

# Entrepreneurial finance: an overview of the issues and evidence

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## Abstract

This article provides an overview of the rapidly growing entrepreneurial finance literature. The studies reviewed in the article focus on four primary areas of inquiry: (i) alternative sources of capital, (ii) financial contracting issues, (iii) public policy, and (iv) the dynamics of private equity returns. Although much has been learned in each area, this survey highlights several areas in which our understanding of the issues remains incomplete.

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*Keywords:* Entrepreneurial finance; Venture capital; Private equity

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## 1. Introduction

Small firms and new businesses have become an increasingly important component of economic development in the US. For example, [Lerner \(1994\)](#) reports that although large firms have historically accounted for the majority of jobs created in the US, this pattern was reversed in the 1980s. According to [Birch \(1990\)](#), while Fortune 500 firms lost 4 million jobs during the 1980s, firms with fewer than 100 employees added 16 million jobs during the same decade. Moreover, during that time period, the rate of new firm incorporation increased dramatically and small firms created more innovations than their large firm counterparts ([Scherer, 1991](#)). These trends have persisted through the decade of the 1990s, particularly during the internet boom of the late 1990s.

Correspondingly, there has been a dramatic increase in the amount of capital allocated to the private equity market. [Table 1](#) reports that dollar commitments to venture capital funds increased from US\$3.1 billion in 1992 to a high of US\$87.3 billion in 2000, before

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Table 1  
Commitments to venture capital funds and aggregate IPO proceeds

| Year | Commitments to venture capital funds (US\$ billions) <sup>a</sup> | Aggregate IPO proceeds (US\$ billions) <sup>b</sup> |
|------|-------------------------------------------------------------------|-----------------------------------------------------|
| 1992 | 3.05                                                              | 20.97                                               |
| 1993 | 6.80                                                              | 28.16                                               |
| 1994 | 7.06                                                              | 16.24                                               |
| 1995 | 7.38                                                              | 24.46                                               |
| 1996 | 13.17                                                             | 40.65                                               |
| 1997 | 17.33                                                             | 28.97                                               |
| 1998 | 31.01                                                             | 32.20                                               |
| 1999 | 50.91                                                             | 62.69                                               |
| 2000 | 87.27                                                             | 60.54                                               |
| 2001 | 47.64                                                             | 33.97                                               |

<sup>a</sup> Source: VentureOne.

<sup>b</sup> Source: Ritter, J. “Some Factoids About the 2002 IPO Market.” <http://bear.cba.ufl.edu/ritter>.

coming back down to US\$47.6 billion in 2001. By way of comparison, the dollar value of initial public offerings (IPOs) increased from US\$21.0 billion in 1992 to US\$60.5 billion in 2000, before coming back down to US\$33.97 billion in 2001. Data from *VentureOne* indicates that more than 75% of venture capital financings over the last decade have been used to finance investment in the information technology and healthcare sectors, two sectors that account for a large proportion of the innovative activity in the US economy.

Research in finance has lagged behind these capital allocation patterns. For example, Fig. 1 shows the number of articles published in the *Journal of Finance*, *Journal of Financial Economics*, *Review of Financial Studies*, *Journal of Business*, *Journal of Financial and Quantitative Analysis*, and *Journal of Corporate Finance* that study issues

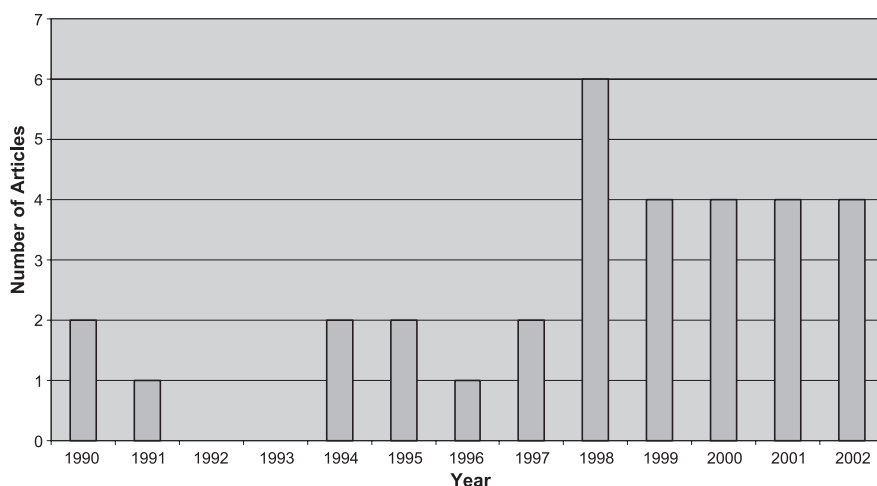


Fig. 1. Entrepreneurial finance articles published in the *Journal of Finance*, *Journal of Financial Economics*, *Review of Financial Studies*, *Journal of Business*, *Journal of Financial and Quantitative Analysis*, and *Journal of Corporate Finance* (1990–2002).

related to entrepreneurial finance. I include in this set any articles dealing with the financing and financiers (e.g. venture capitalists [VCs]) of private companies. I do not include articles from the voluminous literature on IPOs unless the article connects aspects of the IPO with private equity providers. Studies in entrepreneurial finance were nearly non-existent until the early 1990s. Since that time, the number of published entrepreneurial finance articles has gradually increased, but never exceeds six published articles in any calendar year. However, there are strong indications that entrepreneurial finance is a rapidly growing research field. A search of the Social Science Research Network using only the keywords “venture capital” turns up 123 working papers. It appears, therefore, that the volume of academic research in entrepreneurial finance is catching up with the volume of financing activity in this sector of the economy.

The purpose of this article is to provide an overview of the important issues and questions in entrepreneurial finance, and to partially survey the nascent literature on this topic. Historically, finance scholars have tended to view entrepreneurship as entirely separate from the field of corporate finance. Implicit in this approach is the idea that the issues in entrepreneurial finance are sufficiently different from those faced by public corporations so as to limit the applicability of traditional finance theory. More recently, however, financial economists have recognized that entrepreneurial situations are characterized by the same two fundamental problems that form the basis for much of corporate finance theory: agency problems and information asymmetries. Entrepreneurial finance differs from traditional corporate finance only in the sense that the magnitude of these two problems is larger, thereby requiring contractual solutions that differ from those typically encountered in larger, more established corporations. Thus, the more recent literature analyzes issues in entrepreneurial finance in the context of corporate finance theory.

This article provides an overview of four areas of inquiry within the entrepreneurial finance literature: (i) alternative sources of capital, (ii) financial contracting issues, (iii) public policy issues, and (iv) risk and return in private equity investments. These four areas are not meant to be an exhaustive set of issues but, rather, represent the primary areas that have been studied to date.<sup>1</sup> Moreover, this article is not meant to be an exhaustive survey of the literature on the issues listed above. Instead, my more modest goal is to survey those articles that, in my opinion, represent the most important contributions and the “state-of-the-art” thinking on entrepreneurial finance issues. This approach will necessarily preclude the discussion of many high-quality individual papers. To these authors, I apologize.

The paper is organized as follows. In Section 2, I provide an overview of the literature that examines alternative funding sources such as venture capital, angel investors, corporate venture capital programs, banks, and self-financing. Section 3 examines the main contracting issues encountered in entrepreneurial settings: the type of security to be issued, the nature of covenants associated with that security, and ownership and control rights. Section 4

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<sup>1</sup> One important area of study that is excluded from this article is the literature on IPOs. Interested readers should consult Ritter and Welch (2002) for an excellent survey on this topic. In addition, there is a long history of the study of entrepreneurship, largely within the field of strategic management. See Cooper (2003) for an historical perspective on the development of entrepreneurship as an academic field. My purpose is not to survey this literature, but rather, to provide an overview of issues pertaining to the financing of entrepreneurial companies.

examines public policy efforts to promote the financing of entrepreneurial firms; e.g. government investment programs, tax policy, and other regulations. Section 5 summarizes data on the risk and return characteristics of private equity investments. Section 6 concludes.

## **2. Alternative sources of capital**

One of the most important issues facing entrepreneurial firms is their ability to access capital. Because such firms are typically not yet profitable and lack tangible assets, debt financing is usually not an option. Consequently, entrepreneurs tend to rely on three primary sources of outside equity financing: venture capital funds, angel investors, and corporate investors. Venture capital funds refer to limited partnerships in which the managing partners invest on behalf of the limited partners. Angel investors refer to high net worth individuals that invest their own funds in a small set of companies. Corporations invest on behalf of their shareholders, for financial and/or strategic reasons.

Although it is difficult to precisely quantify the aggregate dollar amounts of capital coming from each funding source, various estimates suggest that all three sources contribute a substantial amount of capital to entrepreneurial firms. For example, the National Venture Capital Association estimates the size of the angel investor market to be roughly US\$100 billion and the size of the independent venture capital market to be US\$48.3 billion as of January 2000 (Wong, 2002). Statistics on the size of the corporate venture capital market are particularly difficult to obtain. Although Hellman (1998b) estimates that organized corporate venture capital programs account for slightly less than 5% of all venture capital financings, there are several reasons why this number underestimates the role of corporations in funding entrepreneurial firms. First, the data only measure the financing activity of organized corporate venture capital programs. In practice, there is a large amount of informal or ad hoc investing in entrepreneurial ventures undertaken by corporations. Unfortunately, no aggregate statistics exist for this informal market. Second, corporations also invest in entrepreneurial ventures via acquisitions and strategic alliances. Third, corporations invest indirectly by making commitments to independent venture capital funds. For example, Gompers and Lerner (2000) report that corporations accounted for 30% of all commitments to venture capital funds in the US in 1997. Hence, any statistics regarding the size of the corporate venture capital market should be viewed as, at best, a lower bound on the role of corporations in funding entrepreneurial ventures.

The existence of multiple sources of financing raises the question of whether the source of funding matters for the entrepreneurial firm. This question is analogous to similar questions addressed in the corporate finance literature. For example, a large literature is devoted to studying the importance of the source of debt financing. This literature generally concludes that banks are “special” in that they provide services such as monitoring that are not provided by other debt claimants, while non-bank private debt serves an important role in accommodating the financing needs of firms with low credit quality.<sup>2</sup> Similarly, a number

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<sup>2</sup> See, for example, Fama (1985) and James (1987) for evidence on the uniqueness of bank loans and Denis and Mihov (in press) for evidence on the role of non-bank private debt.

of studies address the importance of the identity of equity investors. These studies identify unique roles for institutional investors, unaffiliated blockholders, blockholders affiliated with incumbent managers, and corporate blockholders.<sup>3</sup>

Correspondingly, a parallel literature has emerged in which studies attempt to identify the various benefits and costs associated with alternative sources of financing for entrepreneurial firms. This literature has focused primarily on venture capitalists due to greater data availability. However, recent studies also document the roles of angel investors and corporate investors. This section provides an overview of that literature.

### *2.1. Venture capitalists*

Several studies examine the hypothesis that venture capitalists play an active role in the companies in which they invest, providing mentoring, strategic advice, help in bringing innovative products to the marketplace, and assistance in the recruitment of top managers. Other studies hypothesize that the presence of venture capitalists is useful in certifying the value of companies to the marketplace, and that venture capitalists play an important role in the governance of the companies in which they invest. In short, these studies hypothesize that venture capitalists are active investors of the type envisioned by Jensen (1993).

#### *2.1.1. Monitoring*

Theories of financial intermediation tend to focus on the monitoring role of intermediaries (see, for example, Diamond, 1984; Stiglitz, 1985). Because they have access to detailed knowledge of their portfolio companies, venture capitalists are uniquely positioned to provide such monitoring services. Several studies confirm that venture capitalists serve such a role in start-up companies. Early work by Gorman and Sahlman (1989) provides indirect evidence that venture capitalists are active monitors. Gorman and Sahlman report that lead venture capitalists visit companies in their portfolios an average of 19 times per year. Of course, such frequent visits potentially entail substantial transaction costs. Consistent with such costs of monitoring, Lerner (1995) finds that geographic proximity is an important determinant of whether a venture capitalist is on the board of directors of a particular company.

Drawing on the work of Fama and Jensen (1983) and Williamson (1983), Lerner (1995) provides additional evidence of venture capital monitoring. Lerner (1995) hypothesizes that if venture capitalists serve an important oversight role, their representation on boards of directors should increase during periods in which the need for monitoring is greatest. One such period is the period surrounding the replacement of a company's top executive. Using a sample of 271 biotechnology firms between 1978 and 1989, Lerner finds that, on average, 1.75 venture capitalists are added to the board between financing rounds when the firm's CEO is replaced during that time period. This rate is significantly higher than the rate at which VCs are added to the board between financing rounds in which the CEO is not replaced. These findings support the monitoring role of venture capitalists.

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<sup>3</sup> See, for example, Jensen and Warner (1988), Holderness (2003), and Denis (2001) for surveys of the influence of different equity owners on firm value.

By examining the investment analyses of venture capitalists prior to investing, [Kaplan and Stromberg \(2001a,b\)](#) provide perhaps the most direct evidence of VC monitoring. Their findings indicate that VCs play a primary role in shaping the top management team of the companies in which they invest. Specifically, in 14% of the cases, VCs play a role in shaping the management team prior to investing, while in 50% of the cases VCs explicitly expect to play such a role after they invest. [Kaplan and Stromberg \(2001a,b\)](#) also report that the monitoring activities of VCs are closely related to their pre-investment screening activities, as well as to the structure of the financial contracts associated with the VC financing. Specifically, [Kaplan and Stromberg \(2001a,b\)](#) report that in the process of screening, VCs typically identify the specific areas where they believe monitoring can add value. Similarly, VCs allocate decision rights and control in a manner that facilitates post-investment monitoring activities. [Gompers \(1995\)](#) also argues that there is an important interaction between the structure of financing arrangements and monitoring activities. In particular, [Gompers \(1995\)](#) argues that VCs stage capital infusions in order to facilitate monitoring and reduce potential agency problems.

#### *2.1.2. Professionalization*

[Kaplan and Stromberg's \(2000\)](#) examination of ex ante investment analyses reveals that venture capitalists expect to provide a variety of support services to their portfolio companies, including developing a business plan, assistance with acquisitions, help facilitating strategic partnerships, and the design of employee compensation plans. Using a sample of 173 start-up companies located in California's Silicon Valley, [Hellman and Puri \(2002\)](#) confirm the role of VCs in the development of new firms. Their evidence suggests that VCs provide valuable support in building the internal organization of the company. Specifically, they find that companies that obtain venture capital are significantly more likely to professionalize along several dimensions: human resource policies, the recruitment of professional marketing and sales staff, and the adoption of stock option plans. They also find that venture-backed companies are significantly more likely to replace a founder with an outsider as the chief executive officer (CEO) of the company. These findings are robust to controls for selection bias issues and indicate that VCs provide inputs that go beyond those typically ascribed to financial intermediaries. Since these activities are costly for VCs to provide, a logical conclusion is that they provide added value to the start-up companies.

In a separate study, [Hellman and Puri \(2000\)](#) use the same dataset to examine whether product market outcomes are related to the presence of venture capitalists. They find that innovator (as opposed to imitator) firms are more likely to be financed by venture capitalists. In addition, firms financed by VCs tend to bring their products to market more quickly. These findings are consistent with the view that the expertise of VCs gives them a comparative advantage in identifying valuable innovations and assisting the companies in bringing their product to market.

#### *2.1.3. Certification*

In addition to providing monitoring and other support services to entrepreneurial firms, venture capitalists can potentially help entrepreneurs raise additional funds by certifying the quality of a start-up. In general, in order for a certifying agent to be effective, three

conditions must be met. First, the certifying agent must have reputational capital at stake that will be damaged in the event of a false certification. Second, the value of the agent's reputational capital must exceed the largest one-time gain from a false certification. Third, the certified target must face a cost from leasing the agent's reputation that is increasing in the uncertainty regarding the value of the target.

Meggison and Weiss (1991) hypothesize that all three of the above conditions are met in the context of venture capitalists certifying the value of companies going public in an initial public offering. Venture capitalists are repeat players in the IPO market, their success allows them to establish profitable follow-on funds, and entrepreneurs give up substantial equity stakes to VCs in exchange for relatively small capital infusions. The evidence on the certification hypothesis is mixed, however. Consistent with valuable VC certification, Meggison and Weiss (1991) find that venture-backed IPOs exhibit lower underpricing and lower underwriter spreads than a matched set of non-VC backed IPOs. However, Lee and Wahal (2002), using more sophisticated econometric techniques to control for endogeneity, find that VC backed IPOs exhibit greater underpricing, particularly during the internet boom of the late 1990s. They conclude that their findings are inconsistent with the certification hypothesis.

In contrast to the above two studies that examine whether there are performance benefits from aligning with prominent VCs, Hsu (2002) examines the costs of such certification. More specifically, Hsu analyzes whether entrepreneurs pay a premium for affiliating with more prominent venture capitalists. To explore this question, Hsu collects data on the set of multiple financing offers for a sample of 148 early stage high-tech start-up companies. Because the characteristics of the start-up are held constant across financing offers, Hsu's empirical approach is capable of isolating the impact of VC prominence on offer prices. Hsu's findings indicate that entrepreneurs do not necessarily accept the offers with the highest valuations. Rather, entrepreneurs are frequently willing to accept offers with lower valuations in order to affiliate with more prominent venture capitalists. These findings are consistent with the view that the contributions of venture capitalists go well beyond simply the provision of financial capital.

To summarize, the literature shows that venture capitalists provide many benefits to entrepreneurial companies that are not normally provided by financial intermediaries. Of course, these benefits are not costless to entrepreneurs. The close involvement of the VC can be time consuming for the entrepreneur. More importantly, as will be shown in Section 3, VC financing is associated with a significant reduction in the entrepreneur's decision and control rights. Finally, VCs tend to demand high rates of return for their investments relative to other private equity investors (see, for example, Sahlman, 1990). This makes venture capital a relatively expensive source of financing. These costs must be traded off against the benefits of venture capital financing.

## 2.2. *Angel investors*

In contrast to the large volume of academic research on the role of venture capitalists, comparatively little work has been done on angel investors. As defined earlier, angel investors are high net worth individuals who invest their personal capital in a small set of companies. According to Fenn et al. (1997) angel investors typically invest "seed capital,"

that is, capital required by firms at a very early stage of their development. These investments tend to be relatively small (US\$500,000 to US\$2 million) and illiquid when compared with venture capital investments. Angel investments are private transactions that are not subject to any public disclosure. In addition, unlike the venture capital market, there is little institutional infrastructure supporting the angel market. For all of these reasons, data on angel investments are difficult to obtain.

Wong (2002) attempts to mitigate these data problems by conducting an extensive survey of entrepreneurial companies. His final sample consists of 215 financing rounds made by angel investors at 143 companies between 1994 and 2001. Relative to venture capital financings, Wong's (2002) data reveal that angel investments are typically smaller, are concentrated in younger companies, and take place at an earlier stage in the company's life cycle. Specifically, Wong reports an average angel investment size of US\$1 million, which is less than half the average investment size reported by Kaplan and Stromberg for VC investments in companies at a comparable stage of life. Wong also reports that, on average, companies are only 10.5 months old at the time of their first angel funding and 69% of the firms receiving angel financing have yet to produce revenues. By way of comparison, companies first receiving VC funding are typically over 1 year old (Gompers, 1995) and less than 40% of them are at the pre-revenue stage (Kaplan and Stromberg, 2001a,b). Finally, Wong reports that angel investors tend to invest in companies that are in close geographic proximity.

Given the early stage of the companies being funded, it is likely that the companies require a substantial amount of support. Surprisingly, however, Wong (2002) finds little evidence that angels provide support services of the type provided by VCs. For example, only 24% of the angels surveyed assist in the identification and recruitment of the top management team. This rate is less than half that reported for VCs in Kaplan and Stromberg (2000). Wong does report that angel investors appear to serve an important networking role in helping companies receive subsequent funding from venture capitalists. Specifically, he reports a negative correlation between the number of angel investors and the time until venture financing. Moreover, he reports that the likelihood of angels providing support to the entrepreneurs is more likely if the angels are in close geographic proximity.

Collectively, these data indicate that angels serve a unique role in funding early stage start-ups that require smaller amounts of capital. Rather than competing directly with venture capitalists, angel investors appear to serve a complementary role in providing a type of bridge financing until the company is in a position to receive VC financing.

### *2.3. Corporate venture investing*

As noted earlier, corporations invest in entrepreneurial firms in a variety of ways, including direct investments via corporate venture funds, indirect investments via independent venture funds, and acquisitions of or strategic alliances with start-up companies. The majority of this funding comes from corporate investments in independent venture capital funds and from acquisitions/alliances. Although the number of corporate venture capital programs has at times been quite large, these programs account for less than 5% of the funding of entrepreneurial companies (Hellman, 1997). Previous studies

have identified two broad reasons for the relative paucity of financing from corporate venture capital programs: structural problems with the programs themselves and possible conflicts of interest between the corporate investors and the entrepreneurial company.

Lerner (2001) identifies three structural problems that have historically plagued corporate venture capital programs. First, these programs frequently lack a clearly stated mission. As a result, the programs have often pursued mutually incompatible objectives (see Siegel et al., 1988). Second, the programs often lack a sufficient commitment from the corporation (see, for example, Sykes, 1990). Third, unlike independent venture funds, corporate venture capital programs have often been reluctant to tie the compensation of the venture manager to the payoff from the venture.<sup>4</sup> Consequently, successful risk-taking was not rewarded and it was often difficult for corporate venture capital funds to attract top talent. According to Barry (2000), the reluctance to offer suitable profit sharing has eased over time, but still remains a real issue in corporate venture capital programs.

Aside from structural problems, corporate venture capital investing can be hindered by inherent conflicts of interest between the corporation and the entrepreneurial venture. For example, new ventures might represent substitutes for products that exist within the corporation. As a result, some parts of the corporation might have little incentive to provide the value-added support services for the new venture that an independent venture capitalist might offer. (See, for example, Hellman's, 1998a,b description of the interaction between GO, a start-up computing venture, and its strategic partner IBM.) Alternatively, the corporation might elect to become a competitor of the new venture at some point in the future. This risk might lead the new venture to reject funding from a corporate VC. Finally, corporate venture capital programs might lead to conflicts over the strategic direction of the start-up. As illustrated in Hellman et al. (1995) description of the issues facing Apple's corporate VC program, corporate investors have the incentive to steer new ventures in that direction that most benefits the corporation, even if that direction is not in the best interest of the entrepreneurial company.

These potential conflicts offer one explanation for the overwhelming preference for independent venture capital funds over corporate venture capital funds in financing start-up companies. Unless the corporate investor can offer some sort of strategic complementarity (Hellman, 1998a,b), the entrepreneur will typically prefer to receive financing from an independent venture capitalist. Consistent with this view, Gompers and Lerner (2000) find that the success of corporate venture capital programs (as measured by the probability of going public) is linked with the degree of strategic overlap between the corporate parent and the start-up company.

#### *2.4. Summary/other issues*

The evidence indicates that the identity of equity investors matters in entrepreneurial situations. Much of this evidence is descriptive and shows a substantial amount of segmentation in the provision of capital to start-up enterprises. Angel investors provide capital at a much earlier stage and generally provide few post-investment support services.

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<sup>4</sup> Independent venture capitalists are typically compensated by receiving a fixed percentage of the funds under management plus a percentage of the profits generated in the fund, the so-called "carried interest."

Venture capital investors (both independent and corporate) invest at a later stage and provide a substantial amount of support services. In this sense, venture capitalists are clearly active investors. Because these support services are costly to the entrepreneur, he/she must trade off the benefits of this support against the costs when deciding on the optimal source of financing. What remains unclear is the identity of the factors that drive the equilibrium towards the observed market segmentation.<sup>5</sup>

It is worth noting that there are sources of financing for start-up firms other than the three primary sources discussed above. One interesting hybrid organizational form is the business incubator model founded by CMGI. Under this model, a company like CMGI purchases equity stakes in a large number of start-up companies. The company then goes to great lengths to coordinate the activities of the start-up with those of the other start-ups in the company's portfolio. At the same time, however, each start-up maintains its status as an independent corporation. This type of organizational form bears some similarity to that of leveraged buyout funds such as those run by Kohlberg, Kravis, and Roberts (KKR). Because these incubators were generally set up to help fund start-up dot coms, most have not performed well. Whether this is due to flaws in organizational design or whether this simply reflects the decline of the internet sector remains an open question.

### **3. Financial contracting issues**

Entrepreneurial financing situations are characterized by two fundamental problems. First, there are large information asymmetries between entrepreneurs and investors. For example, it is difficult for outside investors to ascertain the quality and potential value of technological innovations. By contrast, however, entrepreneurs, who are often the innovators themselves, understand the quality of the innovation.<sup>6</sup> Second, there is a potentially serious moral hazard problem. Once entrepreneurs have raised funds from outside investors, they have the incentive to misallocate these funds by spending on items that benefit themselves disproportionately. For example, an entrepreneur/scientist might choose to invest funds in research activities that bring notoriety to the scientist, but for which there is little return for the investor.

As described in Hart (2001), the corporate finance literature has evolved to consider financing in the face of asymmetric information and moral hazard problems. The financial contracting literature proposes two primary solutions. First, incentive contracts can be designed in a way that optimizes the sensitivity of the entrepreneur's wealth to some observable signal(s) of the entrepreneur's effort (e.g. output or profits). Second, control

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<sup>5</sup> Chemmanur and Chen (2002) model the choice between angel and venture capital financing. In their model, they assume that venture capitalists can add value through costly effort, while angel investors cannot. Among other things, their model makes comparative static predictions regarding the choice between angels and VCs over different financing rounds.

<sup>6</sup> Of course, it is possible that entrepreneurs may have a biased perception of the quality of their innovation and may lack an understanding of how this quality translates into value.

rights can be specified that determine who chooses the actions that are taken within the company.

Because entrepreneurial situations closely approximate the situations addressed by financial contracting theory (Kaplan and Stromberg, 2001a,b), a large literature has emerged that analyzes contractual solutions to agency and information asymmetry problems embedded in financing agreements between investors (primarily venture capitalists) and entrepreneurs. As summarized below, this literature demonstrates how entrepreneurial financing contracts address the two fundamental problems of information asymmetry and moral hazard by allocating cash flow rights, voting control, and decision rights. The financing contracts are highly state-contingent and effectively shift a substantial amount of the risk in a new venture from the investor to the entrepreneur. The primary contracting issues analyzed are the type of security issued, the nature of the covenants in the financing agreement, and the resulting ownership and control rights.

### *3.1. Type of security*

In the United States, venture capitalists typically invest in start-up companies by purchasing convertible preferred stock. Kaplan and Stromberg (2001a,b) report that convertible preferred stock is used in 204 of the 213 (96%) financing rounds in their sample. Convertible preferred stock is used exclusively in 170 (80%) of the financing rounds. The systematic preference for convertible preferred stock is also noted in Sahlman (1990) and Gompers (1998). Kaplan and Stromberg (2001a,b) also report that venture capitalists often employ a variant of convertible preferred stock called participating preferred. In the event of liquidation or exit, the participating preferred holder receives both the principal amount of the preferred stock and shares of common stock.

Explanations for the overwhelming use of convertible preferred securities center on asymmetric information, incentive problems, and taxes. In a situation characterized by large information asymmetries, preferred securities can be used to force entrepreneurs to signal their confidence in the company's business plan in a manner similar to Ross's (1976) debt signaling model. If the plan is unsuccessful, venture capitalists obtain a disproportionate share of the company through their preferred position. By agreeing to financing using a senior claim like preferred stock, the entrepreneur signals that they believe that the venture will succeed. However, a fixed claim with default consequences is infeasible for a start-up venture that is not yet producing positive cash flows. At the same time, the use of a senior claim like preferred makes the entrepreneur's claim more sensitive to realized performance. This gives the entrepreneur strong incentives to make the plan succeed.

Although these explanations can justify the use of senior securities in venture financing, they are incomplete in that they do not address the conversion feature so commonly observed in venture capital contracts. To address the optimality of the conversion feature, several recent studies incorporate the observation that venture capitalists often provide substantial services to their portfolio companies in addition to the provision of funds (see Section 2.1). As an example of this approach, Schmidt (2001) observes that if the success of the venture depends on the efforts of the VC, this

creates a double moral hazard problem.<sup>7</sup> Convertible securities address this problem by endogenously allocating residual cash flow rights to both the entrepreneur and the venture capitalist as a function of the realized value of the company. It is less clear, however, whether Schmidt's model can explain the frequent use of combinations of straight preferred stock and common equity and the use of participating preferred stock. Kaplan and Stromberg (2001a,b) point out that participating preferred is used in 48% of their sample VC financings.

An alternative approach is to model the interaction between the choice of security type and other features of the financing contract. For example, Cornelli and Yosha (2003) argue that when the VC retains the option to abandon a project (i.e. through the formal staging of capital infusions), the entrepreneur has the incentive to manage earnings in order to assure subsequent financing. With convertible securities, this earnings manipulation increases the likelihood that the VC will convert into equity, thereby diluting the entrepreneur's claim. Consequently, the use of convertibles reduces the entrepreneur's incentive to engage in short-term earnings management.

In the model of Hellmann (2002), convertibles are an optimal solution to the tradeoff between the need to allocate cash flow rights to the VC and the need to make efficient exit decisions. The attractive feature of Hellman's model is that it not only explains the prevalent use of convertible securities, but also explains otherwise puzzling features of VC contracts such as automatic conversion in the event of an IPO and the use of participating preferred stock.

A final approach to explaining the prevailing use of convertible preferred stock is offered by Gilson and Schizer (2002). Gilson and Schizer argue that firms that issue convertible preferred stock are able to offer more favorable tax treatment for incentive compensation being paid to the entrepreneur and other employees. Instead of being taxed at ordinary income rates, entrepreneurs and employees can defer taxation until the incentive compensation is sold, at which time a preferential tax rate is available. Because incentive compensation for entrepreneurs is an important feature of VC financing contracts, Gilson and Schizer (2002) argue that the favorable tax treatment of such compensation is likely to be of first-order importance in the choice of security type.

A final issue to consider is the generalizability of the optimality of convertible preferred securities in VC financings. Employing a novel dataset of financings by Canadian venture capitalists, Cumming (2002) reports that the preference for convertible preferred does not extend to Canada. Rather, Canadian VCs use a variety of forms of finance, including common equity, warrants, straight preferred, convertible debt, straight debt, and combinations of each form of finance. The intensity of use for various forms of finance has changed over time, but in no period between 1991 and 1998 has convertible preferred been the dominant form of finance in Canada. Cumming's (2002) findings imply that

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<sup>7</sup> Other studies that model the relationship between the venture capitalist and the entrepreneur as a double moral hazard problem include Casmatta (2000), Dessi (2001), Inderst and Muller (2001), Renucci (2000), and Repullo and Suarez (1998). As Kaplan and Stromberg (2001a,b) observe, these theories are all consistent with the observation that in general, both VCs and entrepreneurs are allocated cash flow rights, but are more difficult to reconcile with the liquidation rights that are typically associated with the convertible preferred securities issued in practice.

institutional reasons for the prevalence of convertible preferred may be most important and suggest the need for further research on the choice of security type in different institutional settings.

### 3.2. Covenants

Covenants contained in entrepreneurial financing arrangements address problems of information asymmetry and moral hazard by structuring investments so that (i) the financing party is able to maintain control,<sup>8</sup> (ii) the entrepreneur has appropriate incentives to maximize the value of the financial claims, (iii) the financing party can become actively involved in the management of the company, and (iv) the financing party can preserve the ability to liquidate their investment. Below, I briefly summarize the primary covenants typically included in venture capital contracts, the economic rationale for the covenants, and the available empirical evidence on their use. Much of this evidence is drawn from Kaplan and Stromberg's (2001a,b) comprehensive analysis of 213 venture capital financing agreements.

#### 3.2.1. Staged financing

Venture capitalists typically do not provide all the capital that a company will require to implement its business plan in a single financing round. Rather, the VC stages capital infusions to correspond with distinct phases of the company's development. Generally, subsequent rounds of financing are tied to the company having reached stated milestones. The staging of capital infusions accomplishes two objectives. First, the VC preserves the right to abandon an investment whose prospects no longer appear promising. Second, the staging provides incentives to the entrepreneur to conserve capital and to focus on achieving the milestones required to get to the next round of financing. In theory, the need for staging should decline as the company becomes more established or if the entrepreneur establishes more of a reputation.

Gompers (1995) analyzes the staging of capital infusions in a sample of 794 venture capital-financed companies. Gompers reports that venture capitalists do, in fact, refuse future financing to companies when they learn negative information about future returns. In addition, Gompers (1995) provides evidence that early stage companies receive less money per financing round, while increased asset tangibility increases the duration of a financing round. These findings support the role of staging as an important control mechanism in early stage ventures.

#### 3.2.2. Rights of first refusal

Just as venture capitalists use the staging of capital infusions as a means of retaining the option to abandon their investment, they seek to preserve the option to invest more if the venture proves to be successful. To accomplish this, Sahlman (1990) reports that VCs typically insist on rights of first refusal, or pre-emptive rights, which give the VC the right to invest in subsequent rounds.

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<sup>8</sup> See Hellman (1998a) and Kirilenko (2001) for models that endogenously determine the allocation of control between entrepreneurs and venture capitalists.

### 3.2.3. Anti-dilution clauses

Kaplan and Stromberg (2001a,b) report that almost 95% of the VC financings in their sample include some type of anti-dilution clause. These clauses offer protection to the VC from future financings taking place at a lower valuation than that of the protected financing round. Most (78% of the Kaplan/Stromberg sample) of the anti-dilution clauses take the form of a weighted average ratchet, in which the conversion price of the convertible security is a function of the number of shares issued and the conversion price of the new issue. The conversion price of the protected financing round is reduced so as to effectively equate the price of the protected issue to that of the new issue.

### 3.2.4. Liquidation rights

The prevalent use of convertible preferred stock implies that venture capitalists have a claim senior to that of the entrepreneur in the event that the value of the venture is low. Kaplan and Stromberg (2001a,b) report that the VC's claims in liquidation are at least as large as their original investment over 98% of the time. Moreover, they report that the convertible preferred securities promise the VC cumulative preferred dividends in approximately 44% of the cases, further strengthening the VC's liquidation rights. Of course, since convertible preferred stock does not contain a contracted payment on which the entrepreneur can default, the liquidation rights of the VC by themselves are not particularly powerful. An entrepreneur has little incentive to abandon a low valued project to which he/she has already committed capital. Moreover, start-up companies typically have few tangible assets that could be sold if the venture fails. For these reasons, VC contracts also frequently feature redemption rights, which give the VC the right to sell their claim back to the company after some period of time. Kaplan and Stromberg report that redemption rights are present in 79% of their sample VC financings, with an average vesting period of 5 years.

### 3.2.5. Board rights

As emphasized in Fama and Jensen (1983), corporate boards retain the responsibility for hiring and firing top management and ratifying major corporate decisions. In order to preserve the right to be actively involved in the management and control of the company, venture capitalists typically insist on board representation as a condition of their financing of the company. In fact, as Kaplan and Stromberg (2001a,b) report, the venture capitalist controls a majority of the board seats in 25% of their sample. Moreover, board representation is state-contingent (i.e. the VCs board control increases if certain performance benchmarks are not met) in 18% of the cases.

### 3.2.6. Automatic conversion

The covenants described above require the entrepreneur to give up a large amount of control to the venture capitalist. To provide incentives to the entrepreneur to maximize value, venture capital financings usually contain automatic conversion clauses that force conversion of the VCs claim into common equity if certain events take place. Usually, this "event" is an initial public offering of the company's stock at a price or amount of proceeds that exceeds some benchmark. In the event of conversion, the VC gives up many of their superior control rights (see Black and Gilson, 1998). In this sense, the automatic

conversion provision allows the entrepreneur to “buy back” control of the company through superior performance.

Kaplan and Stromberg (2001a,b) report that automatic conversion provisions are present in 95% of their sample financings and that the median provision requires the company to complete an IPO at a stock price that is three times the level of the price at the time of the VC’s financing. As they note, over a 4-year horizon this equates to a 31% annual return.

### 3.2.7. *Non-compete clauses*

Because much of the value of a start-up enterprise is tied to the human capital of the entrepreneur, this can result in the entrepreneur having substantial bargaining power over the venture capitalist. Once the VC has committed capital to the company, the entrepreneur can threaten to leave the company, thereby creating hold-up problems in subsequent rounds of financing. To avoid these problems, VC contracts typically attempt to make it more costly for entrepreneurs to leave the company. This is accomplished in two ways. First, the entrepreneur’s shares can vest over time. This type of provision is present in 41% of all of the financings in Kaplan and Stromberg’s (2001a,b) sample and in 48% of the first-round financings. Second, the venture capitalist can require the entrepreneur to sign an agreement stating that he/she cannot work for another company operating in the same industry for some fixed period of time. Kaplan and Stromberg (2001a,b) observe this type of clause in 70% of their financings.

Interestingly, Wong (2002) finds little evidence that angel investors employ the same control mechanisms as venture capitalists. He reports that angels rarely demand board seats, usually invest in straight common equity, rarely stage financing, rarely demand anti-dilution protection, and rarely employ state-contingent control rights. These observations are puzzling. Angel investors typically invest in companies that are less than 1 year old, suggesting that there is great uncertainty about company value and large moral hazard problems. Wong explains this puzzle by noting that angel investors are generally in close geographic proximity to the entrepreneurial company. This geographic proximity appears to substitute for the more formal mechanisms of control found in venture capital contracts. Apparently, entrepreneurs appeal to social networks and local ties to generate the initial funding of their venture. As this source of funding is exhausted, more formal mechanisms of control are introduced.

### 3.3. *Ownership and control rights*

Incentives and control within entrepreneurial companies are primarily described by the distribution of cash flow rights, voting rights, and board seats. The prior section makes it clear that VCs obtain substantial rights in all three dimensions and that these rights are often state contingent. In this section, I describe the empirical evidence on the net effect of the typical financing agreement on the allocation of cash flow and control rights.

Kaplan and Stromberg (2001a,b) report that, on average, venture capitalists own approximately 50% of the cash flow rights, whereas founders retain 30% of the cash flow rights. Other investors own the remaining 20%. Thus, although founders give up a large percentage of ownership in the company, they still retain substantial incentives.

These incentives are strengthened by the state contingencies. On average, the founder's cash flow ownership is nearly 7% higher if the company meets all performance milestones. This difference is nearly 10% for first-round financings.

Further strengthening the performance incentives of the founder is the structure of the executive compensation contract. [Baker and Gompers \(1999\)](#) report that venture-capital backed companies employ significantly greater amounts of executive stock options than non-venture-backed companies. This implies that VCs actively seek to increase the incentives of the founder.

Voting rights can be separated from cash flow rights in several ways, including the use of non-voting stock, unvested stock options, explicit contracts that tie voting rights or cash flow rights to performance targets, or contracts that specify changes in ownership upon certain events (e.g. an IPO). [Kaplan and Stromberg \(2001a,b\)](#) report that the net effect of this separation in their sample financings is to increase the voting power of venture capitalists relative to their cash flow rights. On average, the ratio of voting rights to cash flow rights is 1.16 for VCs. Like cash flow rights, the allocation of voting rights is highly state-contingent. The VCs voting power is reduced by nearly 13% in the event that management meets all performance milestones. This differential is noteworthy since, in the median firm, this shifts voting power from a situation in which the VC has majority control, to one in which the VC and founder have voting power that is approximately equal.

Finally, as noted earlier, VCs obtain control through board representation. Boards of entrepreneurial companies are smaller than those of publicly traded companies. [Kaplan and Stromberg \(2001a,b\)](#) report that the typical board consists of six members, of which 40% of the seats are held by venture capitalists, 37.5% are held by the founder, and 20% are held by outsiders. In the event of poor performance or some other adverse state, the percentage of board seats held by the VC increases to 43%. Interestingly, the median ratio of percentage board seats to percentage of cash flow rights is equal to 1.12 for founders and 0.89 for VCs. This implies that it is important to keep founders well represented on the board of directors. One explanation for this is that the founders possess valuable firm-specific knowledge in the sense discussed in [Fama and Jensen \(1983\)](#) and [DeAngelo and DeAngelo \(1985\)](#).

#### **4. Public policy issues**

As noted in the introduction, innovations coming from entrepreneurial companies have become an increasingly important component of economic development. At the same time, however, there is evidence of a 'funding gap' for research and development (R&D) expenditures ([Hall, 2002](#)). That is, there appears to be net underinvestment in R&D. This underinvestment is hypothesized to be due to two factors. First, the presence of large information asymmetries and moral hazard problems drive a wedge between the rate of return required by an entrepreneur investing his or her own funds and that required by providers of external capital. Because most innovations require external funds, some projects will be bypassed. Second, many innovations produce knowledge. Because it is difficult to keep this knowledge as private

information, innovators cannot fully appropriate the returns on this knowledge. Consequently, firms will be less willing to invest in knowledge-oriented (i.e. R&D) ventures.<sup>9</sup>

An argument can be made that if innovation is valuable and/or entrepreneurial businesses are an important component of economic development, public policy should be geared towards stimulating this activity. Several recent studies examine how public policy can be shaped so as to stimulate the financing of entrepreneurial companies. These studies can roughly be divided into those that examine policies that promote the development of markets for financing new ventures and those that examine direct public financing.

#### *4.1. The development of venture financing markets*

Kortum and Lerner (2000) report a positive association between venture capital activity and patented inventions. To rule out a spurious association, Kortum and Lerner utilize the fact that the 1979 ERISA Act led to an exogenous increase in venture capital fundraising. Their findings indicate that the increases in venture funding led to a substantial increase in patenting rates. Based on these and other findings, Kortum and Lerner conclude that venture capital has a meaningful impact on innovation. A number of studies, therefore, explore the link between public policy choices and the development of venture financing markets.

##### *4.1.1. Tax policy*

Tax policy might affect venture capital activity either by affecting the supply of funds or by affecting the incentives of individuals to become entrepreneurs. Poterba's (1989) analyzes the link between capital gains taxation and venture capital activity. He argues that the supply of funds is unlikely to be greatly affected by lower taxes because more than half of venture investors are tax-exempt. However, he shows that lower capital gains taxes might increase the demand for venture capital by increasing the incentive of individuals to pursue entrepreneurial ventures. Consistent with Poterba's (1989) analysis, Gompers and Lerner (1999) find that lower capital gains tax rates are followed by larger amounts of venture capital fundraising. Because this increased fundraising comes from both taxable and tax-exempt investors, Gompers and Lerner argue that the effect of capital gains taxes stems from its impact on the supply of entrepreneurs.

More recently, Cullen and Gordon (2002) examine the impact of tax policy on entrepreneurial activity and note that a progressive tax schedule effectively taxes profits at a higher rate than the rate against which losses can be deducted. This provides a disincentive for risk-taking. Their empirical estimates imply that replacing the current personal and corporate tax system with a 20% flat tax would nearly triple the amount of entrepreneurial activity.

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<sup>9</sup> See Arrow (1962) for the seminal theoretical treatment of this issue.

#### 4.1.2. Regulatory restrictions on investment

Venture financing can be restricted through regulations that prohibit certain investors from participating in the market for new ventures. For example, prior to 1978, pension funds were prohibited from investing in venture capital funds. [Gompers and Lerner \(1999\)](#) show that following the passage of ERISA in 1978, there was a dramatic increase in venture capital fundraising. According to their estimates, pension funds are now the largest contributors to pension funds in the United States.

#### 4.1.3. Stock market development

[Black and Gilson \(1998\)](#) argue that the venture financing market within a country is strongly linked with the stock market in that country. Their argument is based on the observation that IPOs are important to both entrepreneurs and venture capitalists. As described in Section 3, financing contracts between entrepreneurs and venture capitalists typically allow the entrepreneur to reacquire control from the venture capitalist in the event of an initial public offering. At the same time, an IPO provides the venture capitalist with the opportunity to exit their investment and return capital to the fund's limited partners. For these reasons, Black and Gilson argue that venture capital markets can flourish only if there is also an active stock market. As evidence in support of this conjecture, they point out that countries with well-developed stock markets, such as the United States, Great Britain, and Ireland, tend to have venture capital commitments that are higher as a percentage of GDP than do countries with less stable stock markets, such as Japan and Germany.

Similarly, [Milhaupt \(1997\)](#) compares the different institutional environments for venture capital in the United States and Japan. He shows that US venture funds tend to be larger, more independent, take large equity stakes, are more actively involved in the management of their portfolio companies, invest in more early stage ventures, and invest more heavily in new technologies than do Japanese VCs. He argues that these differences stem from differences in the corporate governance systems of the two countries. In his view, the US market-based system both increases the supply of venture funds and increases the demand for venture financing relative to a bank-centered system as found in Japan.

[LaPorta et al. \(1998\)](#) hypothesize that the degree to which a country's laws protect investor rights and the degree to which the country's laws are enforced are fundamental determinants of the manner in which corporate finance and corporate governance evolve in that country. [LaPorta et al. \(1997\)](#) report evidence consistent with the hypothesis that a country's legal system has a large impact on the size and breadth of its capital market. Moreover, evidence in [Rajan and Zingales \(1998\)](#) and [Wurgler \(2000\)](#) implies that these differences in financial market development have important real consequences on economic growth. Firms in countries with more developed financial markets appear to have greater ability to take advantage of growth opportunities.

If legal systems impact the development of financial systems and a well-developed financial market is essential for the development of venture capital markets, the work of [LaPorta et al. \(1997, 1998\)](#) implies that countries with inferior investor protection will have less developed markets for new venture financing. To date, there has (to my knowledge) not been any direct evidence on this conjecture.

#### 4.1.4. *Development of angel networks*

Lerner (1998) points out that policymakers in the United States have recently attempted to encourage entrepreneurial investments by angel investors.<sup>10</sup> These attempts rest on the assumption that public efforts to promote venture capital financing are insufficient. Lerner (1998) observes that venture capitalists finance only a modest number of firms, these investments are geographically concentrated, and VCs only invest in those firms that have a fairly substantial need for funds. Of course, as Lerner (1998) also points out, these patterns of venture capital financing might be explained by VCs bypassing smaller investments, or those in other geographic regions simply because the expected returns are too low. If so, public efforts to encourage small investments by angels could be socially wasteful. Moreover, even if venture capital investment is insufficient in some firms or in some areas, market solutions represent an alternative to public policy efforts. Lerner cites the creation of incubators, “entrepreneur-in-residence” programs, and the increased willingness of institutional investors to fund seed ventures as innovative market solutions.

#### 4.2. *Public financing of entrepreneurial ventures*

Although venture financing markets can address underinvestment problems due to asymmetric information and moral hazard, it is more difficult to address underinvestment problems that are due to information spillovers. If innovators cannot fully appropriate the returns on their intellectual capital, they may underinvest in knowledge production. One way to circumvent this problem is through the public financing of knowledge-oriented ventures. Offsetting this potential advantage of public financing, however, are distortions that can result from government subsidy programs. A large literature in political economy and public finance argues that politicians or interest groups may direct subsidies in a manner that benefits themselves rather than benefitting social welfare.<sup>11</sup>

To investigate the role of public subsidies in the financing of small, high-technology companies, Lerner (1999) studies the performance and subsequent financing of companies receiving grants from the United States’ Small Business Innovation Research (SBIR) program. Lerner (1999) reports that program awardees grow more quickly and are more likely to receive subsequent venture capital financing than a matched set of companies. While these findings are consistent with a positive role for government programs, Lerner acknowledges two important limitations to his study. First, the study is unable to measure the social benefits to the SBIR program. Second, the study examines only one of the many different domestic and international public investment programs. Other efforts might not be as successful.

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<sup>10</sup> Perhaps the best known program is the Angel Capital Network (ACE-Net) introduced by the US Small Business Administration’s Office of Advocacy. ACE-Net is an internet forum that allows entrepreneurs to post their business plans and to communicate with accredited investors.

<sup>11</sup> See, for example, Stigler (1971), Peltzman (1976), and Becker (1983).

## 5. Risk and return of entrepreneurial investments

As noted in the introduction, the private equity industry has grown substantially in recent years. [Kaplan and Schoar \(2003\)](#), quoting data from Venture Economics, report that commitments to venture capital partnerships increased from less than US\$10 billion in 1991 to over US\$180 billion in 2000. Despite the importance of this asset class, however, comparatively little work has been done on analyzing the risk and return characteristics of private equity investments. The obvious obstacle to such an analysis is data availability. Unlike publicly traded companies, private firms are not subject to many disclosure requirements.

[Cochrane \(2001\)](#) cites several reasons why the dynamics of private equity returns might be different from those of public companies. First, investors may demand higher returns to compensate for the relative illiquidity of private equity investments. Second, because private equity tends to be held in large blocks, investors might demand additional returns to compensate them for their lack of diversification. Third, as noted in Section 2, private equity investments are often more than just financial investments. Venture capitalists might demand additional compensation for the mentoring and monitoring roles they serve in their portfolio companies.<sup>12</sup> Finally, [Kaplan and Schoar \(2003\)](#) note that it is possible that some private equity investors have proprietary access to superior transactions.

Several recent studies attempt to characterize the dynamics of private equity returns. [Cochrane \(2001\)](#) analyzes the risk and return of venture capital investments using the VentureOne database. This data reports the dollar investment and the number of shares sold at each round of venture capital investment. A return can then be calculated if there is some sort of exit event—e.g. the company goes public, is acquired, or goes out of business. This creates an obvious sample selection bias in that only the better performing companies choose to go public. Moreover, a substantial number of companies elect to remain private. For these firms, no returns can be calculated.

To circumvent these selection biases, [Cochrane \(2001\)](#) uses maximum likelihood procedures to measure the probability of going public or getting acquired, and the point at which a company goes out of business.<sup>13</sup> Incorporating these probabilities, Cochrane finds (not surprisingly) that returns on venture capital investments are extremely volatile, with later stage deals being less risky than early stage deals. He also reports average log returns of approximately 5% and intercepts from log market models near zero. Because of the large volatility, however, arithmetic returns and alphas are much larger.

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<sup>12</sup> Indirect evidence supporting this conjecture can be found in [Hsu \(2002\)](#), who reports that more reputable venture capitalists are able to invest on better terms (i.e. lower valuations) than can venture capitalists with less established reputations. Presumably, this represents compensation to the more reputable VCs for superior services (i.e. mentoring, monitoring, etc.) provided to the startup company.

<sup>13</sup> In a separate study, [Das et al. \(2003\)](#) account for selection bias by analyzing expected exit multiples, defined as the product of the probability of exit via IPO or acquisition times the exit multiple. Exit multiples are measured as the ratio of exit valuation to valuation at the time of financing. They obtain returns similar to those in [Cochrane \(2001\)](#).

In contrast to [Cochrane's \(2001\)](#) analysis of the returns on venture capital projects, other studies examine the returns of venture capital funds. One difficulty encountered with this approach is that VC funds are organized as limited partnerships. Therefore, the researcher must either wait to measure returns until funds are paid out to investors or somehow mark-to-market the fund's investments in the interim between investment and payout.

Three recent studies analyze the returns of private equity funds. [Kaplan and Schoar \(2003\)](#) analyze individual fund performance for a large set of private equity funds between 1970 and 2001. The data, supplied by Venture Economics, consists of quarterly information on individual funds voluntarily reported by the private equity firms and their limited partners. [Kaplan and Schoar \(2003\)](#) report that average returns on private equity funds do not exceed returns on the S and P 500. However, there is considerable cross-sectional variation in fund performance and some evidence of persistence in performance. That is, those private equity funds that perform well in one period are more likely to do so in subsequent periods.

Using a database that is virtually identical to that of [Kaplan and Schoar \(2003\)](#), [Jones and Rhodes-Kropf \(2003\)](#) analyze the role of idiosyncratic risk in the pricing of private equity investments. They argue that venture capitalists are exposed to a significant amount of idiosyncratic risk for two reasons. First, because of standard incentive problems in the principal-agent relationship between the VC and its limited partners, the VC is forced to hold a substantial stake in its portfolio companies. Second, because of the substantial amount of time required to screen potential investment candidates, the VC can only identify a few positive net present value opportunities. The net effect of these two factors is that the VC holds an undiversified portfolio. Thus, in equilibrium, the portfolio should earn returns that compensate the VC for total, not just systematic, risk. Consistent with this prediction, [Jones and Rhodes-Kropf \(2003\)](#) find that venture capital and buyout funds with higher idiosyncratic risk exhibit higher returns. Moreover, net of fees that compensate the VC for bearing idiosyncratic risk, fund 'alphas' are statistically insignificant.

The evidence in [Kaplan and Schoar \(2003\)](#) and [Jones and Rhodes-Kropf \(2003\)](#) imply that private equity investments do not earn excess returns. A criticism of the data used in these two studies, however, is that it does not take into account the timing of cash flows or the risk profile of the portfolio companies. To examine the importance of these factors, [Ljungqvist and Richardson \(2003\)](#) obtain detailed records from one of the largest private equity investors in the US. This data contains complete cash flow records for all of the investor's private equity investments between 1981 and 2001. This allows [Ljungqvist and Richardson \(2003\)](#) to incorporate the timing of investment and cash disbursements. The evidence indicates that incorporating the timing of flows is important. It takes over 6 years for funds to invest more than 90% of committed capital. Moreover, it takes over 8 years for the internal rates of return to become positive. Incorporating this information into the calculation of returns, [Ljungqvist and Richardson \(2003\)](#) report evidence of positive risk-adjusted returns. While this contrasts with the evidence in [Kaplan and Schoar \(2003\)](#) and [Jones and Rhodes-Kropf \(2003\)](#), the evidence in [Ljungqvist and Richardson](#) is subject to the caveat of a relatively limited sample.

Finally, in contrast to the above studies that analyze the risk and return of intermediated investments in private equity funds, [Moskowitz and Vissing-Jorgensen \(2002\)](#) examine returns of (mostly) non-intermediated investment in non-publicly-traded equity. Using data

from the *Survey of Consumer Finances* (SCF), Moskowitz and Vissing-Jorgensen (2002) report that investment in private equity is highly concentrated. Approximately 75% of all private equity is owned by households, for whom the private equity investment accounts for at least half of their net worth. Moreover, these households typically invest more than 70% of their private equity holdings in a single company in which they have an active management interest. In other words, most entrepreneurial investment represents investment by individuals in their own companies.

Despite the lack of diversification in these private equity investments, Moskowitz and Vissing-Jorgensen (2002) report that average returns on private equity investments are no higher than returns on public equity. These findings raise a puzzle as to why individuals would pursue entrepreneurial activity if the risk-return tradeoff is inferior to that of public equity investment. Moskowitz and Vissing-Jorgensen (2002) discuss several possible explanations, including biased perceptions of risk and return, nonpecuniary benefits to entrepreneurial activity, additional pecuniary benefits, a preference for skewness, and high entrepreneur risk tolerance. Evidence on the relative importance of each of these factors represents an interesting area for future research.

In sum, although much progress has been made, our knowledge of the dynamics of private equity returns remains incomplete. Analyses of these phenomena are complicated by the lack of data and the potential selection biases in available datasets. It remains unclear whether private equity returns are different from those of public equity. If there are differences, additional work will most likely be focused on whether these differences primarily represent compensation for lack of diversification, informational advantages of certain private equity investors, compensation for non-financial services provided by intermediaries like venture capitalists, or compensation for illiquidity. If there are no differences in the returns of public and private equity, then additional work should focus on the motives for entrepreneurial investment in the presence of inferior risk-return tradeoffs.

## 6. Summary and further directions

The research surveyed in this article represents an important extension of the literature in financial economics. To date, a large portion of the research in finance focuses on issues pertaining to the financing of *public* companies and the pricing of the securities issued by those companies. However, because new businesses have become an increasingly important component of economic development, there has been a dramatic growth in the volume of capital allocated to the *private* equity sector. Correspondingly, financial economists have increasingly become interested in issues pertaining to the financing of entrepreneurial companies. Although many of these issues are interesting in their own right, finance scholars have recognized that entrepreneurial settings also provide an interesting laboratory in which to study broader issues such as financial contracting, risk and return, the market price of illiquidity, and others.

The studies cited in this article have substantially increased our understanding in four main areas of inquiry: (i) alternative sources of capital, (ii) financial contracting issues, (iii) public policy, and (iv) the dynamics of private equity returns. Nonetheless, this survey highlights several areas in which our understanding of the issues remains incomplete.

For example, descriptive evidence indicates a substantial segmentation in the provision of capital from angel and venture capital investors to start-up enterprises. What factors determine this type of equilibrium and where (if at all) do corporate venture capital and business incubator programs fit within this equilibrium? What is the relative importance of institutional and legal settings in determining optimal financial contracts in entrepreneurial settings? What determines the optimal mix of covenants in contracts between entrepreneurs and financiers? What factors drive the differences (if any) between private equity and public equity returns? These are just a few of the interesting questions that await future research.

Up to this point, a large proportion of the research in entrepreneurial finance has examined companies financed by venture capitalists. This is due primarily to data availability. However, as Moskowitz and Vissing-Jorgensen (2002) point out, venture capital accounts for only a trivial fraction (less than 1%) of the private equity market. A more thorough analysis of alternative funding sources, such as angel investors, corporate venture financing, and hybrid organizational forms (e.g. business incubators), will allow for a more complete understanding of the factors driving the apparent segmentation in the provision of capital to start-up enterprises. A more complete analysis of alternative funding sources will also enhance our understanding of the dynamics of private equity returns.

Similarly, a large portion of the existing research has focused on US companies and US venture capitalists. Yet, venture capital and private equity markets are developing in many other countries as well. Finance scholars are beginning to study these other markets. Such study will undoubtedly yield further insights into institutional and legal determinants of the supply of and demand for new venture financing. As data becomes more readily available, entrepreneurial finance should remain an active field of research for many years to come.

## Acknowledgements

This article has been prepared for the *Journal of Corporate Finance* Special Issue on Venture Capital and Entrepreneurial Finance. I appreciate the helpful comments from Diane Denis and the research assistance provided by Jason Hallenbeck and Mira Straska.

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