equity, straight debt, convertible preferred equity, convertible debt, mixes of debt and common equity, and other combinations. The sample used is the subsample of seed and expansion stage investments only. Panel A comprises both limited partnership and corporate venture capitalists, while Panels B and C comprise limited partnerships only. Different explanatory variables are presented in Panels B and C to illustrate robustness. Explanatory variables include dummy variables for the seed stage of development (the expansion stage is suppressed to avoid perfect collinearity), the first or follow-on financing round, life science firms and other high-tech firms, variables for the amount invested (\$ Can '000) and amount invested relative to total deal size including syndicated investor amounts. Year fixed effects and provincial dummy variables are used. Other variables are excluded altogether, or are not used in the same specification, in order to avoid collinearity. Values presented are the marginal effects, not the coefficients, and therefore indicate the likelihood that the characteristic leads to the security choice.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 5

Multinomial logit estimates of the security choice

Panel A. Subsample of corporate and limited partnership investment in all firms types

3083 observations, Log likelihood: -5153.918, Chi-squared: 641.8226***

	Common equity		Convertible preferred		Debt		Convertible debt		Debt and common		Other combinations		Straight preferred	
	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic
Year fixed effects?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Province dummy variables?	No		No		No		No		No		No		No	
Corporate VC fund	-0.13	-5.25***	1.79e-03	0.14	0.07	4.70***	-0.02	-1.45	0.08	6.71***	-0.02	1.71*	0.02	-1.58
Seed stage	0.06	2.99***	-3.03e-03	-0.27	-0.04	-2.34**	-0.03	-1.85*	-0.03	-2.55**	-1.93e-03	-0.22	0.04	3.53***
Turnaround	-0.11	-1.88*	-0.01	-0.3	0.08	2.39**	0.01	0.35	0.02	0.64	8.12e-03	0.31	0.01	0.34
Buyout	0.09	2.14**	-0.10	-2.70***	0.02	0.83	-0.01	-0.24	0.02	1.16	-0.02	-0.92	-4.54e-03	-0.19
High-tech and life science	0.03	1.05	0.06	3.35**	-0.06	-3.74***	0.01	0.64	-0.05	-3.47***	0.01	0.52	8.19e-04	0.06
\$ Invested ('000)	-5.00e-07	-0.10	2.25e-06	0.85	2.96e-06	1.00	6.92e-06	-1.70*	-5.95e-06	-1.75*	2.74e-06	1.64	5.41e-06	2.95***
\$ Invested/\$ total capital	0.07	2.79***	-0.09	-6.11***	0.10	5.06***	0.04	2.12**	-0.01	-0.78	-0.06	-5.11***	0.05	-3.68***
Round 1	-0.04	-2.01**	0.02	1.60	0.00	-0.32	0.01	0.40	0.01	0.84	0.02	2.66***	-0.01	-1.24

Panel B. Subsample of corporate and limited partnership investment in all firms types

2375 observations, Log likelihood: -3879.539, Chi-squared: 477.161***

	Common equity		Convertible preferred		Debt		Convertible debt		Debt and common		Other combinations		Straight preferred	
	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic	Marginal effect	<i>t</i> -Statistic
Year fixed effects?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Province dummy variables?	No		No		No		No		No		No		No	
Seed stage	0.06	2.62***	-4.01e-04	-0.03	-0.03	-1.57	-0.03	-2.11**	-0.03	-2.45**	-0.01	-0.93	0.04	3.18***
Turnaround	-0.09	-1.33	-4.18e-03	-0.11	0.08	2.57**	-1.60e-03	-0.04	0.002	0.07	0.01	0.52	-4.75e-03	-0.13
Buyout	0.14	2.49**	-0.10	-1.99**	0.02	0.60	-4.80e-03	0.13	0.01	0.59	-0.02	-0.67	-0.06	-1.39
High-tech and life science	0.04	1.25	0.03	1.67*	-0.07	-3.80***	0.01	0.30	-0.02	-1.71*	0.01	0.75	2.51e-03	0.16

\$ Invested ('000)	–3.20e–07	–0.05	3.40e–06	0.92	2.23e–06	0.52	–9.98e–06	–1.78*	–7.38e–06	–1.62	3.26e–06	1.43	8.79e–06	3.40***
\$ Invested total capital	0.09	3.00***	–0.10	–5.81***	0.07	3.16***	0.05	2.51**	–0.02	–1.51	–0.04	–3.20***	–0.05	–3.72***
Round 1	–0.03	–1.53	0.01	0.81	–0.01	–0.67	0.01	0.79	0.01	1.20	0.02	2.60***	–0.02	–1.37

Panel C. Subsample of corporate and limited partnership investment in all firms types

2375 observations, Log likelihood: 3880.366, Chi-squared: 475.5084***

	Common equity		Convertible preferred		Debt		Convertible debt		Debt and common		Other combinations		Straight preferred	
	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic	Marginal effect	t-Statistic
Year fixed effects?	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Province dummy variables?	No		No		No		No		No		No		No	
Seed stage	0.07	2.73***	–0.01	–0.37	–0.03	–2.04**	–0.03	–1.75*	–0.04	–3.02***	–4.70e–03	–0.48	0.04	3.69***
Turnaround	–0.08	–1.22	–0.01	–0.33	0.09	2.78***	1.47e–03	0.04	4.64e–04	0.02	0.01	0.31	–0.01	–0.21
Buyout	0.11	2.01**	–0.09	–1.82*	0.02	0.76	0.01	0.14	0.02	1.14	–0.01	–0.55	–0.06	–1.47
High-tech	–0.06	–2.52**	0.03	2.72***	–0.04	–2.37**	0.01	0.80	0.02	1.68	0.02	2.64***	1.06e–03	0.10
\$ Invested ('000)	2.92e–06	0.42	1.99e–06	0.52	2.76e–06	0.63	–8.73e–06	–1.56	–7.66e–06	–1.64	–1.84e–06	0.79	6.87e–06	2.65***
Syndication	–0.07	–3.11***	0.05	4.15***	–0.04	–2.55**	–0.04	–2.61***	0.02	2.20**	0.02	2.48**	0.05	4.33***
Employees <50	0.02	0.94	0.03	2.15**	–0.02	–1.28	–2.24e–03	–0.14	0.01	0.61	–0.01	–1.05	–0.02	–2.32**
Rounds 2–11	0.02	1.07	–0.01	–0.39	0.01	0.36	–0.01	–0.65	–0.01	–1.31	–0.02	–2.29**	0.02	1.88*

This table presents multinomial logit estimates of the determinants of the selected securities: common equity, warrants, straight preferred equity, straight debt, convertible preferred equity, convertible debt, mixes of debt and common equity, and other combinations. The sample used comprises all different types of entrepreneurial firms at different stages of development. Panel A comprises both limited partnership and corporate venture capitalists, while Panels B and C comprise limited partnerships only. Different explanatory variables are presented in Panels B and C to illustrate robustness. Explanatory variables include dummy variables for the seed stage of development (the expansion stage is suppressed to avoid perfect collinearity), the first or follow-on financing round, life science firms and other high-tech firms, variables for the amount invested (\$ Can '000) and amount invested relative to total deal size including syndicated investor amounts. Year fixed effects are used. Provincial dummy variables are not used to avoid collinearity with the entrepreneur stage of development variables. Other variables are excluded altogether, or are not used in the same specification, in order to avoid collinearity. Values presented are the marginal effects, not the coefficients, and therefore indicate the likelihood that the characteristic leads to the security choice.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

We present the results for the subsample of early and expansion stage firms only in Table 4, as well as for the sample including the late, turnaround and buyout firms in Table 5. We also present results that only consider the subset of limited partnership funds in Panels B and C of Tables 4 and 5. We explicitly show these results are extremely similar. The tables present the marginal effects, not the multinomial logit coefficients, in order to explicitly indicate the economic significance of the results alongside the statistical significance. The marginal effects indicate the probability of a security being selected depending on the particular characteristics of the investor and investee, and the nature of the transaction.

The regression results in Panel A of Tables 4 and 5 consistently indicate that corporate funds are 8% more likely to use straight debt, 7% more likely to use mixes of straight debt and common equity, and 2% more likely to use other combinations of securities (including debt). Corporate funds are 12% less likely to use straight common equity (see Panel A of Table 4; the economic significance is 13% in Panel A of Table 5), and 3% less likely to use straight preferred equity (see Panel A of Table 4; the effect is statistically insignificant in Panel A of Table 5). Corporate funds are neither more nor less likely to use convertible preferred securities. The tendency for corporate funds to more likely use debt than limited partnerships is consistent with other evidence that corporate VCs tend to have lower incentive compensation schemes, less stable life spans, and tend to take a less active role in the monitoring of their investees (Gompers and Lerner, 1999).

Seed stage entrepreneurial firms are 4% more likely to be financed by straight preferred equity. The economic significance of this effect is in fact consistently estimated to be 4%, and is significant at the 1% level, in all of the specifications in Panels A–C of Tables 4 and 5. At first glance, this is quite a puzzling result because straight preferred shares do not provide the investor with upside potential. One explanation, discussed above (see H4d in Subsection 3.2), is that agency problems among syndicated investors give rise to a need to make one investor's payoff independent of the payoff to another investor. Straight preferred contracts facilitate the design of an independent payoff stream to different syndicated investors (see Cumming, 2003). Note as well, in Panel C of Tables 4 and 5, that the syndication variable gives rise to a 5% increase in the probability of use of straight preferred securities. The evidence therefore indicates that the importance of one investor acting as an unbiased intermediary between the entrepreneur and the other investors is more important for nascent seed stage entrepreneurial firms where informational asymmetries are relatively more pronounced (it is more difficult for investors to evaluate the quality of the firm) (and not necessarily for round 1 investments which encompass both seed and expansion stage financings).¹⁸ Hence, Cumming's (2003) model has greater

¹⁸ Note that specifications with the expansion dummy included and the seed dummy excluded (both dummies cannot be in the same regression due to collinearity) yielded insignificant coefficients for the expansion dummy with respect to the use of straight preferred equity. Alternative specifications were considered with interaction dummies, such as (round 1) (seed stage), and similar dummies with syndication. These interaction variables tended to be insignificant for the various specifications across all securities. One possible interpretation is that preferred equity investments are made at the first and subsequent rounds (Table 1A and B indicates that a majority of preferred investments are in rounds 2–5, albeit many preferred investments are at all rounds). Another interpretation is that there are fewer data points with a “1” in the interaction dummy variable, which gives rise to statistical insignificance.

empirical validity for investments in seed stage entrepreneurial firms relative to those in the expansion stage.

The evidence also indicates that seed stage entrepreneurial firms are 5–7% more likely to be financed by common equity (the coefficients are all statistically significant in [Tables 4 and 5](#) Panels A–C, but the economic significance differs slightly depending on the specification). There is related evidence that seed stage firms are less likely to be financed by debt. These estimates range from 7% less likely in Panel B of [Table 4](#) to 3% less likely in Panels B and C of [Table 5](#) and are statistically significant at the 5% level of significance, but are statistically insignificant in some of the other specifications. There is similar evidence (which is statistically significant in all of the specifications at either the 5% or 1% level of significance) that seed stage firms are around 3–4% less likely to be financed by mixes of debt and common equity in each of the Panels in [Tables 4 and 5](#). The natural explanation for these results is that seed firms typically do not have income streams that can service interest payments on debt. One may also infer that the agency costs of debt are particularly pronounced for seed stage firms, as discussed in Subsections 3.1 (H4) and 3.2 (H4f and H4g).

The dummy variable for firms with fewer than 50 employees is included in Panel C of [Table 5](#) (but not Panels A and B of [Table 5](#) and not in [Table 4](#), because this variable is correlated with the seed stage dummy and some of the other controls). The evidence indicates a 3% higher probability of convertible preferred equity for firms with fewer than 50 employees ([Table 5](#), Panel C), and a 2% lower probability of straight preferred equity. Hence, as a proxy for small size, the variable for firms with fewer than 50 employees is somewhat consistent with the view that convertible securities are used to finance small firms. Albeit, this evidence should be viewed in conjunction with the evidence on the seed stage variable discussed above. In net, we may infer from the evidence that there is no unique optimal capital structure in venture finance, but rather, the selected securities significantly depend on the characteristics of the transacting parties (see H4, Section 3).

Overall, there is no systematic evidence in support of the claim that seed stage firms are more likely to use convertible preferred equity (see Panels A–C in [Tables 4 and 5](#)). Likewise, it is difficult to attribute the results to systematic differential tax factors for different types of firms in Canada (see the discussion in H1 and Subsection 3.3). As per our discussion of the effect of regulation on venture capital security design in Subsection 3.3, the evidence is consistent with the view that US-based evidence (see cites in Footnotes 1 and 2) is attributable to US tax biases (as described by [Gilson and Schizer, 2003](#)), and these tax biases are absent in Canada (as described by [Sandler, 2001](#)).

There is nevertheless some evidence that is consistent with prior research (see Footnotes 1 and 2) in the Canadian data. In particular, high-tech firms are more likely to be financed with the use of convertible securities (the economic significance of this effect ranges from 3% to 6%, but the statistical significance of this effect depends on the specification in [Tables 4 and 5](#)). One may infer that the use of convertibles is more important in life science and other high-tech industries because there is a pronounced need to mitigate problems of bilateral moral hazard (H4b in Subsection 3.2; [DeBettignies, 2003](#)), trilateral bargaining (H4c; [Berglöf, 1994](#)), and window dressing (H4e; [Cornelli and](#)

Yosha, 2003). Note that convertible debt is not used for high-tech firms (likely due to the fact that such firms often have difficulty meeting interest payments prior to conversion). Overall, these results indicate that it would be inappropriate to conclude prior work on the use of convertibles (see Footnotes 1 and 2) is altogether incorrect; rather, the evidence indicates that convertible preferred securities are used, but only when certain specific agency problems are particularly pronounced. But more often than not, convertible preferred equity is not used, and therefore the literature on the optimality of convertibles in venture finance is far from generalizable.

The amount of financing provided by the investor and the amount provided relative to that from other investors are generally significant variables, as would be expected given the bargaining power associated with different levels of capital commitment.¹⁹ The evidence (Panels A and B of [Tables 4 and 5](#)) indicates that a 50% increase in the amount invested relative to other investors is associated with a 2–5% increase in the probability of use of common equity, debt, and convertible debt, and a 2–5% reduction in the probability of use of convertible preferred equity, straight preferred equity, and combinations of other securities. The companion evidence on deal size indicates that larger deals are more likely to be in the form of straight preferred equity (an increase in \$ Can 1 million increases the probability by 0.5–0.9%) and less likely to be in the form of convertible debt (an increase in \$ Can 1 million lowers the probability by 0.7–1.4%). Noe and Rebello's model (which is derived generally and not necessarily for the context of venture finance) indicates that the effect on capital structure from the relative amounts invested by the investor and entrepreneur depends on the relative importance of agency problems among the entrepreneur and the investor (see [Noe and Rebello, 1996](#) Propositions 3 and 4). The evidence in [Tables 4 and 5](#) is broadly consistent with this notion.

The controls for the rounds are generally insignificant, with the exception that complex combinations of various securities were more 2% likely in the first round ([Tables 4 and 5](#), Panels A and B) and 2% less likely in the follow-on rounds ([Tables 4 and 5](#), Panel C). Complex deal structures could involve greater legal costs to negotiate and structure, which likely accounts for these results.

Buyout firms are 9–14% more likely to be financed with straight common equity, and 10% less likely to be financed with convertible preferred equity ([Table 5](#), Panels A–C). The most apparent reason is that many of these buyout firms are also publicly listed ([Table 1](#), Panels C and D; of course, by definition, none of the start-up and expansion firms is publicly listed). (A separate dummy for a public listing is not provided for reasons of collinearity.) Turnaround firms, by contrast, are 8–9% more likely to be financed with straight debt ([Table 5](#), Panels A–C; there is also evidence in Panel A of [Table 5](#) that turnarounds are 11% less likely to be financed with common equity). This later result is probably best explained by the fact that turnaround companies (many of which are also publicly listed in this dataset) have more difficulty raising capital from new equity issues

¹⁹ The inclusion or exclusion of these variables does not affect any of the results regarding the stage of development variables, or the other results in the tables. Additional specifications are available upon request.

(i.e., the agency problems identified by Myers and Majluf, 1984, could be quite pronounced for turnaround companies not earning their cost of capital).²⁰

Note that the coefficients are significantly different for securities that we may have considered to be functional equivalents. For example, the factors that give rise to the use of straight debt and straight preferred equity are significantly different from one another for the seed stage investments (numerous other examples are apparent from the tables). We therefore reject the neutral mutation hypothesis (H2 in Section 3) within the context of this dataset.

Finally, in regard to the “learning” hypothesis (see H3 in Section 3), there is scant evidence in the specifications that convertible preferred equity is more likely in some of the latter years.²¹ However, at the same time, there is evidence that other securities are used more frequently (especially straight common equity; these details—available upon request—are not provided in Tables 4 and 5 for reasons of succinctness in Tables 4 and 5, and because it is clear in Fig. 1a–d). Hence, there is no evidence of convergence toward any particular security in the years spanned by the data (again, see Fig. 1a–d). This finding (as with the other findings discussed) is quite consistent across the results that exclude the late stage, buyout and turnaround investments (Table 4) and the results that include those firms (Table 5).

5. Conclusion

This paper provided data on forms of venture finance in Canada based on 3083 transactions, together with empirical tests of the proposition that the selected securities depend on the context and firm characteristics. The data and empirical tests provide many insights into capital structure in venture finance. In these concluding remarks, we summarize two general and important findings. First, there is no single unique optimal form of venture finance, such as convertible preferred equity. A review of the prior literature and US evidence (see Footnotes 1 and 2), would easily lead one to conclude convertible preferred equity is optimal and almost always used. That convertible preferred equity is less frequently used outside of the United States strongly supports Gilson and Schizer’s (2003) tax explanation for convertibles in the United States. Common equity was used in 36.33% of the 3083 investments; followed by straight (nonconvertible) debt: 14.99%; convertible debt (including mixes of straight debt and warrants): 12.36%; convertible preferred equity (including mixes of straight preferred

²⁰ Concerns in regard to taxation could also play a role in structuring these transactions, but our discussions with practitioners indicated that there are no systematic differences just because the transaction is considered a buyout or turnaround. Practitioners indicated that the tax concerns for turnarounds and buyouts are very much firm-specific (and hence would show up with random variations in the residuals in our specifications), and quite different from the tax issues associated with differential VC/entrepreneur valuations associated with start-ups in the United States (as identified by Gilson and Schizer, 2003; see Subsection 3.3).

²¹ Alternative explanations include the fact that 1999 and 2000 were the bubble years, and there may have been a behavioral effect on financing choices in those years. Regressions on a subset of the years (available upon request) did not yield material differences compared to the ones reported.

equity and warrants): 10.87%; mixes of straight debt and common equity: 10.67%; straight preferred equity: 7.27%. In addition, a variety of less frequently employed combinations of other securities, such as mixes of straight preferred equity and straight debt and other combinations, were used in 7.53% of the investments.

Second, an examination of the Canadian data indicates empirical regularities connecting the type of security selected to the type of entrepreneurial firm that is financed. We may infer from this evidence that the set of agency problems differs depending on the nature of the firm being financed (as well as the context of the transaction). One of the most robust findings in the empirical tests was that seed stage firms are more likely to be financed with either straight preferred equity than convertible preferred equity, which is consistent with the conjecture that straight preferred equity mitigates agency problems among investor syndicates. Seed stage firms were also less likely to be financed with straight debt, convertible debt, or mixes of debt and common equity, which is consistent with the oft-repeated claim that nascent firms without cash flows are less suited for debt finance. We also presented evidence that high-tech firms are more likely to be financed with convertible preferred equity, which is consistent with the large body of theoretical work in venture finance (see Footnotes 1 and 2). Taken together, we may infer from the evidence that there is no unique form of finance; rather, the selected security is transaction-dependent, and a response to expected agency problems particular to the transaction.

Consistent with the Canadian VC data, it is important to point out that recent empirical research has shown the use of a variety of different securities are used in all jurisdictions other than the United States, including Europe, US VCs financing Canadian entrepreneurs, Australia, as well as in developing countries (see Footnote 9). Further theoretical work explaining these findings (rather than the overwhelming focus on convertible preferred equity, which appears to be “optimal” only in the US, and most likely for tax reasons; [Gilson and Schizer, 2003](#)), and empirical research on capital structure and contracting in venture finance in other countries, is clearly warranted.

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