



A cross-country comparison of full and partial venture capital exits

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Abstract

This paper considers the issue of when venture capitalists (VCs) make a partial, as opposed to a full exit, for the full range of exit vehicles. A full exit for an initial public offerings (IPO) involves a sale of all of the venture capitalist's holdings within one year of the IPO; a partial exit involves sale of only part of the venture capitalist's holdings within that period. A full acquisition exit involves the sale of the entire firm for cash; in a partial acquisition exit, the venture capitalist receives (often illiquid) shares in the acquiror firm instead of cash. In the case of a buyback exit (in which the entrepreneur buys out the venture capitalist) or a secondary sale, a partial exit entails a sale of only part of the venture capitalist's holdings. A partial write-off involves a write down of the investment. We consider the determinants of full and partial venture capital exits for all five exit vehicles. We also perform a number of comparative empirical tests on samples of full and partial exits derived from a survey of Canadian and US venture capital firms. The data offer support to the central hypothesis of the paper: that the greater the degree of information asymmetry between the selling VC and the buyer, the greater the likelihood of a partial exit to signal quality. The data also indicate differences between the US and Canadian venture capital industries, and highlight the impact of legal and institutional factors on exits across countries.

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1. Introduction

Much theoretical research has focused on the role of venture capital financial contracts in mitigating agency costs and informational asymmetries between venture capitalists and entrepreneurial firms (e.g., Sahlman, 1990; Cornelli and Yosha, 1997; Trester, 1998; Marx, 1998; Hellmann, 1998; Bergmann and Hege, 1998; Trester, 1998; Amit et al., 1998; Kirilenko, 2001). Empirical research along these lines may be classified into one of two categories: studies that use industry data with many observations (e.g., Lerner, 1994; Gompers, 1995; Gompers and Lerner, 1999a), and studies that use more detailed hand-collected data with up to 200 observations (e.g., Gompers, 1997; Trester, 1998; Kaplan and Strömberg, 2000; Hellmann and Puri, 2002).

A second type of research in venture capital focuses on mitigating agency problems between entrepreneurial firms and their new owners upon venture capital exit. The ability to make a profitable exit lies at the heart of venture capital (VC) investing (Sahlman, 1990; Gompers and Lerner, 1999a). There are five principle types of VC exits (MacIntosh, 1997): an initial public offerings (IPO), in which a significant portion of the firm is sold into the public market; an acquisition exit, in which the entire firm is bought by a third party; a secondary sale, in which only the VCs shares are sold to a third party (again, typically a strategic acquiror); a buyback, in which the VCs shares are repurchased by the entrepreneurial firm; and a write-off, in which the VC walks away from the investment.

Barry et al. (1990), Megginson and Weiss (1991), Ljungqvist (1999), Gompers and Lerner (1999a), Franzke (2001), Lee and Wahal (2002), Botazzi and Da Rin (2002), Rindermann (2002) and others have considered the role of venture capitalists in the going public process. MacIntosh (1997) analyzed factors that affect the choice of the complete class of venture capital exits (IPOs, acquisitions, secondary sales, buybacks, and write-offs); this work has been extended and the factors that affect the selection of different exits have been empirically tested by Cumming and MacIntosh (2002) using a hand-collected data set from venture capital exits in Canada and the United States. Recent papers by Schweinbacher (2002) and Cumming (2002) analyze exits in Europe; Fleming (2002) considers Australian data. Petty et al. (1999) provide US case studies on harvesting venture capital investments for different types of exits. Smith and Smith (2000) discuss aspects of IPOs, acquisitions and buybacks. Black and Gilson (1998) introduced the notion of implicit contracting over exit. Berglöf (1994), Bascha and Walz (2001), Hellmann (2001), Smith (2001) and Cumming (2002) analyze control over exit. Cochrane (2001) significantly adds to this research by considering a large sample of US industry data.

This paper extends previous research on the complete class of venture capital exit vehicles and the associated selection effects for measuring the risk and return to venture capital investing. We distinguish between full and partial exits for the complete class of venture capital exits. We provide empirical tests of the factors that influence the choice of a full or partial venture capital exits over the complete class of exits, and provide evidence that the risk and return to venture investing differs by the extent of exit for each exit vehicle. Partial exits are typically associated with a higher risk and return, which is consistent with the proposition that partial dispositions

are more common among exits whereby informational asymmetries are more pronounced.

We use hand-collected data on 248 VC exits from Canada and the United States. This data was collected using our own surveys and distributed with the assistance of the Canadian Venture Capital Association, and Venture Economics in the US. The trade-off in collecting detailed private VC exits information is in the comparatively smaller data set; nevertheless, our descriptive statistics are comparable to the available US industry data described by Cochrane (2001) and the Venture Economics Annual Reports, and the available Canadian industry data from the Canadian Venture Capital Association Annual Reports (see Section 6). Our hand-collected data involves a number of distinguishing features from available US industry data employed by Cochrane (2001). For example, the US industry data do not distinguish between selection among the full class of private exits (acquisitions, secondary sales, and buy-backs), and do not distinguish between selection of full and partial exits over the five distinct types of exits, among other limitations (see Section 6 below).

In the spirit of Black and Gilson (1998), Jeng and Wells (2000), and Mayer et al. (2002), we also provide an analysis of international differences in venture capital. We find significant differences in exit behaviour and the risk and return to venture capital as between Canada and the United States. In particular, we find a lower risk and return to venture capital investing in Canada. These differences are likely attributable to a combination of market and regulatory factors that differ between the two countries.

This paper is organized as follows. Section 2 of this paper recaps the types of exits used by venture capitalists. Section 3 distinguishes between full and partial exits for each exit vehicle. Section 4 considers the determinants of full versus partial exits. Section 5 documents institutional and legal differences between Canada and the United States that may affect exit. The data are described in Section 6. Comparison tests across the data from Canada and the United States are provided in Section 7. Empirical tests on factors that affect the extent of exit are presented in Section 8. The last section concludes.

2. Types of exit vehicles employed by venture capitalists

In general, VCs will exit their investments by one of the following five methods. In an IPO, the firm sells shares to members of the public for the first time. The VC will typically retain its shares at the date of the public offering, selling shares into the market in the months or years following the IPO. Alternatively, following the IPO the VC may dispose of its investment by making a dividend of investee firm shares to the fund's owners. Despite the fact that the VC will not usually sell more than a small fraction of its shares at the time of the IPO (if any at all), exits effected by sales *subsequent* to the IPO are (following common usage) classified as IPO exits.

The VC may also sell the entire firm to a third party, which we refer to below as an *acquisition* exit. Typically, the buyer is a *strategic acquiror* – a larger entity in the same or similar business to the acquired firm that wishes to meld the firm's product

or technology with its own (either vertically or horizontally). Strategic acquisitions often involve the merger of two corporations with some prior contractual relationship, such as in the supply of inputs or the licensing of a particular technology (MacIntosh, 1994).

This form of exit may be effected in a number of different ways. For example, the transaction may be structured as a sale of all the shares in return for cash, shares of the acquirer, or other assets. Alternatively, the transaction may be structured as a sale of the firm's assets or as a merger between the investee firm and purchasing firm (or a subsidiary thereof).

In an exit effected by way of *secondary sale*, the VC will sell its shares to a third party – typically a strategic acquirer, and in some cases another VC. A secondary sale differs from an acquisition exit in that only the shares of the VC are sold to the third party; the entrepreneur and other investors will retain their investments. Where the purchaser is a strategic acquirer, it will often be seeking a window on the firm's technology, with a view to possibly effecting out a complete acquisition of the firm sometime in the future.

In a *buyback* exit, the VC will sell its shares to the entrepreneur and/or the company (on buyouts generally, see, e.g., Wright et al., 2001).

A *write-off* typically involves the failure of the entrepreneurial firm, although the VC may continue to hold shares in a non-viable or barely profitable enterprise. A partial write-off consists of a write-down of the value of the assets on the firm's balance sheet.

3. Full and partial venture capital exits

An exit may be full or partial. A full exit for an IPO involves a sale of all of the venture capitalist's holdings within one year of the IPO; a partial exit involves sale of only part of the venture capitalist's holdings within that period. A full acquisition exit involves the sale of the entire firm for cash; in a partial acquisition exit, the venture capitalist receives (often illiquid) shares in the acquirer firm instead of cash. In the case of a secondary sale or a buyback exit (in which the entrepreneur buys out the venture capitalist), a partial exit entails a sale of only part of the venture capitalist's holdings. A partial write-off involves a write down of the investment.

In the case of IPOs, the VC will rarely sell its holdings at the date of the IPO, for reasons explored further below. By convention (and recording of industry data by the Canadian Venture Capital Association and Venture Economics in the US; see Section 6 below), a full exit is defined as one in which the VC fully disposes of its holdings within one year of the date of the IPO. A partial exit involves a sale of at least some of the VC's holdings within one year of the IPO, with retention of some of its holdings beyond the one-year period.

In a write-off exit, the VC makes a decision to spend no further time or effort bringing the investment to fruition, and essentially walks away from it. Indeed, many write-offs involve the bankruptcy and subsequent disappearance of the firm. Given that a partial exit is typically one in respect of which the VC disposes of some of

its holdings, it would appear to be impossible to have a partial write-off. Nonetheless, the Canadian Venture Capital Association and Venture Economics define a partial write-off as a situation in which the VC takes a write-down of the investment on its books. When this occurs, it is virtually certain that the investment is a “living dead” investment – i.e., one involving a viable but marginally profitable enterprise which lacks sufficient upside potential for the VC to continue to devote time and attention to it. While distinguishing between full write-offs and partial write-offs thus provides useful information, partial write-offs are distinct from partial exits in the case of IPOs, secondary sales and buybacks. We thus segregate the sample of write-offs from the other exit types in our empirical analysis.

The case of partial acquisition exits is also unique. An acquisition exit is, definitionally, an event in which the entire firm is sold, typically to a strategic acquiror that intends to merge the target firm into its own operations. Such sales frequently involve the payment of cash consideration to the outgoing shareholders of the purchased firm. Thus, on its face, it seems impossible to imagine that an acquisition could be a partial acquisition. Nonetheless, in certain situations, the acquisition exit may resemble a partial exit. At a broad level of generality, there are four types of acquisition exits classified by the identity of the acquiror: (a) acquisitions by public companies with deep public markets; (b) acquisitions by public companies that are thinly traded; (c) acquisitions by private companies; (d) acquisitions by the investee firm of another firm.

In any of these cases, the consideration received by the VC for selling its shares may be (and often is) shares. In the first case, shares received by the VC are tantamount to cash, since the shares may freely be sold into the public market. Such exits are thus properly classified as full exits. In the second case, the shares can also be converted into cash by a sale into the public market. However, depending on the degree of illiquidity of the acquiror’s stock, the VC may be able to convert to cash only over a lengthy period of time, or perhaps (if the market is very illiquid) not at all. Thus, the VC remains invested in the combined operations of its original investee firm and those of the acquiror. This type of transaction resembles a partial exit in that the VC’s ability to influence and control the operations of the investee firm are reduced commensurately with the VC’s reduction in equity ownership (although not linearly).² It also resembles a partial exit in that, following the transaction, the VC retains an indirect interest in the investee firm’s assets that is less substantial than the direct interest it formerly held.

In the third case, shares of a private company are necessarily very illiquid. In addition to the absence of a ready market in which to sell the shares, private companies typically have constitutional or contractual restrictions on the ability of any shareholder to resell its shares (such as requirements for board and/or shareholder

² Key control thresholds in equity ownership are 33% (conferring the ability to block a 2/3 resolution), 50% (conferring *de jure* control), and 66.67% (conferring the power to pass supermajority resolutions, but this threshold is subject to jurisdictional variation, and variation arising from supermajority requirements in the corporation’s constitution). Also, the VC may no longer possess a seat or seats on the board, and may also sacrifice previously held rights arising from shareholder agreements. See also Zingales (1995).

approval of a share transfer). This type of exit again resembles a partial exit. In the fourth case, the investee firm acquires, and subsequently merges with, another firm. If the acquired firm is small relative to the acquiring firm, then there is no exit at all. If the acquired firm is large relative to the acquirer (as is typically the case in a transaction structured as a reverse takeover³) then the transaction is either a full or partial exit, depending on the liquidity of the shares received as consideration for the transaction.

While our data sample indicates those situations in which share consideration is received, it does not indicate the identity or nature of the purchaser, nor whether that purchaser is a public or a private company. Thus, we are unable to make the fine distinctions between different types of acquisition exits that we would have preferred to make. As a saw-off, we have classified all acquisition exits in which share consideration is received as “partial acquisitions”, which assumes that there is at least some degree of share illiquidity in the average acquisition exit.

Because partial exits for each type of exit are somewhat unique, we have empirically tested the data both for all exits together, and for each exit vehicle separately. The next section develops a theory of full versus partial venture capital exits for each type of exit vehicle.

4. A theory of partial exits

In previous work (MacIntosh, 1997; Cumming and MacIntosh, 2001, 2002), we provide a general theory of venture capital exits. This work, primarily based on Black and Gilson (1998) and Gompers and Lerner (1999a,b,c), is briefly summarized as follows. VC investors are active, value-added investors. They bring not merely capital to the table, but knowledge, skill, and a network of legal, accounting, investment banking, marketing, and other contacts that are useful to a fledgling enterprise. We hypothesize that a VC will exit from an investment when the projected marginal value added as a result of the VC's efforts, at any given measurement interval, is less than the projected cost of these efforts. By “effort” we mean all of those things that VCs can do to add value to an enterprise. By “cost” we mean all the direct and overhead costs associated with creating value, the costs of monitoring and periodically re-evaluating the investment, as well as the opportunity cost associated with alternative deployments of capital. By “projected” we mean to suggest that the VC will take into account not merely present cost and effort, but a summation of all future costs and efforts. By “measurement interval”, we mean those points in time (whether quarterly, yearly, or otherwise) at which the VC formally or informally reassesses its continued commitment to an investment. Below, we refer to the projected costs of maintaining the investment as the “maintenance costs”.

³ A reverse takeover is one in which shareholders of the nominal target corporation are paid in shares of the acquirer corporation. Following the takeover, the two corporations are merged, with shareholders of each corporation receiving shares in the merged entity. The end result is that the shareholders of the former target will hold the majority of shares in the merged entity, giving them control.

We predict that the exit condition will tend to be satisfied, and the VC will effect an exit, when its skill set is exhausted, when the maintenance costs of the investment increase unexpectedly, or when the VC's potential value-added diminishes sharply (owing, e.g., to an internal event such as a failure of the firm's technology, or an external event like a competitor's invention of a superior product). This will be subject to considerations relating to the VC's opportunity cost of investment, however. We hypothesize that the VC will exit its investment even when the potential value-added exceeds the investment's maintenance cost, if the VC can sell the investment to a party with a greater ability to add value (such as a strategic acquirer). Regardless of ability to add value, there may also be windows of opportunity for the VC to sell into the public market when valuations for technology firms are particularly high.

Engrafted on this general theory are a number of special cases in which the VC will have an incentive to exit (Cumming and MacIntosh, 2001, 2002). For example, for a variety of reasons (such as the approach of the fund termination date, at which time all investments must be distributed to fund investors) the VC may desire to convert its investment into a liquid form. It may thus desire to exit even in a case in which it remains a value-added (indeed, even the *highest* value-added) investor. Alternatively, at any given point in time, a particular buyer, or the public market, may overvalue the firm, giving the VC an incentive to exit (again, without regard to whether the VC is the highest value-added investor).

When would we expect to observe partial exits? Initially, a partial exit appears to be an odd phenomenon. A partial exit, involving the disposition of some, but not all of the VC's investment, will lower the VC's potential upside profit commensurately with the lessening of the VC's equity stake. It will also dilute the VC's ability to exercise powers of control over the enterprise – powers that can be useful in bringing discipline to management and to maximizing the value of the investment. It will not, however, substantially decrease the VC's maintenance costs. Such costs are relatively fixed; i.e., the cost of maintaining an investment, per dollar of investment, will increase less than proportionately with the size of the investment. Turning this on its head, as the size of the VC's investment decreases, it sacrifices economies of scale in investing. We thus expect that partial exits will be made only in a small number of special situations, which we summarize here and elaborate below. As will be seen, in most of these situations, the purpose of the partial exit is to mitigate information asymmetries arising as between the VC as seller, and the outside buyer(s).

4.1. Partial exit as a signal of quality

There is abundant evidence in the finance literature that partial ownership retention is a signal of quality (e.g., Leland and Pyle, 1977; Lin and Smith, 1997; Gompers and Lerner, 1999a). Partial retention is a credible signal of quality because it is less expensive for the VC to maintain an ownership interest in a high quality firm than in a low quality firm. We thus hypothesize that a VC may choose a partial exit in preference to a full exit in order to signal the quality of the firm and sell shares at a value closer to the firm's true worth. Clearly the value of the signal will vary with the degree of information asymmetry between (selling) insiders and (purchasing) outsiders.

Below, we formulate hypotheses about the degree to which information asymmetry will vary with the investee firm's book and market values, its stage of development, and degree of asset intangibility. We also generate hypotheses concerning the degree of information asymmetry and whether the investment is staged or syndicated, the duration of the VCs investment, and the different types of exit vehicles used.

4.1.1. Signalling and increases in capital available to the venture capital industry

When the pool of capital available to the VC industry expands, this will create opportunities for VC managers to expand the pool of capital under administration, increasing VC returns. In the short run, however, this will stretch managerial resources, resulting in re-deployment of managers from some old investments to new investments. We hypothesize that the net effect of an increase in capital in the industry will be to spark a sale of some of the VC's existing investments, resulting in a shorter duration of investment that would otherwise have been the case for those investments. Because younger firms will exhibit enhanced information asymmetry, this will increase the value of a partial exit as a signal of quality. We thus hypothesize that an increase in capital available to the VC industry will be associated with a shorter duration of investment.

4.1.2. Bringing on board a new active investor with specialized skills

We hypothesize that, in connection with investments that are of less than "home run" quality, a VC may wish to bring in another active investor to facilitate in monitoring and strategic decision making. This will involve a sale of part of the VC's shares to the new investor, and hence a partial exit. In this situation, the use of a partial (rather than a full) exit may also be used to signal quality to the incoming strategic acquirer or other purchaser.

4.1.3. Signalling and grandstanding

Grandstanding may be an additional reason why earlier stage investments are more likely to be exited partially. Gompers (1996) finds that younger VC firms will prematurely exit portfolio investments in order to build a track record that will facilitate further fund raising efforts. The theory of grandstanding may be extended into more than a theory of why investments are prematurely exited; we hypothesize that it might also explain why some investments are *partially* exited.

Grandstanding necessarily involves exit of some investments at an earlier stage than might otherwise be the case. *Ceteris paribus*, exiting an investment earlier in the life of the firm will be associated with heightened information asymmetry, since younger firms are associated with greater information asymmetry. For this reason, we hypothesize that when a VC fund engages in grandstanding, there is an elevated probability that a partial exit will be employed.

There may be another way in which grandstanding leads to a heightened probability of a partial exit. The best of all worlds for a young VC firm would be to be able to retain all promising investments while simultaneously establishing a track record. However, establishing a track record necessarily requires that at least some investments be exited. Via a partial exit, the VC can simultaneously establish a track

record *and* retain a continuing interest in promising investments. On this view, partial exit is a compromise between establishing a track record sufficient for purposes of raising capital and remaining involved in those investments that still have significant upside potential.

4.1.4. Investors' divergent distribution preferences

There may be rare cases in which some *some*, but not *all*, investors in a particular fund are bullish on continuing to hold a given stock in the VCs portfolio following the termination date of the investment fund. In the analysis that follows, we refer to investors who choose to remain invested in a particular portfolio firm as “retainers”, and those who choose to receive cash instead as “divesters”. Because investors will tend to agree that shares in non-public companies should be sold by the VC, and not distributed, we assume that the portfolio company in question is a public company.

The simultaneous existence of retainers and divesters can create an incentive for the VC to engage in a partial exit. With respect to the retainers, it makes little sense for the VC to sell the shares in the market. This will simply force retainers to expend brokerage costs in order to repurchase the shares. With respect to taxable retainers, it will also result in an immediate (and avoidable) tax liability. To accommodate the divesters, however, the VC will need to sell sufficient stock to generate cash for distribution. Accommodating both investor preferences necessarily involves a partial exit by the VC.

The existence of an illiquid public market for the shares of the portfolio company will exacerbate differences in investor preferences. For some investors (and particularly those that are non-taxable, like pension funds), the prospect of disposing of the shares in an illiquid market will give rise to a cash preference – at least to the extent that the VC has a comparative advantage in liquidating the shares. For those with a preference to hold, however, the cost of re-assembling the desired holding post-distribution will be comparatively great. Not only are brokerage costs higher for illiquid stocks, but in addition there is a greater likelihood of a temporary adverse price impact resulting from the acquisition activity.

The phenomenon of divergent preferences is unlikely to occur for private companies. As a general matter, because of their extreme illiquidity, investors are not interested in holding shares in such companies. Investors will therefore tend to have a universal preference for a cash distribution.

Is it plausible that some investors might be retainers, and others divesters? Investors in different tax positions could easily have divergent preferences. For example, a taxable individual investor will tend to be a retainer, in order to postpone tax liabilities. Where the shares are in a relatively illiquid company, however, a tax exempt investor like a pension fund may prefer that the VC dispose of portfolio company shares if the VC is perceived to have a comparative advantage in doing so. Our discussions with VCs suggest to us that differential distributions are a relatively rare, but not unheard of phenomenon.

Unfortunately, this theory is not directly testable with our exits data. Further research would be fruitful.

4.2. *Type of exit vehicle and the benefits of a partial exit*

Different exit vehicles are associated with different degrees of information asymmetry as between insiders and outsiders. We expect to see partial exits used more frequently in connection with exit vehicles for which the new owners face greater hurdles in resolving informational asymmetry. In this subsection, we summarize our previous research on the extent of information asymmetry associated with different forms of exit (Cumming and MacIntosh, 2002).

In the empirical analysis (Section 8) we consider the extent of exits for the full sample of all exit types together, as well as the extent of exit for the subsamples of each exit type individually. The tests based on all exit types together (Table 4 in Section 8.1 below) is based on the premise that full and partial exits for each exit vehicle involve partial ownership retention, so the dependent variable (the extent of exit) may be used for all exits together. The tests with five separate subsamples for each exit type separately (Table 5 (Panels A–E) in Section 8.2 below) is consistent with the view that the dependent variable is different (i.e., the meaning of a partial and full exit is different) for each exit vehicle. We present both perspectives to illustrate the robustness of the results to the underlying assumptions.

4.2.1. *Initial public offerings*

IPOs involve the sale of shares of a company to public investors, typically (but not always) accompanied by a listing on a stock exchange. We hypothesize that this form of exit will be accompanied by the greatest information asymmetry between the firm and its new owners. This is partly a product of the relatively unsophisticated nature of public buyers. While all but the smallest IPOs are sold mainly to institutional investors, institutional money managers will not possess the same degree of expertise in any particular technology as strategic acquirors, which are typically the purchasers in both acquisition exits and secondary sales. Nor will they be as knowledgeable as the entrepreneur herself, in the case of a buyback. Thus, public buyers will be the least sophisticated purchasers.

Public buyers will also suffer from free rider problems. The incentive of each is to rely on other buyers to set an accurate IPO price. It is well known that this free rider problem carries over into post-IPO monitoring of the firm's activities. By contrast, exits via acquisitions, secondary sales, and buybacks all result in considerable concentration in post-exit shareholdings.

These problems will be all the more acute with respect to technology issues, in which information asymmetry between insiders and outsiders is high, and for which the skill and knowledge deficit is most pronounced. About three-quarters of all VC investments are made in technology investments (MacDonald, 1992; Venture Economics, 1993–1996; Gompers and Lerner, 1999a).

The skill and knowledge deficit and the free rider problem will be abridged by the investment bankers (and other professionals associated with the offering, such as lawyers and accountants) who will use their knowledge and expertise to price IPOs, and hence to protect public investors. The very fact that an investment banker is willing to bring an issue to market is a signal of the issue's quality; indeed, the more

reputable the investment banker, the more potent the signal of quality (Megginson and Weiss, 1991). Investment bankers, however, like institutional money managers, tend to be generalists,⁴ who will in turn rely heavily on their technology analysts in determining whether to underwrite a particular offering. Despite their specialized skills, however, these analysts are unlikely to be able to replicate the knowledge and experience of a strategic acquiror, or the firm's insiders. Thus, even the presence of expert market intermediaries will leave more information asymmetry in the case of IPOs than with respect to acquisition exits, secondary sales, and buybacks. Because a partial exit mitigates information asymmetry, we hypothesize that partial exits will be used more often in association with IPOs than with other forms of exit in the tests using the full sample of all exits in the empirics (see Table 4 in Section 8).

In the empirics we also consider the subsample of IPO exits separately (see Table 5 (Panel A) in Section 8), and consider factors that affect the extent of IPO exits. These factors are discussed further in Sections 4.3–4.8 below.

4.2.2. *Acquisition exits*

As noted earlier, an acquisition exit involves the sale of the entire firm to a third party, often a strategic acquiror. We classify any acquisition exit where share consideration is paid to the VC as a partial exit. Given that this variable is somewhat unique, in the empirical analysis (Section 8) of the extent of exit for all exits together (Table 4), we therefore suppress the acquisition exits variable to avoid problems of collinearity across different exit types.

We perform tests in Section 8 on the subsample of acquisition exits to determine when share as opposed to cash consideration is likely to be paid (see Table 5 (Panel B) below). Because of collinearity problems, we were able to run regressions on the set of acquisition exits in our sample only with a limited number of variables, namely technology versus non-technology investments, market/book ratio, investment duration, and a variable for market conditions (discussed further in Section 4.8 below). We hypothesize that we will observe more partial exits (i.e., those in which share consideration is received) with technology investments. Technology investments are riskier than non-technology investments, in part because they are more difficult to value. This creates a valuation risk that will be borne by those who continue to hold shares in the investee firm, whether directly or indirectly (i.e., through share ownership of the purchaser). Giving share consideration is a way of splitting this risk between purchaser and seller. This in turn avoids at least two moral hazard problems. First, the vendor will be tempted to misrepresent the value of the firm to the acquiror. Remaining indirectly invested in the investee firm through holding the acquiror's shares attenuates this risk. Second, the seller(s) possess(es) skill and knowledge that has

⁴ This is more frequently the case in Canada than in the United States. Almost all underwriters in Canada are generalists. Even Yorkton securities, the investment banker with perhaps the best claim to be a technology boutique, still does approximately 30% of its business in traditional industries. Moreover, it does not specialize in any one segment of the technology market. By contrast, in the United States, boutique underwriters more frequently concentrate on technology offerings, or even on particular types of technology offerings. See also MacIntosh (1997).

continuing value to the purchasers. Remaining invested provides an incentive to communicate this information and, more generally, to continue to work so far as possible to make the investee firm work.

In addition, technology firms dominate our sample. Most acquirors of technology firms will also be technology firms, and such firms are notoriously strapped for cash. This also makes the use of share consideration preferable to cash consideration.

We also hypothesize that a high market/book ratio is consistent with a fast growth firm, and such firms are more likely to be characterized by uncertainty as to future earnings and profitability than firms with slow but steady growth. We thus hypothesize that high market/book ratios will be associated with more partial acquisition exits, to signal quality.

Finally, longer duration of investment will tend to be associated with a more mature firm with less information asymmetry, and a lower degree of valuation risk. We thus hypothesize that the longer the duration, the less frequently we will observe partial acquisition exits.

4.2.3. *Secondary sales*

Instead of selling the entire firm, the VC may sell all or part of its investment to another venture capitalist or a strategic acquiror in a secondary sale. As we have suggested elsewhere, a secondary sale is likely to be an inferior form of exit to an acquisition exit (Cumming and MacIntosh, 2002). Generally speaking, a strategic acquiror will prefer to purchase 100% of the firm, since it then has much greater freedom to use the firm's assets and technology unhindered by legal obligations to other owners. While this will not always be the case (the acquiror may desire nothing more than to gain a window on the firm's technology), we believe that it will be the case more often than not.

Moreover, because in a secondary sale the buyer will purchase less than 100% of the firm, the incentive and ability to monitor post-exit will be less than in connection with a strategic acquisition (lowering the value of the purchase to the acquiror). In addition, a bilateral agency problem arises as between two previously unrelated owners of the firm – the entrepreneur and the new owner. There is no guarantee that this relationship will work well.

A secondary sale will typically involve a sale of the VC's shares but not the entrepreneur's. This may be indicative of a breakdown in the relationship between the entrepreneur and VC (i.e., the parties are not "working on the same team") (MacIntosh, 1997). This is frequently associated with a lack of clear direction and purpose – and hence an investment that is floundering.

In some (relatively infrequent) cases, secondary sales will be made to other VCs. This will probably occur most often when a venture capital fund nears the end of its life cycle (typically ten years) and investments must be liquidated in an orderly fashion. This is clearly a scenario that the VC would prefer to avoid, since a forced sale may be a fire sale. Nonetheless, there may be firms that, as the end of the fund's existence approaches, are ready neither for an IPO nor a strategic sale. In this situation, a secondary sale may be the best that can be achieved.

We nonetheless hypothesize that a partial secondary sale may be value enhancing. A partial secondary sale to a strategic acquiror or other VC is similar to a syndication of the investment, given that it will bring on board an additional skilled monitor. A VC may be willing to entertain a partial secondary sale when it would not be willing to entertain any other form of exit, in cases where the investee firm has a promising future, but the skill set of management and of the current team of active investors is inadequate to fully develop the firm's potential.

While our data sample does not disclose the identity of the purchasers in secondary sales, anecdotal evidence suggests that such purchasers are usually strategic purchasers – who in many cases will purchase with a view to making a future acquisition if the technology proves successful. In such cases, the buyer will be a skilled monitor. If we can assume that maintenance costs are spread equally among all active investors (and that free rider problems do not corrupt this equal allocation of monitoring responsibility), then the maintenance costs of each active investor will be proportionately reduced by the partial sale of the VC's shares and the arrival of the new active investor. Thus, while a secondary sale will necessarily reduce the seller's upside, it may also reduce its maintenance cost by a roughly commensurate amount. Even if it does not, the new active investor may sufficiently enhance the upside to justify the VC's sale of part of its shares.

We nevertheless suggest that this type of value-enhancing secondary sale will tend to be confined to investments without significant home run potential. If the VC views the investee firm as a suitable candidate for an IPO, it is unlikely that it will accede to a secondary sale of part its interest. Such a sale will reduce the upside potential commensurate with the proportion of shares sold. Since IPOs typically yield the greatest return on investment, this reduction in upside will likely dominate any advantages secured from obtaining a new active monitor.

Another way of putting this is that the act of bringing a new specialized monitor on board suggests that the VC is not entirely confident about the firm's future under current stewardship, and/or the potential of its technology – and hence its ability to take the firm to an IPO. Very likely, the strategic acquiror will harbor thoughts of ultimately purchasing the entire firm, should its product prove successful. Thus, any attempt to take the firm public is likely to lead to material conflicts between the firm's investors, diverting management's focus and damaging the business.

In summary, we suggest that a partial secondary sale is a superior form of exit vehicle to a full secondary sale. We have argued that full secondary sales will tend to occur in situations where the investment is floundering. By contrast, the investment is likely to be relatively healthy in situations in which we observe a partial secondary sale, although probably not of home run potential.

We also considered that partial secondary sales may be effected in situations of high information asymmetry, in order to induce the strategic acquiror to purchase. This explanation for partial secondary exits does not suggest that partial exits will be of higher quality than full secondary exits. However, we note that strategic acquirors are likely to be able to resolve information asymmetries quite effectively on their own, mitigating the efficacy of a partial VC exit to signal quality. Thus, we suggest

that partial secondary sales will more often be designed to bring on board a new specialized monitor than to overcome information asymmetries.

For the reasons expressed above, we hypothesize that a secondary sale is more likely to be effected as a partial than as a full exit. This hypothesis is tested in our full sample estimates (see Table 4 in Section 8.1).

In the empirical analysis in Section 8, we also consider the subsample of secondary sale exits to consider the factors that affect the extent of exit for secondary sales alone (see Table 5 (Panel C) in Section 8.2). The factors that affect the extent of exit for the subsample are discussed in Sections 4.3–4.8.

4.2.4. Buybacks

In a buyback exit, the entrepreneur is the new owner of the VC's shares. In associated work (Cumming and MacIntosh, 2002), we hypothesize that buybacks are an inferior form of exit reserved for cases in which the investment is a "living dead" or "lifestyle" company that satisfies the entrepreneur's desire for profit but has virtually no home run potential. Because informational asymmetry is eliminated in a buyback, the need for a partial exit is mitigated. Although buybacks do not suffer from problems of informational asymmetry, they put a large strain on the firm's and/or entrepreneur's cash resources, and thus almost by definition will not involve companies with high valuations.

In such cases, the VC will have a clear preference for a full exit. However, consistent with the theory that these are living dead investments and the firm is only modestly successful and has limited ability to generate cash flow, the entrepreneur (with or without external borrowing) may not have the resources to effect a full buyout. For this reason, our null hypothesis is that buybacks will be associated with an elevated probability of a partial exit. This hypothesis is tested in the full sample estimates (see Table 4 in Section 8.1).

In the empirical analysis in Section 8, we also segregate the subsample of buyback exits to determine the factors that affect the extent of a buybacks separately (see Table 5 (Panel D) in Section 8.2). These factors are discussed further below in Sections 4.3–4.8.

4.2.5. Write-offs

An investment will be fully written off when the VC determines that there is little or no prospect of ever recovering its initial investment. A "partial write-off", in our data set, is a write-down on the books of the company. In this situation, the VC recognizes that the investment still has value, but lacks the significant upside potential that motivates venture capital investing. When a write-down occurs, the VC will likely spend very little or no further effort in bringing the investment to fruition. In the parlance of the VC, it is a "living dead" or "walking wounded" investment. As a partial write-off signals that the VC has a poor quality firm remaining in its portfolio, we hypothesize that the VC's inclination will be to take a full, rather than partial write-off. This hypothesis is tested in the full sample estimates (see Table 4 in Section 8.1 below).

A partial write-off is somewhat unique in that it entails nothing more than a write-down of the book value of the investment. In the empirical analysis in Section 8 we therefore also segregate the sample of write-offs to separately consider the factors that lead VCs to write down an investment rather than completely writing it off (see Section 8.2). Unfortunately, because of collinearity problems, we were unable to regress the extent of write-off against any variables save duration and market conditions (see Section 4.8 below), and thus report only our hypothesis in relation to those variables (Table 5 (Panel E)). We hypothesize that the longer the investment duration, the less likely an investment will be written-off, as opposed to being written-down. This is because an investment of longer duration has survived more periodic profitability evaluations than an investment of shorter duration. Periodic re-evaluations act as a screen to cull the least desirable investments from the VC's portfolio. The worst investments are likely to be culled in one of these periodic re-evaluations, while investments of at least living dead quality (i.e., those that are written down rather than written off) will survive but ultimately be written-down.

4.2.6. The direction of causality in the relationship between exit vehicle and extent of exit

Above, we assumed that the choice of exit vehicle affects the extent of exit. However, it may also be the case that the extent of exit affects the choice of exit vehicle. This potential for endogeneity is considered in the empirical analysis (and see also Cumming and MacIntosh, 2001, 2002).

4.3. Development stage and the benefits of a partial exit

Information asymmetry between firm insiders and outsiders varies substantially with the stage of the firm's development at the time when the investment is made (e.g., Gompers and Lerner, 1999a). However, it is the degree of information asymmetry at the time of exit that will be a factor in determining whether the VC will make a full or partial exit. It may be, however, that there is some correlation between the stage at which the investment is made and the degree of information asymmetry at the time of exit. When investments are made at an early stage (particularly at the seed or start-up stages, and perhaps the expansion stage; for definitions of the stages of development, see e.g., MacDonald, 1992; MacIntosh, 1994, or Venture Economics, 1993–1996), informational asymmetries are high. Further, the rate at which informational asymmetry is resolved will be high in the first few years following the investment. For later stage investments (buyout, turnaround), however, the information asymmetry will be comparatively low – and the rate at which informational asymmetry is resolved will also be low. Thus, for any duration of investment, early stage investments will be characterized by a higher degree of unresolved informational asymmetry than later stage investments. This puts a premium on partial exits as a signal of quality.

Put somewhat differently, there is good evidence that VC involvement in an investee firm is a signal of the investment's quality (Gompers and Lerner, 1999a; Megginson and Weiss, 1991; Sahlman, 1990). However, we hypothesize that VC

involvement in early stage investments sends a more ambiguous signal regarding quality than VC involvement in later stage investments. When a VC makes an initial investment, the VC will use a filter to separate those investments that are worthy of investing in from those that are not. This may be called the “threshold criterion for investment” (TCI); only those firms that meet the threshold criterion will receive funding. Once the investment is made, it will periodically be re-evaluated to determine if the investment will be continued (i.e., not exited). We call the continuance criterion the “threshold criterion for continuance” (TCC). We hypothesize that the TCC at any given stage in the firm’s existence will be lower than the TCI. This is plausible because once the investment has been made, the VC’s managers will acquire expertise with respect to the investee firm that is necessarily to some degree firm-specific – such as the cost involved in achieving familiarity with management, the firm’s technology, etc. By themselves, these sunk costs are economically irrelevant and will not figure in any decision to continue or exit. Nonetheless, these investments in the acquisition of firm-specific information create knowledge assets that will lower the continued cost of monitoring the firm and maintaining the investment. Thus, the TCC will be less than the TCI, and a VC’s decision to continue an investment will be a less potent certification of quality, at any given stage, than a decision to embark upon a fresh investment. This enhances the need to signal quality via a partial exit. Our null hypothesis is thus that the earlier the stage at which the investment is made, the more likely it is that a partial exit will be used.

4.4. Venture capital investment duration and the benefits of a partial exit

Venture capital investment duration signals the degree to which the venture capitalist has mitigated informational asymmetries and agency problems faced by the new owner(s) upon purchase of the entrepreneurial firm (Cumming and MacIntosh, 2001). Megginson and Weiss (1991), for example, show IPO underpricing is less pronounced when VC investment duration is longer. Longer venture capital investment duration thus mitigates the need for a partial exit. For this reason, we hypothesize that the longer the investment duration, the lower will be the proportion of partial exits.

4.5. Increases in available capital and the benefits of a partial exit

In other work, we hypothesize (and present evidence) that increases in the total amount of capital available in the venture capital industry lowers the average duration of venture capital investments (Cumming and MacIntosh, 2001; see also Gompers and Lerner, 2000). A vital component of venture capital is the expertise of the venture capital managers; indeed, this expertise is at the very heart of venture capital investing, since venture capital investors are value-added investors (Gompers and Lerner, 1999a; Sahlman, 1990). However, managerial expertise necessarily takes time to develop, and this means that in the short run, the supply of skilled venture capital managers is restricted. Since VCs are commonly compensated (in part) by the receipt of some percentage (usually 20%; see Sahlman, 1990; Gompers and Lerner, 1999a) of the increase in the value of assets under management, there is a strong incentive for

the VC to expand the fund's assets under administration, even if this entails a premature exit from previous investments (Gompers, 1996). Thus, when the pool of available capital expands, VCs have an incentive to re-deploy managers from old to new investments.

We hypothesize that increases in available capital will increase the proportion of partial exits. Anything that results in unanticipated divestment will shorten the average duration of VC investments; i.e., some proportion of the VC's portfolio will be exited at an earlier stage than would otherwise be the case.⁵ Firms at an earlier stage in their development will be characterized by heightened information asymmetry between the firm and the prospective buyers. Thus, the proportion of firms in which a partial exit will serve as a valuable signal of quality will increase. We therefore hypothesize that expansion in the pool of available capital will result in an increase in the proportion of exits taken as partial exits.

4.6. Firm growth rate and the benefits of a partial exit

For each investment in our sample, we have the investment or "book" value, and the exit or "market" value. We can thus compute the ratio of market to book value. A high market to book value has an ambiguous effect on the extent of exit. Investments with a high market to book value are likely to be the highest quality investments in the VC's investment portfolio. If so, such investments should have relatively little informational asymmetry and the need for a partial exit to signal quality will be mitigated. On the other hand, investments with a high market to book value are likely to be high growth firms, and high growth firms are typically characterized by much uncertainty as to future value – i.e., abundant information asymmetry. This suggests that a partial exit will be useful in mitigating this asymmetry. We believe that the second effect will be stronger, and thus our null hypothesis is that firms with a high market to book ratio will be more likely to be partially than fully exited.

The very basis for partially exiting, however, is to achieve a higher exit value. Thus, there is potential for endogeneity with this variable; in the empirical analysis we test for endogeneity.⁶

⁵ The empirical results in Section 8 are not materially affected by the inclusion of both the variables for investment duration and capital available for investment.

⁶ In the empirical analysis quality is proxied by the value the VC receives for the investment (market value) divided by book value. There is potential for endogeneity with this variable if a partial exit leads to a different full exit value, although tests for endogeneity in the empirical analysis in Section 8 suggested that this was not a significant problem. Generally, however, causation is expected to run from quality to the extent of exit, as quality is associated with lower informational asymmetry, which in turn diminishes the need for a partial exit. Further, note that in partial exits for IPOs, secondary sales and buybacks, the data only indicate the proceeds received from the shares sold; thus, the proceeds will be lower than that for the sale of the whole company. This will bias the results in favour of finding an association between low proceeds and partial exits. We have therefore adjusted the market values upward proportionate to the fraction of shares sold in the case of partial exits for IPOs, secondary sales and buybacks in the empirical analysis in Section 8. See also note 9, *infra*.

4.7. Technology firms and the benefits of a partial exit

Approximately 70% of all venture capital investments are made in technology companies (see, e.g., Canadian Venture Capital Association, 1993–1996; Venture Economics (1993–1996)) and 30% in traditional sectors. Compared to these traditional sectors, technology companies are characterized by greater asset intangibility, and heightened informational asymmetry and agency costs (Helwege and Liang, 1994; Hart and Moore, 1994; Noe and Rebello, 1996; Gompers and Lerner, 1999a). As such, we hypothesize that we are more likely to observe partial exits for high-technology firms.

4.8. Other factors affecting the extent of exit

In the survey data (described in Section 6), we observe some exits that are pre-planned, and others associated with unsolicited offers, market conditions, or “other reasons”. Due to problems of collinearity, these variables are not included in the full sample estimates (see Table 4 in Section 8.1). Nevertheless, where possible, we include some of these variables in the econometric models using the data for the separate subsamples in Table 5 (Panels A–E) as control variables (see Section 8.2).

5. Legal and institutional differences across Canada and the United States

Previous research has documented regulatory differences across Canada and the United States, and stressed the impact of such differences on small and medium sized enterprises (MacIntosh, 1994; see also Gillen, 1992, Halpern, 1997, and Tucker, 1999, on Canadian regulation; see Levin, 1995, and Gompers and Lerner, 1999a, on US regulation). This subsection only briefly highlights two of the more important differences – securities regulation and government sponsorship of venture capital⁷ – as they pertain to full versus partial exits.

In related work (MacIntosh, 1994, 1997; Cumming and MacIntosh, 2001, 2002) we present evidence that there are significant institutional and legal differences between Canadian and US venture capital markets. The effect of these differences can be summarized as follows: (1) more onerous hold period and escrow requirements applicable to Canadian VCs and lower liquidity in Canadian secondary markets suggest that partial exits will be more common in Canada than in the US, particularly for IPOs; (2) government sponsorship of venture capital through the

⁷ VCs will pay capital gains tax regardless of the exit vehicle selected (MacIntosh, 1994). Nevertheless, there may be tax incentives for partial exits if VCs want to defer tax until their next taxation year (Levin, 1995). Such a strategy, however, would mitigate the certification effect of a partial exit. Mixing of taxation factors and certification strategies sends mixed signals to all new owners regarding the rationales underlying the partial exit. It is more likely that the VC will delay the entire exit until the next taxation year, rather than pursue a partial exit, if there is an underlying taxation motive, so that the benefits of signalling through a partial exit is not mitigated.

vehicle of the “Labour Sponsored Venture Capital Corporation” distorts investment and exit behaviour, introducing noise into exit behaviour and making it less likely that theoretical models of investment behaviour will hold; (3) VC managers in Canada are less skilled than their US counterparts, again introducing noise into the Canadian exits data and making it less likely that the theoretical model will hold in Canada. Taken together, these factors suggest that it is better to treat the Canadian and US data as distinct subsamples than to pool the data. Nonetheless, in our empirical tests below, we alternately segregate and pool the data to provide comparative evidence.

It is also noteworthy that different restrictive covenants and other constraints imposed on venture capitalists may exist across countries. For example, in the United States, venture capital partnership agreements specify a number of covenants restricting the actions of the general partners (the venture capital managers) (Gompers and Lerner, 1999). These restrictions include covenants relating to the management of the fund (e.g., the size of investment in any one firm, the use of debt, coinvestment, reinvestment of capital gains), covenants relating to the activities of general partners (e.g., coinvestment by general partners, sale of partnership interests, fund raising, the addition of other general partners), and covenants relating to the types of investments that the fund may make (e.g., no investments in other venture funds, public securities, leveraged buyouts, foreign securities or other asset classes). The frequency of use of these restrictions changes over time subject to changes in economic conditions. These restrictions may impact upon the choice of venture capital exit and the measurement of the risk and return to venture capital investing. Because these restrictions may differ across countries, we provide comparative evidence from Canada and US, in the spirit of Black and Gilson (1998) and Jeng and Wells (2000). Further research across other countries is warranted.

In sum, reduced market liquidity in Canada should lead to a greater number of partial exits to signal quality. A lesser degree of underwriter specialization should also lead to greater use of partial exits, as should the relative inexperience of Canadian venture capital managers. However, we expect more noise in the Canadian than the US data, due to the use of the LSVCC vehicle and lower level of VC manager skill. Nonetheless, overall, we expect a greater use of partial exits in Canada to signal the quality of VC investments. Enhanced escrow and hold period requirements will also result in more partial IPO exits in Canada; not to signal quality, but merely to comply with applicable regulatory requirements.

The testable hypotheses described above are summarized in Table 1 (Panels A and B). The data used to test these propositions and the comparative effects of regulation in the two countries is described in Section 6. Empirical tests follow in Sections 7 and 8.

6. Data

Survey data over the period 1992–1995 from 112 venture capital exits in the US and 134 venture capital exits in Canada are used to test the hypotheses developed

Table 1
Summary of testable hypotheses by exit vehicle (Panel A) and entrepreneurial firm characteristics (Panel B)

| | Information asymmetry rank ^a | Partial exit signals high quality? | Partial exit facilitates entrepreneur ownership? | Partial exits arise from hold-periods? | | Partial exits arise from Canadian LSVCCs? |
|----------------------------|---|------------------------------------|--|--|----------------------------|---|
| | | | | Canada | United States | |
| <i>Panel A</i> | | | | | | |
| IPO | 1 | Yes | No | Very Likely | Possibly | Possibly |
| Secondary Sale | 2 | Yes | No | No | No | Possibly |
| Acquisition | 3 | No | No | No | No | No |
| Buyback | 4 ^b | No | Yes | No | No | No |
| Write-off | N/A | No ^c | No | No | No | No |
| | Information asymmetry | Partial exits for IPOs | Partial exits for secondary sales | Partial exits for acquisitions | Partial exits for buybacks | Partial exits for write-offs |
| <i>Panel B</i> | | | | | | |
| Technology firms | Greater | Yes | N/A | Yes | Yes | N/A |
| Longer investment duration | Lower | No | No | No | Uncertain | Yes |
| Higher market/book value | Greater | Yes | Yes | Yes | Uncertain | N/A |
| Early development stages | Greater | Yes | N/A | N/A | N/A | N/A |
| Greater fund raising | Greater | Yes | Yes | N/A | Yes | N/A |

N/A: Not applicable. Some hypotheses were not testable with the data.

^a A rank of 1 indicates the most significant.

^b Information asymmetry is eliminated with a buyback as the entrepreneur is the new owner.

^c A partial write-off may be a signal that the VC firm is a 'living-dead' investment.

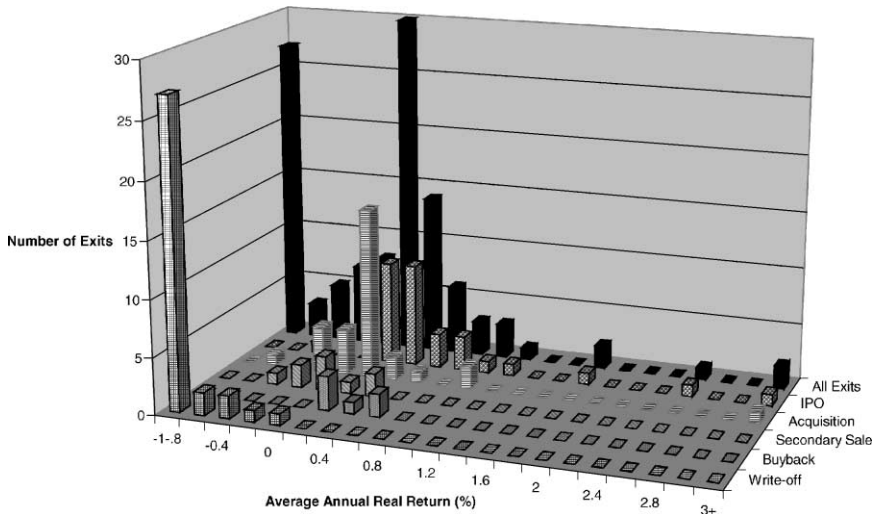


Fig. 1. Histogram of venture capital exits in the United States.

herein. The IPO exits data are publicly available. With respect to acquisitions, secondary sales, buybacks and write-offs, private data were collected through the facilities of Venture Economics in the United States, and the Canadian Venture Capital Association (CVCA) in Canada. Participation by surveyed venture capitalists was completely voluntary.⁸

The confidentiality of the data imposes some limitations on our empirical tests. For example, although we know whether an IPO exit was partial or full, we do not know the exact date of the sales of securities that led to the partial or full exit. The data nevertheless provide a first look at full and partial exits across all exit vehicles, and a first look at the factors that affect the extent of exit for the complete class of venture capital exits. US industry data (see Cochrane, 2001) shows histograms of returns that are quite similar to our survey data (see Figs. 1 and 2). However, the US industry data does not make distinctions between types of exits over the complete class of private exits (IPOs, acquisitions, secondary sales, buybacks and write-offs), nor does it make distinctions between full and partial exits. Given the institutional differences in venture capital across countries (see Section 5) and economic differences in full versus partial exits (see Sections 2–4), our empirical tests

⁸ Factors that may induce self-selection reporting bias of private data (acquisitions, secondary sales, buybacks and write-offs) across Canada and the US are likely to be the same in the two countries. Therefore self-selection bias, if it exists, should not affect the comparative cross-country results. The Canadian Venture Capital Association (1993–1996) reports the total dollar values of the exits in Canada for each exit vehicle; Venture Economics (1993–1996) only reports the total dollar values of IPO and acquisition exits. Additional industry data (such as the extent of each exit) is not available in the Venture Economics (1993–1996) and Canadian Venture Capital Association (1993–1996) annual reports; nevertheless, the available industry data do not suggest significant discrepancies between the Canadian and US samples and industry data. See also notes 9 and 10, *infra*.

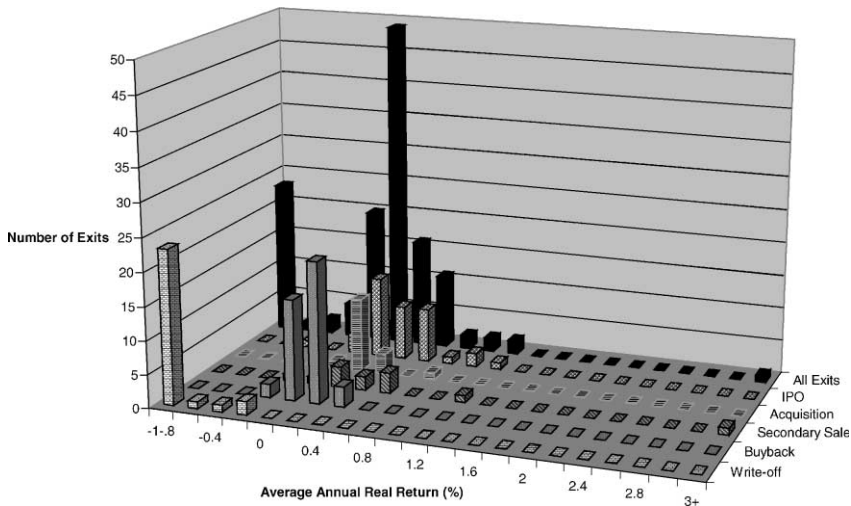


Fig. 2. Histogram of venture capital exits in Canada.

distinguish between the US and Canadian data for full and partial exits. The data suggest that the legal and institutional factors discussed above are important considerations in measuring the risk and return to venture capital. Sections 7 and 8 below provide statistical tests for such differences across Canada and the United States for the complete class of exits and for full and partial exits.

Table 2 (Panel A) summarizes the United States data by the choice of exit vehicle. The US sample comprises approximately 10% of the US exits in the Venture Economics database over the 1992–1995 period (see Venture Economics, 1993–1996, and notes 8 and 10).⁹ Eighty-seven of the 112 US exits were full exits. Partial exits are observed across all the exit types, although (as indicated above) a partial exit in the case of an acquisition or a write-off has a different meaning than in other exit contexts. Full exits in the US were most common among write-offs, and least common among buybacks. Twenty-seven percent of the US IPOs are partial exits.¹⁰

⁹ While the total number of secondary sale, buyback, write-off and other exits are unknown in the US, we base our estimate on the total number of IPO and acquisition transactions reported by Venture Economics over the test period. “Other” exits comprise a mixed exit (e.g., part buyback and part secondary sale). The exact details of the few other exits in Canada and the US are unknown; dummies for “other” exits are not included in the empirical analysis. The market values for partial exits have been adjusted to reflect the full market values, assuming an average 68.9% disposition of shares for partial exits (see also notes 6 and 10). The empirical results in Section 8 are robust to a wide variety of adjustments to the full market values for partial exits.

¹⁰ Similar evidence on dispositions is provided by Gompers and Lerner (1999a). Gompers and Lerner’s (1999a, Table 13.1) US sample of IPOs (1978–1993) indicates that the median percentage of VC holdings distributed was 100% in the first distribution, and the first VC distribution occurred within a median of 0.9 years from the time of the IPO. For all IPO distributions, VCs distributed a median of 68.9% of their holdings within a median time of 1.02 years.

Table 2
 United States^a (Panel A) and Canadian^b (Panel B) venture capital full and partial exits data summarized by exit vehicle

| Exit vehicle | Number of portfolio companies | Average duration (years) | Technology industry | | Extent of exit | | Full sample including partial exits | | | | | Partial exits only | | Full exits only | |
|----------------|-------------------------------|--------------------------|---------------------|-----|----------------|------|-------------------------------------|---------------------------------|-------------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|
| | | | No | Yes | Partial | Full | Average investment ^c | Average exit value ^e | Average gross real return (%) | Average annual real return (%) | Variance in real return (%) | Average annual real return (%) | Variance in real return (%) | Average annual real return (%) | Variance in real return (%) |
| <i>Panel A</i> | | | | | | | | | | | | | | | |
| IPO | 30 | 4.7000 | 12 | 18 | 8 | 22 | 2,035,036 | 12,565,880 | 464.6397 | 54.9152 | 51.1517 | 83.5759 | 154.3296 | 44.4932 | 14.9276 |
| Acquisition | 30 | 5.1667 | 9 | 21 | 6 | 24 | 1,720,349 | 3,859,077 | 143.0386 | 57.8286 | 754.7467 | 20.1013 | 18.0705 | 67.2604 | 943.0674 |
| Secondary Sale | 9 | 6.3333 | 2 | 7 | 3 | 6 | 519,931 | 1,005,871 | 54.8768 | -7.5650 | 6.6850 | -3.1798 | 15.3582 | -9.7570 | 4.3797 |
| Buy back | 6 | 4.0000 | 5 | 1 | 5 | 1 | 784,397 | 2,687,449 | 145.0423 | 24.7910 | 3.2665 | 21.6493 | 3.3428 | 40.4996 | 0.0000 |
| Write-off | 33 | 4.3636 | 15 | 18 | 2 | 31 | 1,984,068 | 92,500 | -97.8450 | -90.0070 | 4.8772 | -100.0000 ^d | 0.0000 | -89.3620 ^d | 5.1315 |
| Other | 4 | 2.7500 | 2 | 2 | 1 | 3 | 1,112,445 | 1,539,990 | 35.2761 | 34.0191 | 83.9444 | 165.6761 | 0.0000 | -9.8670 | 10.3594 |
| Total | 112 | 4.7500 | 45 | 67 | 25 | 87 | 1,714,030 | 4,706,597 | 147.3815 | 5.6146 | 256.6047 | 34.1439 | 83.5232 | -2.5835 | 304.8443 |
| | | | | | | | Average investment ^c | Average exit value ^e | | | | | | | |
| <i>Panel B</i> | | | | | | | | | | | | | | | |
| IPO | 36 | 5.8611 | 3 | 33 | 20 | 16 | 1,464,087 | 5,170,185 | 1385.8530 | 27.8282 | 9.8247 | 32.8825 | 10.6479 | 21.5102 | 8.6706 |
| Acquisition | 16 | 6.9375 | 9 | 7 | 1 | 15 | 1,945,386 | 3,271,514 | 84.5848 | 13.3089 | 2.9498 | 5.9532 | 0.0000 | 13.7993 | 3.1193 |
| Secondary Sale | 12 | 3.0833 | 0 | 12 | 5 | 7 | 402,144 | 968,181 | 165.6950 | 54.8972 | 90.2764 | 106.4305 | 179.2162 | 18.0877 | 8.0910 |
| Buyback | 41 | 6.3415 | 30 | 11 | 7 | 34 | 668,245 | 808,686 | 66.9712 | 3.8207 | 1.5041 | 9.9051 | 1.1401 | 2.5680 | 1.5212 |
| Write-off | 27 | 4.0741 | 18 | 9 | 1 | 26 | 332,038 | 3821 | -97.1010 | -92.0440 | 4.3792 | -100.0000 ^d | 0.0000 | -91.7380 ^d | 4.5280 |
| Other | 2 | 6.0000 | 2 | 0 | 1 | 1 | 2,412,731 | 3,687,627 | 60.1537 | 9.5346 | 0.1692 | 6.6257 | 0.0000 | 12.4435 | 0.0000 |
| Total | 134 | 5.5299 | 62 | 72 | 35 | 99 | 969,012 | 2,169,579 | 399.0807 | -3.2530 | 33.8738 | 33.4777 | 41.8835 | -16.2390 | 24.9186 |

^a Source: Venture Economics.

^b Source: Canadian Venture Capital Association.

^c Real US dollars (base year = 1990). CPI data source: International Financial Statistics, Label 11/64; available at www.chass.utoronto.ca. Partial exit market values are adjusted to reflect full values. Real returns are calculated assuming investment at the beginning of the year, and exit at the end of the year, reflecting the lowest possible estimate.

^d Partial write-offs (write-downs) were recorded without indicating the full cost of the amount not written off. Full write-offs yielded a small return upon liquidation.

^e Real Canadian dollars (base year = 1990) converted to US Dollars. CPI data source: CANSIM, Label P700000; available at www.chass.utoronto.ca. Foreign exchange rates from CANSIM, label B3400. Values expressed in US dollars for comparative purposes only. Returns were computed in Canadian dollars and do not reflect exchange rate changes. Partial exit market values are adjusted to reflect full values. Real returns are calculated assuming investment at the beginning of the year, and exit at the end of the year, reflecting the lowest possible estimate.

Table 2 (Panel B) summarizes the Canadian data, which comprise 32% of the exits in the CVCA database over the 1992–1995 period (see Canadian Venture Capital Association, 1993–1996, and note 8). Buybacks are more frequent in Canada than in the US. In contrast to the US data, full exits are also relatively more common for buybacks in Canada (perhaps because Canadian VC investments are, on average smaller than their US counterparts, suggesting smaller investee firms and comparatively greater ease with which the entrepreneur can buy out the VC). The data on the average investment values, exit values, gross and real returns, variation in real returns, duration, and whether the firm was in a high-technology industry are also summarized in Table 2 (Panels A and B).¹¹

Table 3 (Panel A) summarizes additional information in the data by the extent of exit. The data indicate the stage of investment at the time of initial investment (seed, start-up, expansion, buyout, turnaround, and secondary purchases; these investment stages are commonly used in venture capital investing in Canada and the US and defined in the annual reports of the Canadian Venture Capital Association and Venture Economics in the US).

Table 3 (Panel B) provides correlation coefficients between the extent of exit (a dummy variable indicating the value 1 for a full exit and zero otherwise) and the average annualised real returns in Canada and the United States. The only statistically significant coefficients are for Canadian acquisition and secondary sale exits: in each case, full exits are correlated with lower real returns. The statistics in Table 3 (Panel B) provide an incomplete picture; therefore, additional comparison of means and other tests are provided below. In the following sections we consider differences in the risk and return to venture capital for full and partial exits and factors that affect the extent of exit in the two countries.

7. Comparison tests of full and partial exits in the US and Canada

Are there differences in the returns to venture capital investing, and the variance of the returns, for the five different exit vehicles and for full and partial venture capital exits? Are these differences similar across countries, or do legal and institutional factors affect the risk and return to venture capital investing? We address these questions by performing a number of simple direct comparison tests for differences in proportions, variances, and means. Below, we describe some of the significant differences

¹¹ How is it that average annualized returns are negative in some cases (such as secondary sales in the US) when gross exit returns are positive? Consider the following example: Investment A: exit value = \$75, book value = \$50. Investment B: exit value = \$45, book value = \$50. Suppose the duration of Investment A = 7 years; duration of Investment B = 1 year. The average exit value = $(75 + 45)/2 = \$60$, and the average book value = $(50 + 50)/2 = \$50$. The gross return on Investment A = $(75 - 50)/50 = 50\%$. The gross return on Investment B = $(45 - 50)/50 = -10\%$. The average gross return = $(50\% - 10\%)/2 = 20\%$. The annualized return on Investment A = $(75/50)^{(1/7)} - 1 = 5.96\%$. The annualized return on investment B = $(45/50)^{(1/1)} - 1 = -10\%$. The average annualized real return = $(5.96\% - 10\%)/2 = -2.02\%$.

Table 3
 Relations across investment variables and the extent of venture capital exit in the United States and Canada^a (Panel A) and correlation coefficients between the extent of exit and the average annualized real returns in Canada and the United States^b (Panel B)

| | Investee firm characteristics | | | | | | | Investment characteristics | | Reason for exit | | | |
|---|-------------------------------|----------|-------------|-----------|---------|-----------------------------|------------|----------------------------|---------------------|-------------------|-------------------|-------------|-----------|
| | Seed | Start-up | Early stage | Expansion | Buy-out | Turn-around/SP ^c | Technology | Average duration | Average market/book | Market conditions | Unsolicited offer | Pre-planned | Other |
| <i>Panel A</i> | | | | | | | | | | | | | |
| United States | | | | | | | | | | | | | |
| Full exits | 20 | 18 | 23 | 22 | 1 | 3 | 51 | 4.6552 | 2.2637 | 33 | 9 | 21 | 23 |
| Partial exits | 7 | 2 | 2 | 12 | 1 | 1 | 16 | 5.0800 | 3.2050 | 5 | 1 | 13 | 6 |
| Canada | | | | | | | | | | | | | |
| Full exits | 4 | 34 | 7 | 48 | 2 | 4 | 47 | 5.1818 | 1.4364 | 18 | 26 | 21 | 34 |
| Partial exits | 2 | 9 | 8 | 13 | 1 | 2 | 26 | 6.5143 | 15.0448 | 15 | 3 | 14 | 3 |
| | | | | | | | | All exits | IPO | Acquisition | Secondary sale | Buyback | Write-off |
| <i>Panel B</i> | | | | | | | | | | | | | |
| United States | | | | | | | | | | | | | |
| Number of exits ^d | | | | | | | | 112 | 30 | 30 | 9 | 6 | 33 |
| Correlation coefficient with full exit dummy variable | | | | | | | | -0.0959 | -0.2458 | 0.0698 | -0.1272 | 0.4258 | 0.1167 |
| <i>t</i> -Statistic | | | | | | | | -1.0243 | -1.4327 | 0.3844 | -0.3879 | 1.2740 | 0.6798 |
| Two-sided <i>p</i> -value | | | | | | | | 0.3079 | 0.1630 | 0.7036 | 0.7096 | 0.2717 | 0.5017 |
| Canada | | | | | | | | | | | | | |
| Number of exits ^d | | | | | | | | 134 | 36 | 16 | 12 | 41 | 27 |
| Correlation coefficient with full exit dummy variable | | | | | | | | -0.3767 | 0.1142 | -0.4788 | -0.4788 | -0.2279 | 0.0580 |
| <i>t</i> -Statistic | | | | | | | | -5.0810 | 0.6943 | -2.4846 | -2.1517 | -1.5392 | 0.3023 |
| Two-sided <i>p</i> -value | | | | | | | | 0.0000 | 0.4922 | 0.0262 | 0.0569 | 0.1318 | 0.7649 |

^a See Table 2 (Panels A and B) for relations across choice of exit vehicle and extent of exit.

^b Positive (negative) correlation coefficients indicate full exits are correlated with higher (lower) returns.

^c SP stands for secondary purchases. There were no secondary purchases in the Canadian data. There were no turnaround investments in the US data.

^d Does not sum across columns because the few 'other' exits reported in Table 2 (Panels A and B) are excluded here.

observed in the data. Section 8 considers in more detail explanations for the observed differences in the extent of exits in a multivariate setting.

There are differences in the proportion of exits taken as full versus partial exits within both Canada and the United States across the different exit vehicles.¹² In both the US and Canadian data, more than 50% of all exits are full exits (the two-sided p -values for the test statistics are equal to zero in both the Canadian and US data). The US data indicate that more than 50% of exits are full exits among the subsamples of IPOs (p -value equal to 0.011), acquisitions (p -value equal to 0.001) and write-offs (p -value equal to 0.000). In the Canadian data, more than 50% of exits are full exits for acquisitions (p -value equal to 0.003), buybacks (p -value equal to 0.000) and write-offs (p -value equal to 0.000).

There are also differences in the proportion of full and partial venture capital exits across Canada and the United States.¹³ Statistically significant differences between the Canadian and US samples are found in the proportion of full exits for IPOs (two-sided p -value equal to 0.018) and buybacks (p -value equal to 0.003). A greater proportion of IPOs in the US are full exits than in Canada (p -value equal to 0.018). This difference is in accord with the legal and institutional differences described in Section 5. For buybacks, a greater proportion of exits are full exits in Canada than in the US (p -value equal to 0.003). Possible explanations for the difference in the extent of buybacks are considered below in Section 8.

There is evidence of significant differences in the variance of average annual real returns across exit types for full and partial exits.¹⁴ There are significant differences across each exit vehicle, and across full and partial exits, within each country. In particular, the variance of returns for IPOs is significantly greater (at the 1% level of significance) than that for each of the other four exit vehicles in both the US and Canada. The variance of returns for full IPO exits is significantly greater than that for partial exits, but this result is only significant in the US (p -value equal to 0.004 in the US, and 0.664 in Canada). The variance of all full exits in the US is significantly greater than that for partial exits (p -value equal to 0.001); however, the opposite is true in Canada (p -value equal to 0.087). This difference is attributable to the variance in the returns to full acquisition exits in the US (see Table 2).

The data also indicate that the variance of average annual real returns is significantly greater in the US than in Canada at the 1% level of significance for each exit vehicle (the only exceptions are for the subsamples of IPO and buyback exits where

¹² The test statistic for testing whether the proportion (P) is greater than some base proportion (P_0) is given by $(P - P_0)/(P_0(1 - P_0)/n)^{0.5}$ where n is the number of survey responses (see e.g., Newbold, 1988, Chapter 9). The test statistic is normally distributed for $n \geq 30$; the t -distribution is used for $n < 30$.

¹³ The test statistic for the equality of proportions (P) is given by $(P_{US} - P_{Can})/(P_0(1 - P_0)(n_{US} + n_{Can})/n_{US}n_{Can})^{0.5}$ where $P_0 = (n_{US}P_{US} + n_{Can}P_{Can})/(n_{US} + n_{Can})$, P_{US} is the proportion of responses from the US data, P_{Can} is the proportion of responses from the Canadian data, n_{US} is the number of US responses, n_{Can} is the number of Canadian responses (see e.g., Newbold, 1988, Chapter 9). The test statistic is normally distributed for $n \geq 30$; the t -distribution is used for $n < 30$.

¹⁴ The test statistic for the equality of variances of returns (X) is given by $\text{Var}(X_{\text{IPO}})/\text{Var}(X_{\text{Other}})$, where $\text{Var}(X_{\text{IPO}})$ and $\text{Var}(X_{\text{Other}})$ are the variances of the annual real returns for IPOs and other exits, respectively (see e.g., Newbold, 1988, Chapter 9; see also Zar, 1984).

the differences were insignificant). These results are consistent with the more extensive regulations in the Canadian industry, lowering risk taking among venture capitalists (Section 5; see also MacIntosh, 1994).

There are differences in the means of the average annual real returns for full and partial exits for the complete class of venture capital exits within each country.¹⁵ Consistent with MacIntosh (1997), Cumming and MacIntosh (2002) and Cochrane (2001), the highest quality entrepreneurial firms are either taken public or are acquired. Consistent with research on each type of private exit (including acquisitions, secondary sales, buybacks and write-offs, see MacIntosh (1997) and Cumming and MacIntosh (2001, 2002)), secondary sale and buyback exit strategies are used for lower quality firms, and the lowest quality firms are written off. The returns to partial exits are on average significantly greater than the returns to full exits in Canada (p -value equal to 0.000), but not in the US (p -value equal to 0.160). This difference across Canada and the US may in part reflect the large number of buyback exits in Canada taken as full exits (Table 2 (Panel B)), and the variability of returns associated with acquisition exits in the US (see Table 2 (Panel A)).

Finally, there are differences in the average annual real returns across the US and Canada. Average annual real returns for all exits are greater on average in the US sample; however, the high variability in returns in the US sample (particularly for acquisition exits) gives rise to a test statistic that is statistically insignificant (p -value equal to 0.579). Average annual real returns are significantly greater in the US than in Canada among the subsamples of IPOs (p -value equal to 0.054) and buybacks (p -value equal to 0.009). This is consistent with the institutional differences across the two countries previously discussed in Section 5 and the greater variability of returns in the US.¹⁶

In sum, selection of full or partial exits among the full class of exit vehicles (IPOs, acquisitions, secondary sales, buybacks and write-offs) is associated with different average annual real returns, and differences in the variance of average annual real returns. These differences are in part attributable to economic factors affecting informational asymmetries between the entrepreneurial firm and the new owner(s) upon venture capital exit (see Section 4). But the significance of the differences across Canada and the US also suggests that legal and institutional factors across countries are also important in assessing the risk and return to venture capital. These differences may arise from securities regulation or market liquidity among other things (see Section 5). They may also arise from restrictive covenants governing venture capital firms, imposed in some cases by statute (Canadian LSVCCs; see Section 5), and in other cases by limited partners (Gompers and Lerner, 1996). Further research on the relative importance of these factors in measuring the risk and return to venture

¹⁵ The test statistic for the equality of means (X) is given by $(X_{\text{IPO}} - X_{\text{Other}}) / (\text{Var}(X_{\text{IPO}}) / n_{\text{IPO}} + \text{Var}(X_{\text{Other}}) / n_{\text{Other}})^{0.5}$ where X_{IPO} and X_{Other} are the mean real returns for IPO and other exits, respectively, and $\text{Var}()$ is the variance of the returns (see e.g., Newbold, 1988, Chapter 9). The test statistic is normally distributed for $n \geq 30$; the t -distribution is used for $n < 30$.

¹⁶ The differences are partly attributable to the longer investment duration in Canada relative to the US (see Cumming and MacIntosh, 2001). Note that duration also affects the selection of particular exit vehicles (Cumming and MacIntosh, 2002) and extent of exit (see Section 8).

capital is warranted. In the following section we consider factors that affect the selection of full and partial exits among the full class of exit types.

8. Empirical evidence on the factors that affect the extent of exit in the US and Canada

As discussed above in Section 4.2, partial exits may be considered for all exits taken together, or for the subsamples of each exit vehicle separately. In Table 4 we present the econometric regressions for all exits taken together.¹⁷ In Table 5 (Panels A–E) we present the results for the subsamples of IPOs, acquisitions, secondary sales, buybacks, and write-offs, respectively. In all cases, the binary left-hand-side variable, the extent of exit, was recorded as follows: full exits received the value “1”, and partial exits “0”. As such, significant positive coefficients indicate a greater likelihood of a full exit, while significant negative coefficients indicate a greater likelihood of a partial exit.¹⁸ Various information criteria were used to infer the appropriateness of the included right-hand-side variables in each of the regressions. We present only the logit estimates; probit regressions, among others, were not materially different. In Section 8.1 we discuss the full sample estimates. The results for each exit separately are considered in Section 8.2.

8.1. Full sample estimates (Table 4)

The US logit estimates (Table 4) suggest that partial exits are neither more nor less likely for IPOs and secondary sales, although they have the expected negative sign. As noted earlier, this may be a product of our definition of partial exit, which records as a full exit any exit in which all the VCs shares are sold within a year of the IPO. It is likely that many VCs sell their shares after the expiry of an escrow period with a duration of less than one year.

By contrast, the Canadian data as well as the full sample estimates indicate (at the 5% level of significance) that IPO exits are more likely to be partial exits. Unfortunately, as we indicated in Section 5, this may simply reflect the more onerous escrow and hold periods in Canada, and cannot uniquely be attributed to a desire to signal the quality of the investee firm.

¹⁷ We suppress a dummy variable for the ‘other’ exits (see 8) to avoid perfect collinearity problems. But the inclusion of all five other exit vehicles still generates collinearity problems in estimation, given the fact that there are very few ‘other’ exits, whether full or partial. Because acquisition exits are somewhat unique (see Section 4.2.2), we also suppress the acquisition exits dummy variable to avoid problems of collinearity across variables for different exit types. We nevertheless assess the factors that affect the extent of acquisition exits in Table 5 (Panel B) in Section 8.2. Moreover, for the full sample combining U.S. and Canadian data, note that a dummy variable equal to “1” for Canada (not reported), was insignificant in all the regressions, and did not materially affect the other coefficients. There were insufficient degrees of freedom for interaction dummies.

¹⁸ Durbin–Wu–Hausman tests (see Davidson and MacKinnon, 1993, pp. 235–242) were used with various modifications to test for the effect of possible endogeneity with some of the explanatory variables. Instruments used included the geographic location (US states and Canadian provinces) of the investee firms. There was no significant evidence of endogeneity.

Table 4
Logit estimates of the extent of exits in Canada and the United States

| | United States | | | Canada | | | Full sample estimates | | |
|----------------|---------------|---------------------|------------------------------|-------------|---------------------|------------------------------|-----------------------|---------------------|------------------------------|
| | Coefficient | <i>t</i> -Statistic | <i>p</i> -Value ^a | Coefficient | <i>t</i> -Statistic | <i>p</i> -Value ^a | Coefficient | <i>t</i> -Statistic | <i>p</i> -Value ^a |
| Constant | 2.5415 | 1.7109 | 0.0871 | 2.3416 | 1.5120 | 0.1305 | 1.7849 | 2.0421 | 0.0411 |
| IPO | -0.5653 | -0.8049 | 0.4209 | -2.2167 | -2.2954 | 0.0217 | -1.1766 | -2.4555 | 0.0141 |
| Secondary sale | -0.0745 | -0.0767 | 0.9389 | -2.5584 | -2.1063 | 0.0352 | -1.0788 | -1.7274 | 0.0841 |
| Buyback | -3.2569 | -2.4566 | 0.0140 | -0.4808 | -0.5334 | 0.5938 | -0.8364 | -1.5009 | 0.1334 |
| Write-off | 1.5403 | 1.6986 | 0.0894 | 0.5694 | 0.4243 | 0.6714 | 1.1194 | 1.5491 | 0.1214 |
| Technology | -1.4559 | -2.1294 | 0.0332 | 0.3345 | 0.4744 | 0.6352 | -0.6341 | -1.5760 | 0.1150 |
| Duration | -0.0542 | -0.4343 | 0.6641 | -0.0973 | -1.2427 | 0.2140 | -0.0851 | -1.6360 | 0.1018 |
| Market/book | 0.0514 | 0.7094 | 0.4781 | -0.1694 | -1.7701 | 0.0767 | -0.0283 | -0.5932 | 0.5530 |
| Seed | 0.5762 | 0.4564 | 0.6481 | 1.4040 | 0.8697 | 0.3844 | 0.9533 | 1.1733 | 0.2407 |
| Start-up | 1.7609 | 1.2686 | 0.2046 | 0.3771 | 0.3286 | 0.7425 | 1.4116 | 1.8354 | 0.0664 |
| Early stage | 2.1683 | 1.5422 | 0.1230 | -0.5629 | -0.4531 | 0.6505 | 1.0899 | 1.3588 | 0.1742 |
| Expansion | 0.1150 | 0.0941 | 0.9250 | 0.4802 | 0.4262 | 0.6700 | 0.7645 | 1.0686 | 0.2852 |
| Fund raising | -0.0003 | -1.2266 | 0.2200 | 0.0003 | 0.3842 | 0.7008 | -0.0001 | -0.9457 | 0.3443 |

^a Two-sided test.

In respect of secondary sales, we earlier hypothesized that partial secondary sales are likely to be a more efficient form of exit, and that we would thus expect more partial exits. The US data do not support this hypothesis. However, the Canadian coefficient has the expected sign and is significant at the 5% level (and the full sample coefficient is significant at the 10% level). This is consistent with the lower average skill level of Canadian VCs noted earlier. Lower skill levels make it more likely that a Canadian VC will make a partial secondary sale in order to effect a mini-syndication, bringing on board a new specialized monitor, whether it be another VC or a strategic acquirer. It is also consistent with other factors noted in Section 5 that make a partial exit a more potent signal of quality in the Canadian context.

With respect to buybacks, we earlier noted that information asymmetries are minimal or non-existent, leaving little role for a partial exit as a signalling device. We also noted, however, that buyback exits may overstretch the resources of the entrepreneur and/or investee firm, leading to a heightened probability that a partial exit will be made. In Table 4, all three data samples indicate a negatively signed coefficient, in accord with this hypothesis. However, only the US sample estimates are statistically significant (two-sided *p*-value equal to 0.0140). This is consistent with the relative size of US and Canadian investments; Table 2 (Panels A and B) show that the average VC investment in the US is nearly twice as large as the average VC investment in Canada. A buyback will thus put more strain on the entrepreneur in the US than in Canada, leading to a greater likelihood of a partial exit.

Table 5
Logit estimates in Canada and the United States

| | United States | | | Canada | | | Full sample estimates | | |
|--|------------------|---------------------|------------------------------|------------------|---------------------|------------------------------|-----------------------|---------------------|------------------------------|
| | Coefficient | <i>t</i> -Statistic | <i>p</i> -Value ^a | Coefficient | <i>t</i> -Statistic | <i>p</i> -Value ^a | Coefficient | <i>t</i> -Statistic | <i>p</i> -Value ^a |
| <i>Panel A: Logit estimates of the extent of venture capital IPO exits</i> | | | | | | | | | |
| Constant | -1.7464 | -0.6011 | 0.5478 | 3.8845 | 1.4746 | 0.1403 | -0.9414 | -0.6502 | 0.5155 |
| Technology | -1.3741 | -0.7716 | 0.4404 | -1.0835 | -0.6401 | 0.5221 | -0.2668 | -0.3236 | 0.7463 |
| Duration | 0.0232 | 0.1079 | 0.9141 | 0.0507 | 0.2950 | 0.7680 | -0.0646 | -0.6511 | 0.5150 |
| Market/book | 0.1686 | 1.1524 | 0.2492 | -0.5356 | -2.3978 | 0.0165 | -0.0269 | -0.4409 | 0.6593 |
| Seed | -1.0031 | -0.6911 | 0.4895 | 8.4458 | 1.8914 | 0.0586 | 0.2351 | 0.2283 | 0.8194 |
| Start-up | 0.9551 | 0.5821 | 0.5605 | 0.1227 | 0.1052 | 0.9162 | 0.7264 | 0.9571 | 0.3385 |
| Early stage | 2.8746 | 1.4570 | 0.1451 | -1.9273 | -1.4485 | 0.1475 | 0.2104 | 0.2799 | 0.7795 |
| Fund raising | 0.00002 | 0.0255 | 0.9796 | -0.0003 | -0.1914 | 0.8482 | 0.0004 | 1.4318 | 0.1522 |
| Market conditions | 4.3553 | 1.9961 | 0.0459 | -1.3877 | -0.8020 | 0.4225 | 1.1070 | 1.0651 | 0.2868 |
| Preplanned exit | 1.9696 | 1.2263 | 0.2201 | -0.6243 | -0.3426 | 0.7319 | 1.1470 | 1.2025 | 0.2292 |
| <i>Panel B: Logit estimates of the likelihood of cash consideration in venture capital acquisition exits</i> | | | | | | | | | |
| Constant | 16.3158 | 2.0161 | 0.0438 | 3.9083 | 1.3993 | 0.1617 | 3.9789 | 2.9397 | 0.0033 |
| Technology | -5.7817 | -1.7299 | 0.0836 | N/A ^b | N/A ^b | N/A ^b | -0.4488 | -0.4577 | 0.6471 |
| Duration | -1.7639 | -1.9076 | 0.0564 | -0.1461 | -0.6908 | 0.4897 | -0.2197 | -1.6636 | 0.0962 |
| Market/book | -0.6524 | -1.8228 | 0.0683 | -0.0783 | -0.1057 | 0.9158 | -0.2134 | -1.5004 | 0.1335 |
| Market conditions | -1.8654 | -0.9307 | 0.3520 | N/A ^b | N/A ^b | N/A ^b | -1.1553 | -1.0449 | 0.2961 |
| <i>Panel C: Logit estimates of the extent of venture capital secondary sale exits</i> | | | | | | | | | |
| Constant | 8.7239 | 0.8487 | 0.3960 | -0.2319 | -0.2139 | 0.8306 | 3.4863 | 1.4486 | 0.1474 |
| Duration | 0.1528 | 0.4005 | 0.6888 | 0.5147 | 1.0835 | 0.2786 | 0.2716 | 0.9795 | 0.3273 |
| Market/book | -4.5011 | -0.7136 | 0.4755 | -0.1801 | -0.6207 | 0.5348 | -0.4544 | -1.7349 | 0.0828 |
| Fund raising | -0.0014 | -0.8524 | 0.3940 | N/A ^b | N/A ^b | N/A ^b | -0.0010 | -1.2967 | 0.1947 |
| Market conditions | -3.2965 | -0.6533 | 0.5136 | N/A ^b | N/A ^b | N/A ^b | -1.7177 | -1.0815 | 0.2795 |
| <i>Panel D: Logit estimates of the extent of venture capital buyback exits</i> | | | | | | | | | |
| Constant | -4.1615 | -0.8387 | 0.4017 | 3.3246 | 1.8021 | 0.0715 | 4.9667 | 2.9692 | 0.0030 |
| Technology | N/A ^b | N/A ^b | N/A ^b | -0.4461 | -0.4109 | 0.6812 | -0.0239 | -0.0241 | 0.9808 |
| Duration | -1.0598 | -0.4219 | 0.6731 | -0.2537 | -1.9289 | 0.0537 | -0.2151 | -1.8143 | 0.0696 |

| | | | | | | | | | |
|-------------------|------------------|------------------|------------------|---------|---------|--------|---------|---------|--------|
| Market/book | 1.7273 | 0.5900 | 0.5552 | -0.0703 | -0.3117 | 0.7552 | -0.0309 | -0.1558 | 0.8762 |
| Fund raising | N/A ^b | N/A ^b | N/A ^b | 0.0017 | 1.2522 | 0.2105 | -0.0014 | -2.1257 | 0.0335 |
| Preplanned | N/A ^b | N/A ^b | N/A ^b | -2.3292 | -1.4464 | 0.1481 | -1.9042 | -1.3994 | 0.1617 |
| Unsolicited offer | N/A ^b | N/A ^b | N/A ^b | -1.0873 | -0.7297 | 0.4656 | -0.4738 | -0.3403 | 0.7336 |

Panel E: Logit estimates of the likelihood of venture capital write-offs versus write-downs

| | | | | | | | | | |
|-------------------|---------|---------|--------|------------------|------------------|------------------|---------|---------|--------|
| Constant | 3.7177 | 2.0021 | 0.0453 | 5.9173 | 2.1892 | 0.0286 | 4.5620 | 3.3746 | 0.0007 |
| Duration | -0.2676 | -0.7603 | 0.4471 | -0.5285 | -1.5436 | 0.1227 | -0.4225 | -1.7465 | 0.0807 |
| Market conditions | 0.1290 | 0.0875 | 0.9303 | N/A ^b | N/A ^b | N/A ^b | 0.5814 | 0.4075 | 0.6836 |

^a Two-sided test.

^b Not applicable. Variable excluded to avoid collinearity problems. Similarly, variables not shown were excluded to avoid collinearity problems.

We also note that buybacks appear to be used with much greater frequency in Canada than in the US (i.e., 41 versus 6 buyback exits in samples of similar size; see Table 2 (Panels A and B)). This is consistent with the hypothesis that Canadian VCs possess, on average, a lower degree of skill than their US counterparts, and consequently breed a higher proportion of living dead investments (although it is also worth noting that there are somewhat fewer write-offs in Canada than in the US).

In the US data, the logit estimates indicate (p -value equal to 0.0332) that technology firms are more likely to be partially exited, as predicted. The Canadian evidence, however, is not supportive.¹⁹ This is puzzling, since we had predicted that a partial exit would have greater value in the Canadian context. The result may be explicable if Canadian securities markets are more likely than the US to be characterized by technology fads, in which investors herd to buy technology offerings in a manner only loosely tied to underlying fundamentals. While we are unaware of any direct evidence on point, there is evidence that Canadian markets exhibit more inefficiencies than the relatively mature US markets (Jog and Riding (1990); see also Section 5; for related theoretical analyses of VC skill and (in)efficiencies, see Kannianen and Keuschnigg (2000, 2001) and Keuschnigg and Nielsen (2003)).

In respect of investment duration, we hypothesized that the longer the duration of the investment, the less the degree of information asymmetry between insiders and outsiders, and the lesser the need for a partial exit. Thus, we expected a positive coefficient on duration. The estimates, however, do not support the existence of any relationship. Similarly, the data did not confirm our hypothesis of a relationship between the stage at which the initial investment was made and the extent of exit (the one significant coefficient (at the 10% level) is the start-up coefficient in the full sample, but it does not have the expected sign).

We had predicted that the greater the availability of capital for investment, the greater the likelihood that some investments will be prematurely liquidated, enhancing the value of a partial exit as a signal of quality. However, we find differently signed coefficients in Canada and the US, and the results are insignificant.

We also hypothesized that the higher the market/book ratio, the higher the firm's growth rate, and the greater the uncertainty about future profitability. We thus expected a partial exit to be a useful signal of quality (i.e., we expected a negative coefficient). Only the Canadian coefficient is statistically significant (at the 10% level).²⁰ This is consistent with our hypothesis that a partial exit has more signalling value in the Canadian context.

8.2. Subsample estimates with each exit vehicle segregated (Table 5 (Panels A–E))

As discussed above, some right-hand-side variables were necessarily excluded in the estimates using the smaller subsamples of the different exit types separately in order to avoid estimation problems arising from perfect collinearity. We were never-

¹⁹ The particular type of technology industry did not affect the results.

²⁰ DWH tests did not indicate endogeneity problems; see 18, *supra*.

theless able to include some of the variables associated with the reasons for exit in the survey data (see Sections 4.8 and 6) that were excluded in the full sample estimates to avoid collinearity problems.

Table 5 (Panel A) considers the extent of exit for the subsample of IPOs. The US evidence indicates that market conditions are the only significant determinant of the extent of IPO exits. Consistent with related research, the data indicate that full exits are more likely associated with exits for reasons of market conditions.²¹ The Canadian evidence, by contrast, indicates that full IPO exits are more common among seed investments. This is not in accord with our hypothesis respecting the stage of development and the extent of exit (Section 4.3). Partial IPO exits in Canada are more likely the greater the market/book value. This is consistent with our hypothesis that the higher the market/book ratio, the higher the firm's growth rate, and the greater the uncertainty about future profitability (leading us to hypothesize that a partial exit will be a useful signal of quality – i.e., we expected a negative coefficient; see Section 4.6). The coefficient in the Canadian IPO data is supportive. The greater need to signal quality in Canada may be attributable to institutional factors discussed in Section 5 above.

Table 5 (Panel B) provides the logit estimates for the separate sample of acquisition exits in Canada and the United States. Some of the included variables for Table 4 were necessarily excluded in Table 5 (Panel B) to avoid perfect collinearity problems, and in the end we were able to regress the extent of exit only on the variables technology, market/book ratio and investment duration. We were also able to include a dummy variable for survey respondents indicating whether exit was associated with market conditions, but this variable is insignificant. Earlier, we hypothesized that we would observe more partial exits in connection with technology firms, high market/book firms, and investments of lesser duration. In the US sample, we find evidence that technology investments and higher market/book investments are indeed associated with a greater likelihood of a partial exit. However, contrary to expectation, we find that a partial exit is more likely the *longer* the investment duration. We do not have a good explanation for this puzzling result. In addition, none of the independent variables were significant in respect of the Canadian data in Table 5 (Panel B). Once again, we are not able to provide a good explanation for this result.

We also considered the subsample of secondary sale exits alone in Table 5 (Panel C), where we were able to regress the extent of exit on the duration, market/book, fund raising and market conditions variables. While the evidence is generally insignificant, it does indicate in the combined sample that partial secondary sales are more likely the greater the market/book ratio, as expected (see Sections 4.2.3 and 4.6).

The subsample of buybacks (Table 5 (Panel D)) shows some differences between Canada and the US. The longer the duration of investment, the greater the likelihood of a partial buyback, but this result is only significant in Canada. We had also predicted (Section 4.5) that the greater the amount of venture capital fund raising, the greater the likelihood that some investments will be prematurely liquidated,

²¹ Gompers and Lerner (1999a) consider the extent of IPO exits in much more detail.

enhancing the likelihood of a partial exit. We find evidence in support of this hypothesis from the combined Canada–US sample in Table 5 (Panel D) for buyback exits, although this is the only evidence in Table 5 in support of this hypothesis.

As noted earlier, the write-off data was also segregated for purposes of the regressions (Table 5 (Panel E)). Unfortunately, all of the right-hand-side variables except investment duration and market conditions had to be suppressed to avoid problems of colinearity. The combined Canada and US data indicate at the 10% level of significance that the longer the investment duration, the more likely the investment will be written down than written off. This is in accord with our hypothesis about the relationship between the extent of write-off exits and investment duration (see Section 4.2.5).

9. Conclusion

In exiting their investments, VCs sometimes make a full exit (disposing of their entire interest in the investee firm), and sometimes make a partial exit (retaining at least part of their interest). This study investigates the determinants of the choice between a full and a partial exit. The central hypothesis of the paper is that the key factor in driving this choice is the degree of information asymmetry between the selling VC and the purchaser(s) of the VC's investment. If the information asymmetry is high, then the VC can maximize the overall proceeds of disposition by initially effecting a partial exit, because ownership retention constitutes a credible signal that the quality of the investee firm is high.

We test the central hypothesis by identifying variables that proxy for the degree of information asymmetry, in addition to other variables that might have some influence on the choice of a full versus a partial exit. We then employ regression methodology to test the significance of these variables. Overall, we find support for the hypothesis that information asymmetry is an important factor in the choice of a full versus a partial exit, although our results are by no means uniform.

In particular, in few cases did our Canadian and US subsamples *both* support the hypothesized relationships. For example, while IPOs and secondary sales are more likely to be effected as partial exits (as hypothesized) in Canada, this is not also the case in the US. Similarly, while a higher market to book ratio is associated with a greater likelihood of a partial IPO exit (as hypothesized) in Canada, this is not the case in the US.

Conversely, while buybacks are more likely to be effected as partial exits in the US (as hypothesized), this is not also the case in Canada. Similarly, while technology firms and investments with a higher market to book ratio are associated with a greater likelihood of non-cash consideration in the case of acquisition exits (as hypothesized) in the US, the same is not also true in Canada (although the data did not allow for testing of the first of these variables in the Canadian subsample).

We believe that some of these differences can be accounted for by differences in the legal and institutional environments in Canada and the US. More stringent escrow and hold period requirements in Canada, for example, make it more likely that IPOs will be effected as partial exits in Canada.

That buybacks are more likely to be effected as partial exits in the US might be accounted for by the fact that the average US VC investment is significantly larger than the average Canadian VC investment, and a buyback thus puts more strain on the entrepreneur's financial resources. As our data only offer some insight on this latter point, further research is warranted.

In some cases, however, the differences between the US and Canada were more difficult to explain. We posited a number of factors (such as a less efficient capital market, lower average VC skill, and a variety of intuitional factors) that would lead us to believe that a partial exit will have more value in Canada than in the United States. Our result in relation to the significance of the market/book ratio is in keeping with this hypothesis, as is the result pertaining to secondary sales. However, the hypothesis that partial exits have more value in the Canadian context also suggests that the technology investment variable should be more significant in Canada than in the U.S. In fact, it is significant in the U.S. but not in Canada, as is the capital for investment variable. Thus, our theoretical predictions about differences between the two countries are not always supported by the data.

These differences between Canadian and US subsamples are indicative, in our view, of the importance of taking distinctive features of a country's legal and institutional environment into account in carrying out venture capital research. These legal and institutional differences can have a significant impact on VC behaviour and the closeness of fit of a posited theoretical framework. Further cross-country research would be fruitful.

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