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COMPETITION FOR TALENT**

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ABSTRACT

Corporate Venture Capital: The Upside of Failure and Competition for Talent*

We consider the motives for a firm to engage in corporate venturing. We argue that in case of failure of a new venture, corporate venture capitalists (CVC) have a strategic advantage relative to traditional venture capitalists (VC) in creating rents after rehiring or refinancing the entrepreneurs. Hence, corporate venturing induces the would-be entrepreneur to exert an effort that is higher than within the corporation, but lower than under traditional venture capital financing. *Ceteris paribus*, the entrepreneur ends up with fewer shares and less control under CVC financing than under traditional VC financing. Competition from venture capitalists increases corporate venturing activity, the salaries of potential entrepreneurs, and total economic output. Our results are consistent with the observed pro-cyclicality of corporate venture capital activity with venture capital activity.

JEL Classification: G24, G32, M12 and M13

Keywords: competition, corporate venture capitalist, entrepreneur, failure, manager and venture capitalist

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1 Introduction

Two observations come to mind when one thinks about intrapreneurship, i.e. the financing and development of new business ventures within large established companies, and corporate venturing in general.¹ The first is the pro-cyclicality between entrepreneurial activity and corporate venturing. The swings in corporate venturing investment between 1998 and 2001 seemed to mimic the fluctuations in entrepreneurial activity: Chesbrough (2002) points out that “quarterly corporate venture capital investments in startups rose from \$468 million at the end of 1998 to \$6.2 billion at the beginning of 2000 and then tumbled to \$848 million in the third quarter of 2001.” This pro-cyclicality is not new. In the previous two venture capital (VC) “waves,” in the late 1960s and early 1970s, and then again in the late 1970s and early 1980s, success in venture capital spurred corporate venturing investments which quickly shrank at the end of the booms, in 1973 and 1987 respectively (Gompers and Lerner, 1998, Gompers, 2002). Does this simply suggest that corporations attempt to obtain their share of the potential profits associated with financing new ventures, or is there more to it?

The second observation is that corporate venturing seems to yield significantly lower returns relative to venture capital investments, unless investments are in related lines of business (Gompers, 2002).² Indeed, venture capitalists claim that corporations do not have the competencies for such investments (Chesbrough, 2002). So why do corporations engage in intrapreneurship?

In this paper we provide a simple explanation for these two empirical regularities. We argue that one of the crucial characteristics of intrapreneurship is that, by funding ideas from their own employees, corporations can generate a rent by rehiring a valuable manager into their own ranks (or financing another project of his) even when the new

¹In the United States, over 200 corporations were listed in the 2002 Directory of Corporate Venturing as investing as active corporate venture capitalists. Corporations also invest in venture capital through specialized institutions such as venture capital funds. At the end of 2001, corporations were the second largest source of capital to venture capital funds, after endowments and foundations, with total commitments of about \$35 billion (Goldman and Russell, 2002). Some of these investments, often organized through partnerships, are sometimes included in the definition of corporate venture capital, but not in that of "intrapreneurship". Throughout the paper, we do not distinguish between corporate venturing and intrapreneurship.

²See also Gompers and Lerner (1998).

venture is not successful.³ The CVC obtains higher rents after the failure primarily because his past experiences as an employee and as an entrepreneur provide an informational and/or matching advantage to the CVC compared to the VC. We do not formally specify whether these higher rents take the form of the financing of a second project from the failed entrepreneur or a return to employment. Although we say that the CVC "rehires" his former employee, the rents can take either form. During the late 1990s many companies, such as Procter and Gamble and Dannon, organized contests among their employees and funded the most promising business plans. The employees that won the contest then became entrepreneurs that were financed by the corporate venture capitalist. Interestingly, the winning projects were not necessarily directly related to the CVC's lines of business, and in case of failure the entrepreneur could have his/her old job back. Introducing this idea in an otherwise standard principal-agent model is sufficient to explain the second observation. Specifically, we show that:

- Other things being equal, corporate venturing is likely to yield lower returns than independent venture capital investing: The rent created in case of failure offers insurance to the corporation and/or the manager, thus reducing incentives, effort, and expected performance.
- Unless the VC has a significant expertise advantage, the rehiring gain dominates the efficiency loss due to lower incentives. Despite a lower expected return on investment in the new venture, the total return to the investor/principal is higher with intrapreneurship than with venture capital, and it is still optimal to invest in corporate venturing rather than venture capital.

To answer the first question we must understand why employing the star manager as part of an intrapreneurship project rather than keeping him as a regular employee becomes more attractive as entrepreneurial activity increases.⁴ We argue that as entrepreneurial activity increases, competition for star managers intensifies as the managers

³If the venture is successful the corporation benefits for obvious reasons.

⁴Throughout the paper we view the principal as a female and the agent as a male.

become aware of, and attracted to, the life of an entrepreneur. Indeed, at the peak of the entrepreneurial boom in the late 1990s, retaining talented employees proved difficult:

“Thirty-two percent of traditional U.S. firms have lost employees to dot-coms, according to a survey of 3,400 executives conducted by BrilliantPeople.com, the online recruiting site of Managements Recruiters International Inc. in Cleveland. In New England, 51.7% of firms reported employee losses to internet firms. On the West Coast, 44.8% of firms reported losing employees to startups, followed by the Middle Atlantic region, with 42.7%. The Midwest and South Central regions had the lowest employee losses, with 78.2% and 86.8% respectively, saying they haven’t lost employees.” *Computerworld*, (September 4, 2000, p.56, business news section).

We argue that corporate venturing is the firm’s response to competition with venture capitalists for star managers. It enables the firm to retain these star managers who would otherwise leave the corporation to seek financing by venture capitalists; a conjecture which is confirmed by *the Corporate Venturing Journal*: “One of the reasons for corporate venturing is to attract and retain employees who have the right skills and mindset to operate effectively in the new economy [...]” (September 2000, Issue 3). Our reasoning relies on the assumption that the entrepreneur’s effort has more impact on overall performance in an entrepreneurial project than as an employee of a corporation. The driving forces of our analysis work as follows:

1. Without competition the corporation often decides to keep the potential entrepreneur as an employee. The reason for this is that the firm appropriates rents from the employment relationship that often exceed the rents that it could obtain by financing a venture in which his limited ownership would restrict the entrepreneur’s incentives.
2. As competition from venture capitalists for promising entrepreneurs intensifies, the manager’s market wage becomes higher, and so do the rents to the corporation if the manager remains an employee, and the manager’s ownership and effort under both VC financing and CVC financing.

3. The cost to the investor of the increase in market wage is mitigated by the manager's increase in effort, and this mitigating effect is larger with the CVC and the VC as the manager's increase in effort is larger. This increases the attractiveness of the CVC and the VC relative to retaining the manager within the firm.
4. A VC competing with a corporation for a manager can offer him an expected compensation that is high enough to steal the employee from the corporation. Hence, keeping the potential entrepreneur as an employee is no longer possible. Competition may prompt the corporation to engage in corporate venturing in cases where the manager would have remained an employee otherwise.
5. Unless the VC's expertise advantage is significant, CVC financing yields a higher total payoff than VC financing. The CVC can therefore outbid the VC and retain the star manager.
6. In our model, profitable projects are not financed, as outside financing leads to the potential entrepreneur to exert a suboptimal effort level, and hence leads to an expected return lower than that obtained with the employment relationship. Competition from a VC provides entrepreneurs with more opportunities to be financed and a higher ownership in their project. This leads them to exert a higher effort, and generates more entrepreneurship in equilibrium.

In other words, competition from the VC induces the firm to offer higher salaries to their most promising employees and to engage in corporate venturing. Hence corporate venturing and venture capital activities are highly correlated. Apart from being consistent with the first observation, our results also have a number of implications. For example, we expect that the salaries of potential entrepreneurs (young managers may be a proxy for possible entrepreneurs) may move together with the entrepreneurial cycle, and that high levels of entrepreneurship, through higher managerial compensation, can improve incentives within organizations.

Earlier papers argue that strategic motives for intrapreneurship may help answer our second question, and that rates of return are high when these strategic factors are

taken into account. For example, Gompers (2002) and Gompers and Lerner (1998) document that the projects financed by the CVC exhibit higher success rate when the projects are related to the CVC's main line of business, but significantly lower returns on "non-strategic" investments. Hellmann (2002) argues that corporate venturing is more likely to take place when the project being financed is more complementary with the corporation's existing lines of business. Although product-market interactions are undoubtedly a factor, existing papers do not explain the presence of "non-strategic" investments by CVCs. We suggest that retaining star managers and rehiring them when ventures fail may play an important role. This suggests that the positive spillovers of corporate venturing to other activities of the corporation may be observed when the project fails, rather than when the project succeeds as suggested by the complementarity hypothesis.⁵

The two papers that are closest to ours are probably Gromb and Scharfstein (2003) and Amador and Landier (2003). Gromb and Scharfstein also consider the "safety net" that intrapreneurship provides to entrepreneurs. However, our approach and our results differ from theirs in several respects: Gromb and Scharfstein focus on the choice between traditional entrepreneurship financed by venture capital and intrapreneurship financed by CVCs, and on the interactions between the expected rents to failed entrepreneurs and the equilibrium level of entrepreneurship. As in our paper, intrapreneurship provides lower incentives than entrepreneurship because of the safety net, but it comes with an informational advantage about the quality of the failed intrapreneur. They do not address the effect of competition from traditional venture capitalists on the decisions to engage in corporate venture capital as opposed to retaining managers as employees. In contrast, the central features of our analysis are the choice between the corporate structure and the CVC, and how this choice is affected by competition from venture capitalists for star managers. This is the driving force behind our result that traditional venture capital and corporate venture capital move together, which as argued above is consistent with

⁵Interestingly, the positive spillover may also be interpreted as the absence of a negative spillover. Specifically, the project being financed with corporate venturing may provide fewer negative spillovers than if it was financed within the firm.

empirical evidence.⁶

Amador and Landier (2003) developed (independently) a model in which competition from venture capitalists *sometimes* prompts firms to adopt innovations that they would not adopt otherwise. As in our paper, competition makes it more likely that the manager's idea will be financed elsewhere (e.g. by a VC), and it transfers rents from the investor to the manager. However, the modeling structures and the results are different. For example, in Amador and Landier, the first effect increases the value of financing the manager's idea, but the second one reduces it, thus making the overall effect of competition ambiguous. In our model, with the CVC the cost of transferring rents to the manager is mitigated by efficiency gains, but not (or at least less so) in a corporation. Here the second effect reinforces the first one, and competition unambiguously increases the value of financing new ideas. Furthermore, they do not distinguish between corporate venturing and an innovation adopted within the corporation, and hence they do not discuss the interactions between corporate venturing activity and venture capital activity, which are the focus of our paper.⁷

Section 2 describes our simple model. Section 3 derives the subgame equilibrium when the firm retains the manager as an employee, and when the manager's project is financed by a corporate venture capitalist and a traditional venture capitalist. Section 4 develops a comparative analysis of corporate venture capital financing and traditional venture capital financing. Section 5 examines how a change in the manager's market compensation affects the attractiveness of corporate venturing relative to traditional venture capital financing. Section 6 analyzes the effects of competition between a CVC

⁶In addition, project failure plays a role in our paper that is different from Gromb and Scharfstein (2003) and Landier's (2003) paper on the effect of failure on the equilibrium level of entrepreneurship. In their papers, the market perception of the reasons for failure plays a central role in reaching the equilibrium level of entrepreneurship. For instance, in Landier's paper, if the market believes that failed entrepreneurs ask to be financed a second time mostly because of their first failure, then financing will be expensive, and a low entrepreneurship equilibrium will obtain. But if the market believes that the entrepreneurs that ask to be financed after a failure have an improved project, then this will lead to cheaper financing, and hence a high entrepreneurship equilibrium.

⁷In this paper, we adopt a conceptual view of entrepreneurship that may differ from earlier papers. First, we view managerial talent and entrepreneurial talent as requiring similar skills, which appears to be consistent with the fact that firms lose a large number of successful managers during times of high entrepreneurship. In contrast, earlier papers focus on the differences between managerial talent and entrepreneurial talent. For instance, Lazear (2003) argues that entrepreneurial talent requires a broad of skills while managerial talent requires perhaps more outstanding, but also more specialized skills.

and a traditional VC for promising would-be entrepreneurs. Section 7 concludes.

2 The Model

Consider the relationship between an investor and a penniless project manager. The manager has a market salary w_0 , and he is risk-neutral. His involvement in the project requires an unverifiable effort p that affects the probability of success. The project requires an investment I and generates high return π^h with probability p and low return π^l with probability $(1 - p)$. The cost of effort to the manager is $c(p) = \frac{k}{2}p^2$.

We consider this principal-agent relationship in three types of environment: Corporation (C), venture capital (VC), and corporate venture capital (CVC). We consider each of them in turn.

The investor and the manager can simply interact in a “corporate” relationship in which the investor is a CEO and the manager an employee. We argue that an employee in a corporation has a much lower impact on the overall surplus than does an entrepreneur starting a new venture. For simplicity, and without loss of generality,⁸ we make the extreme assumption that the employee’s job is routine and he has no impact on the surplus: The surplus in a corporation is the same in both states of the world, i.e. $\pi_c^h = \pi_c^l = \pi_c$.⁹

In the case of corporate venture capital, the investor represents corporate headquarters, the manager is an employee who becomes an entrepreneur, and the project itself is the entrepreneur’s idea. The particularity of corporate venturing is that if the project fails, the firm can re-employ the project manager in the job he had before starting the project, and the firm generates a rent y in addition to π^l . Without loss of generality, we assume that the firm appropriates this entire additional rent y , e.g. it has all bargaining power when negotiating this (non-contractible) rent.

With venture capital financing, the investor is a venture capitalist, and the project manager is an entrepreneur. In our standard case throughout the paper we assume

⁸What is important is that the manager’s marginal product is smaller in a corporation than in a new venture, not that it is zero. All results in the paper still hold as long as $\pi_c^h - \pi_c^l < \pi_{cvc}^h - \pi_{cvc}^l - y$.

⁹Despite being a routine job, an employment relationship could yield a high return π_c , e.g. because of the firm’s market power and accumulated experience and physical assets.

that the payoffs are exactly the same as with corporate venture capital, except that the VC cannot generate any rent by rehiring the entrepreneur if the venture fails. When relevant, we also explicitly consider the difference between the VC's higher ability to manage new ventures, and the CVC's advantage in strategic product development. To that end, we assume that the payoff in the good state under the VC is $\pi_{vc}^h = \pi_{cvc}^h + s$, where s is positive when the VC's higher efficiency dominates, and negative when the CVC spillover effect dominates. The effect of s is in many respects formally equivalent to the effect of y , so for the sake of clarity we assume $s = 0$ in most of the paper and we discuss how $s \neq 0$ affects our results when relevant.

Since effort is unverifiable, payment to the manager is contingent on the return realized: The project manager receives a fraction α^h of the payoff π^h in the good state of the world, and a fraction α^l of π^l in the bad state of the world. These different fractions will capture option-like features that are traditional in venture capital contracts (de Bettignies, 2003, Chemla, Habib, and Ljungqvist, 2003, Schmidt, 2003).¹⁰

The timing is as follows:

- At date 0, the investor chooses the organizational form $F \in \{C, VC, CVC\}$.
- At date 1, the investor makes a take-it-or-leave-it contractual offer to the manager. The manager decides whether to accept or reject the offer. If the offer is rejected, the game ends and both parties obtain zero. If the offer is accepted, the investor makes an investment in a new venture when applicable.
- At date 2, the manager exerts effort.
- At date 3, the project's return is generated and the payoffs are distributed.

3 Three Organizational Structures

3.1 Corporation

In a corporation, the manager has no impact on the payoff: $\pi_c^h = \pi_c^l = \pi_c$. The investor does not need to provide the manager with incentives, and the equilibrium is trivial:

¹⁰In particular, the manager's zero personal wealth and limited liability restrict the amount that can be paid to the investor if the project fails.

She offers him the market wage w_0 in both states of the world, he exerts zero effort, the surplus is π_c , of which the investor keeps $\pi_c - w_0$.

3.2 Corporate Venture Capital

The corporate headquarters' program can be written as follows:

$$\max_{p, \alpha^h, \alpha^l} p\pi^h + (1-p)(\pi^l + y) - (p\alpha^h\pi^h + (1-p)\alpha^l\pi^l), \quad (1)$$

subject to the manager's incentive compatibility (IC) constraint:

$$p \in \arg \max_p p\alpha^h\pi^h + (1-p)\alpha^l\pi^l - \frac{k}{2}p^2, \quad (2)$$

the individual rationality (IR) constraint:

$$p\alpha^h\pi^h + (1-p)\alpha^l\pi^l - \frac{k}{2}p^2 \geq w_0, \quad (3)$$

and wealth constraints:

$$\alpha^h > 0, \alpha^l > 0. \quad (4)$$

We call w_0 the market wage: It reflects the compensation that obtains if the manager does not participate and seeks another job in the labor market. As we shall see below, this market wage may be determined endogenously.

As a benchmark, we first describe the first-best (FB) outcome, in which the investor can observe the manager's effort. Since the above program then reduces to maximizing (1) with respect to p , subject to the manager's participation constraint (3), it follows that the FB optimal effort level is:

$$p^* = \frac{\pi^h - \pi^l - y}{k}. \quad (5)$$

For ease of exposition, we assume that π^h, π^l, y and k are such that $0 < p^* < 1$. In equilibrium, the manager exerts effort p^* , and he obtains $w_0 + \frac{k}{2}p^{*2}$.

In the second-best (SB), when the effort is non-contractible, the IC and the IR constraints reduce to:

$$p = \frac{\alpha^h\pi^h - \alpha^l\pi^l}{k}, \quad (6)$$

and:

$$\frac{k}{2}p^2 - \alpha^l \pi^l = w_0, \quad (7)$$

respectively. The effort level and fractions of payoff to be given to the manager in equilibrium depend on the market wage w_0 . Let $Z = \{p_{cvc}^{**}, \alpha_{cvc}^{h**}, \alpha_{cvc}^{l**}\}$ be the set of equilibrium effort and fractions of payoff in the good and the bad states, respectively.

Proposition 1 *The second-best equilibrium effort and compensation variables with the CVC can be described in three regions:*

$$Z = \left\{ \begin{array}{ll} p_{cvc}^{**} = \frac{\pi^h - \pi^l - y}{2k}, \alpha_{cvc}^{h**} = \frac{kp_{cvc}^{**}}{\pi^h}, \alpha_{cvc}^{l**} = 0 & \text{if } 0 \leq w_0 < \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{2k} \right)^2 \\ p_{cvc}^{**} = \sqrt{\frac{2w_0}{k}}, \alpha_{cvc}^{h**} = \frac{kp_{cvc}^{**}}{\pi^h}, \alpha_{cvc}^{l**} = 0 & \text{if } \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{2k} \right)^2 \leq w_0 < \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{k} \right)^2 \\ p_{cvc}^{**} = p_{cvc}^*, \alpha_{cvc}^{h**} = \frac{w_0 - \frac{k}{2}p_{cvc}^{**2} + kp_{cvc}^{**}}{\pi^h}, \alpha_{cvc}^{l**} = \frac{w_0 - \frac{k}{2}p_{cvc}^{**2}}{\pi^l} & \text{if } w_0 \geq \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{k} \right)^2 \end{array} \right\}, \quad (8)$$

Proof: See the Appendix.

We will call 1_{cvc} , 2_{cvc} , and 3_{cvc} the regions identified from top to bottom by the second column. We assume that $k > 2w_0$, so that in equilibrium, $0 < p_{cvc}^{**} < 1$.

In order to provide the manager with appropriate incentives, the investor sets $\alpha_{cvc}^{l**} < \alpha_{cvc}^{h**}$, and $\alpha_{cvc}^{l**} = 0$ as long as the effort exerted is not optimal. The fractions above can be interpreted as a fraction α_{cvc}^{l**} of the shares plus a fraction $(\alpha_{cvc}^{h**} - \alpha_{cvc}^{l**})$ of call options allocated to the entrepreneur, or as a fraction α_{cvc}^{h**} of the shares, plus a fraction $(\alpha_{cvc}^{h**} - \alpha_{cvc}^{l**})$ of call options to the CVC (or put options to the entrepreneur). As documented in Chemla, Habib, and Ljungqvist (2003) and Schmidt (2003), such clauses appear to be frequently used in venture capital contracts. Since CVC financing shares many features with traditional venture capital financing, it is natural that it comes with similar contractual clauses.

3.3 Venture Capital

The same reasoning as in the previous subsection applies. This leads to a first-best equilibrium effort is $p_{vc}^* = \pi^h - \pi^l$.

Corollary 1 *The second-best set of equilibrium effort and fractions of payoff in the good and bad states $Z = \{p_{vc}^{**}, \alpha_{vc}^{h**}, \alpha_{vc}^{l**}\}$ can be written:*

$$Z = \left\{ \begin{array}{ll} p_{vc}^{**} = \frac{\pi^h - \pi^l}{2k}, \alpha_{vc}^{h**} = \frac{kp_{cvc}^{**}}{\pi^h}, \alpha_{vc}^{l**} = 0 & \text{if } 0 \leq w_0 < \frac{k}{2} \left(\frac{\pi^h - \pi^l}{2k} \right)^2 \\ p_{vc}^{**} = \sqrt{\frac{2w_0}{k}}, \alpha_{vc}^{h**} = \frac{kp_{cvc}^{**}}{\pi^h}, \alpha_{vc}^{l**} = 0 & \text{if } \frac{k}{2} \left(\frac{\pi^h - \pi^l}{2k} \right)^2 \leq w_0 < \frac{k}{2} \left(\frac{\pi^h - \pi^l}{k} \right)^2 \\ p_{vc}^{**} = p_{vc}^*, \alpha_{cvc}^{h**} = \frac{w_0 - \frac{k}{2} p_{vc}^{**2} + kp_{vc}^{**}}{\pi^h}, \alpha_{cvc}^{l**} = \frac{w_0 - \frac{k}{2} p_{vc}^{**2}}{\pi^l} & \text{if } w_0 \geq \frac{k}{2} \left(\frac{\pi^h - \pi^l}{k} \right)^2 \end{array} \right\}, \quad (9)$$

where the second column represents regions 1_{vc} , 2_{vc} , and 3_{vc} from top to bottom respectively. Figure 1 graphically depicts some of the information in (8) and (9): It represents managerial effort with the VC and with the CVC.

4 Corporate Venturing Versus Venture Capital

4.1 The Upside of Entrepreneurial Failure for the Corporate Venture Capitalist

By comparing (8) and (9) and from Figure 1, the equilibrium level of effort p by the project manager, and consequently the expected return on the project, are higher with venture capital than with corporate venture capital, so $p_{vc}^{**} > p_{cvc}^{**}$ and

$$p_{vc}^{**} \pi^h + (1 - p_{vc}^{**}) \pi^l > p_{cvc}^{**} \pi^h + (1 - p_{cvc}^{**}) \pi^l. \quad (10)$$

To explain this, it is convenient to re-write the investor's program as follows:

$$\max_p [p\pi^h + (1 - p)(\pi^l + y)] - [p\alpha^{h**}(p)\pi^h + (1 - p)\alpha^{l**}(p)\pi^l], \quad (11)$$

where $\alpha^{h**}(p)$, and $\alpha^{l**}(p)$ are equilibrium fractions of payoff. Expression (11) reflects the corporate venture capitalist's program. For the venture capitalist the program is the same, but with $y = 0$. The first and second squared brackets represent the benefit and cost to the investor of inducing effort p , respectively. In equilibrium, the payment variables $\alpha^{h**}(p)$, and $\alpha^{l**}(p)$ are the same for the VC and the CVC as functions of p . Consequently the marginal cost of inducing effort, $\frac{d[p\alpha^{h**}(p)\pi^h + (1-p)\alpha^{l**}(p)\pi^l]}{dp}$, is the same for the CVC and the VC (taking p as given).

The difference between the VC and the CVC comes from the marginal benefit of inducing effort. For the corporate venture capitalist this marginal benefit is $\pi^h - \pi^l - y$, which is lower than that of the venture capitalist ($\pi^h - \pi^l$). This occurs because the latter does not have the opportunity of hiring the manager back into its core business in the event that the venture fails. We then obtain the following proposition.

Proposition 2 *The marginal benefit from managerial effort in the new venture is lower for the corporate venture capitalist than for the venture capitalist. Thus in equilibrium CVC financing induces a lower managerial effort in the new venture than VC financing: $p_{vc}^{**} > p_{cvc}^{**}$. The expected return on the project is higher with venture capital than with corporate venture capital.*

This could explain why corporate venture capitalists tend to perform worse than venture capitalists: They provide too much insurance to the entrepreneur by guaranteeing his job back in case of failure. The manager/entrepreneur is thus given lower incentives, which in turn leads to lower expected returns.

Even though, as depicted in (10), the expected return on the project is higher with venture capital, the overall return to the investor is higher with the CVC than with the VC: In the good state, the surplus is π^h for both the CVC and the VC, and in the bad state the surplus is y more for the CVC. The two types of investor are otherwise identical. Thus, as long as the CVC does not relinquish all of that surplus advantage y to the manager - and she designs the contract such that he does not - she will be better off than the VC. In sum:

Proposition 3 *When project-specific payoffs π^h and π^l are the same for the CVC and the VC, the overall return to the investor is higher with corporate venturing than with venture capital.*

After Proposition 2 we may be tempted to ask: “if corporate venturing yields lower returns than traditional venture financing, then why do firms invest in corporate venturing rather than in a venture capital firm?” This question focuses on the advantage of the VC, namely a higher probability of success, and ignores the CVC’s advantage, a

higher payoff in the bad state. In fact, this higher success probability with the VC is *the result* of the CVC's advantage. As such the cost of having a lower likelihood of success is always more than offset by the benefit of having a higher payoff in the bad state.

4.2 Specialization Efficiency Versus Strategic Product Development

In Proposition 3, the VC's higher efficiency exactly offsets the CVC's spillover effect: As discussed in section 2, $s = 0$. We now extend the results in Propositions 2 and 3 by allowing the project-specific payoffs π^h and π^l under the CVC and under the VC to differ. Specifically, we now assume that the payoff in the good state under the VC is $\pi_{vc}^h = \pi_{cvc}^h + s$, where s is positive when the VC efficiency dominates, and negative when the CVC spillover effect dominates.

- **CVC's strategic advantage in product development dominates the VC's higher ability to manage new projects: $s < 0$**

With $s < 0$, the marginal benefit from managerial effort is no longer necessarily superior with the VC. If the strategic product development effect is sufficiently large, i.e. if s is sufficiently negative, the marginal benefit from managerial effort is actually higher with the CVC, which implies higher managerial effort and higher expected return in equilibrium relative to the VC. This is consistent with the results in Gompers and Lerner (1999) and Gompers (2002) that CVC returns are not lower than VC returns for strategic investments. In our model with $s < 0$, Proposition 2 still holds provided $y + s \geq 0$,¹¹ i.e. if s is not too low. In addition, Proposition 3 still holds for all values of $s < 0$: If the CVC was better off than the VC with $s = 0$, then she must also be better off with $s < 0$.

- **VC's higher ability to manage new projects dominates the CVC's strategic advantage in product development: $s \geq 0$**

¹¹The proof for this is simple. Proposition 2 still holds if and only if (iff) the marginal product of managerial effort is still higher with VC than with CVC, iff $\pi_{vc}^h - \pi^l \geq \pi_{cvc}^h - \pi^l - y$, iff $\pi_{cvc}^h + s - \pi^l \geq \pi_{cvc}^h - \pi^l - y$, iff $s + y \geq 0$.

Proposition 2 still holds with $s \geq 0$. Indeed, the marginal benefit to the venture capitalist of inducing high effort is even higher, and the difference in effort $p_{vc}^{**} - p_{cvc}^{**} > 0$ is even larger. On the other hand, Proposition 3 no longer necessarily holds with $s \geq 0$. Indeed, for a given rehiring advantage y there is a threshold of net VC efficiency level $\bar{s} > 0$ such that if $s > \bar{s}$ there exists a set of feasible values of w_0 over which the investor's return as a VC is higher than that as a CVC.^{12,13} However, when the venture capitalist's efficiency advantage s is low, corporate venturing still dominates venture capital (the return to the venture capitalist is denoted R_{vc}) in absolute terms (see Figure 3). Since we focus on corporate venture capital, the remainder of the paper focus on cases where s is (close to) zero.

5 Organizational Choice and Managerial Compensation

In this section, we aim to analyze how a change in the market wage affects the relative attractiveness of one organizational form over the others.

An increase in the manager's market wage increases the efficiency of corporate venturing relative to the corporation. We first show that under corporate venturing, both equilibrium effort and the shares allocated to the entrepreneur in case of success weakly increase in the market wage.

Proposition 4 *Under corporate venturing, an increase in the market wage has a positive impact on the fraction of the shares allocated to the entrepreneur, the equilibrium effort level exerted by the project manager, and consequently on the probability of success of the venture and its expected return.*

Proof: Follows directly from (8) (see Figure 1).

The intuition behind the result above is simple. For the first-best level of effort to be implemented, the difference between the high payoff and the low payoff, $\alpha^h \pi^h - \alpha^l \pi^l$,

¹²By feasible we mean such that the principal's return with CVC and VC is non-negative.

¹³The proof is simple: it can easily be shown that the principal's return as CVC is independent of s , while as VC it is increasing in s . When $s = 0$ the CVC return is higher, but there must exist a finite value of $s = \bar{s}$ such that the VC's return is higher.

must be large enough to provide the manager with appropriate incentives. However, the investor is constrained because *i)* $\alpha^l \pi^l$ cannot be too low, as α^l must remain positive, and *ii)* $\alpha^h \pi^h$ cannot be too high, as the higher α^h the higher cost to the investor. Thus in equilibrium the optimal incentives to the manager generate an equilibrium effort that is weakly lower than the first-best. As the manager's market wage w_0 increases, the investor must pay him more to induce him to become an entrepreneur. The investor increases the manager's compensation by increasing the payoff in the good state, $\alpha^h \pi^h$, because this leads to an increase in $\alpha^h \pi^h - \alpha^l \pi^l$, and thus in the manager's incentives and equilibrium effort level. Thus, the higher cost to the investor of inducing the manager to become an entrepreneur is partly compensated by the manager's higher incentives. When market wage is high enough ($w_0 \geq \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{k} \right)^2$), the manager exerts the first-best level of effort.

An increase in the market wage has a negative effect on the investor's payoff, regardless of whether the organizational structure is corporate venturing, venture capital, or corporation. This effect is more detrimental to the payoff of the investor in a corporation than with corporate venturing, and consequently corporate venturing may become relatively more attractive to the investor as the market wage rises. With a corporation, the marginal cost of an increase in the market wage on the payoff to the investor, $\pi_c - w_0$, is -1 . In contrast, in all three CVC regions, 1_{cvc} , 2_{cvc} , and 3_{cvc} , the cost of a marginal increase in w_0 is less than -1 because the higher entrepreneurial incentives alleviate the negative effect on the investor's payoff. This leads to:

Proposition 5 *The marginal cost of an increase in the manager's market wage w_0 to the investor is lower with corporate venturing than in a corporate structure. Thus the attractiveness of corporate venturing relative to a corporate structure increases with w_0 .*

These results are illustrated in Figure 2. The straight line denoted R_c with slope -1 represents the return to the investor in a corporation as a function of w_0 . The other three curves, denoted R_{cvc}^i , R_{cvc}^{ii} , and R_{cvc}^{iii} , respectively, represent the return to the investor with corporate venturing. In all three cases, $\frac{d(R_{cvc} - R_c)}{dw_0} > 0$, as pointed out in Proposition 5. The three cases represent different absolute payoffs. With R_{cvc}^i , the

corporate organizational structure dominates corporate venturing for all values of w_0 : The payoff to the investor is always higher in a corporation. With R_{cvc}^{iii} , the situation is reversed: The investor is always better off with corporate venturing. The most interesting case is that of R_{cvc}^{ii} . In that case, a corporate structure dominates at low levels of w_0 , but as w_0 increases the attractiveness of corporate venturing relative to a corporate structure increases as well, up to a point where corporate venturing becomes the better alternative at large values of w_0 .

The same reasoning applies when examining the project under corporate venturing financing and venture capital financing. The manager's effort has a higher impact on payoffs with VC financing than on payoffs with CVC financing, since $\pi_{vc}^h - \pi_{vc}^l > \pi_{cvc}^h - \pi_{cvc}^l - y$. This implies that the marginal cost of an increase in the market wage would be even more mitigated by increases in effort with venture capital than with corporate venture capital:¹⁴

Proposition 6 *An increase in the manager's market wage w_0 increases the attractiveness of venture capital relative to corporate venturing.*

Proof: Similar to that of Proposition 5.

From Propositions 5 and 6 we obtain the following corollary:

Corollary 2 *The payoff to a venture capital investor relative to a corporation increases with w_0 .*

6 Competition for “Star Managers”

The investor must choose one of the three possible organizational structures around her manager. The standard corporate structure, in which the investor keeps the manager

¹⁴In contrast, changes in parameters of the production function may increase the attractiveness of CVC relative to VC. An increase in y unambiguously favors CVC over both VC and C, despite an adverse effect on the manager's effort under CVC financing. The reason for this is that a higher y increases the CVC's advantage of creating rents after a failure. Similarly, an increase in π^h and, equivalently, a decrease in π^l , both have a positive effect on the entrepreneur's incentives both under VC and CVC financing. The convexity of the cost of effort implies that when there is an insufficient provision of effort under CVC, an increase in π^h and a decrease in π^l both favor CVC over VC.

as an employee; corporate venturing, where the project is financed, with the possibility of rehiring (or re-financing) the manager and generating a rent y if the venture fails; or an investment through an independent venture capital partnership, where it is not possible to generate rents by rehiring the manager in bad times, but in which there may be an efficiency advantage s in good times due to specialization. Section 4 examined the choice between corporate venturing and venture capital financing. We now examine organizational choice between corporate structure and corporate venturing, i.e. we retain the assumption that s is (close to) zero.

A central question in this paper is how competition for star managers affects this choice. Given our foregoing analysis, the answer to this question is simple: Competition for star managers tends to increase their market wage, consequently making corporate venturing a relatively more attractive opportunity.

For ease of exposition, we restrict our analysis to the most interesting case, depicted in figure 4, where the value of π_c is such that $R_c \geq R_{cvc}$ at low values of the market wage w_0 , and such that $R_c < R_{vc}$ at high values of w_0 .¹⁵ When there is no competition for star managers, and when the market wage equals zero ($w_0 = 0$), a corporate structure is more profitable for the investor: The R_c line is above R_{vc} and R_{cvc} .

We focus on the case where the investor competes with a venture capitalist to keep her star manager. Once the organizational structure is chosen, the investor competes with the VC on the market wage. In the unique equilibrium in the market wage, the payoff to the weaker competitor is zero. If the investor chooses a corporate structure, an increase in the manager's market wage weakens her position (from Corollary 2). In Figure 4, she is the weaker competitor: The equilibrium is $w_0 = w'_0$ where $R_c(w'_0) = 0$. She will lose her manager to the venture capitalist who will be able to lure him away by offering $w'_0 + \varepsilon$. If, on the other hand, the investor chooses corporate venturing, the equilibrium wage is $w_0 = w''_0$ such that $R_{vc}(w''_0) = 0$. Our corporate venture capitalist wins the competition for the star manager by offering $w''_0 + \varepsilon$.

Thus, choosing corporate venturing rather than keeping a manager as an employee

¹⁵For very high (resp. very low) values of π_c , the corporation (resp. CVC) is always the optimal structure. However, our point that competition increases the *relative* attractiveness of CVC vis-à-vis the corporation (Proposition 5) is independent of the choice of π_c .

may allow the investor to retain that manager when there is such competition:

Proposition 7 *Competition for star managers increases their market wage. This may prompt the investor to choose corporate venturing when she would otherwise have preferred to keep the manager as an employee.*

In our model, there is a suboptimal level of venture financing: whenever π_c is higher than the total expected output generated by the CVC with first best effort, the firm can always retain the manager by increasing his compensation beyond the level that the competing VC could offer. In that case the investor's organizational choice is also the social optimum.

Now consider the situation where π_c is lower than the total expected output generated by the CVC at the first best level of effort, but not at the second best effort level. In that case corporate venture capital is socially optimal, but is not the organizational structure chosen by the investor, due to agency costs. Competition for star managers alleviates agency costs, increases the equilibrium effort level towards the first best, and that may induce the investor to choose the socially optimum structure, which is corporate venturing in this example. Hence, competition for star managers increases total economic output:

- By increasing both effort and the fraction of the surplus created by the project that is allocated to the manager under both VC financing and CVC financing, and
- By prompting the firm to finance the project in cases where she would have retained the manager as an employee in the absence of competition.

This is summarized in the following proposition:

Proposition 8 *Competition for star managers i) prompts investors to finance entrepreneurial projects, ii) increases entrepreneurial effort under both VC financing and CVC financing, and iii) increases total economic output.*

Propositions 7 and 8 are central results of this paper. They can help us understand the observed pro-cyclicality of corporate venturing with entrepreneurial activity, as well as the dramatic rise and fall of intrapreneurship activity in 1997-2001. The forces that drive these results can be summarized as follows:

1. Without competition (benchmark) the corporation is the organizational form chosen by the investor
2. Competition from venture capitalists for star managers intensifies. This increases the employee's market wage.
3. As the market wage goes up, the investor under both VC and CVC financing can incentivize the manager more easily than in a regular firm, because the manager's effort has a higher marginal impact. More incentives imply that the employee increases effort more as part of a CVC or VC than as an employee¹⁶.
4. The cost to the investor of the increase in market wage is mitigated by the manager's increase in effort. This mitigating effect is larger with CVC and VC financing as the manager's increase in effort is larger.
5. This makes corporate venturing and traditional venture capital attractive options relative to keeping the manager as an employee.
6. Thus a VC competing with a corporation for a star manager can offer a market wage high enough to steal the star manager from the corporation. Keeping the manager as an employee in the face of competition by venture capitalists becomes unfeasible.
7. In the absence of a high s corporate venturing yields a higher total payoff than venture capital financing, and the CVC can outbid the VC and retain the star manager.
8. Competition increases total output by increasing both managerial effort and investors' incentives to finance new ventures.

Item 7 may be affected in a case where the VC's valuation for the project in case of success is significantly higher than the CVC's valuation. If $s > \bar{s}$, there is a threshold

¹⁶In our model, the manager's effort in a corporation remains constant at zero. However, an analysis similar to that made in that paper implies that if $\pi_c^h > \pi_c^l$, competition from VC may lead the firm to keep the manager as an employee, but to increase the incentive component of his package. Hence, competition from VC may also improve incentives within organizations.

level of $w_0 = \bar{w}_0$ such that it is optimal for the investor to choose VC financing over CVC financing for $w_0 > \bar{w}_0$. From Proposition 6 venture capital becomes relatively more attractive an option compared to corporate venturing, as w_0 increases. When s is large, this relative advantage can turn into an absolute advantage. Thus, Proposition 7 can be amended as follows for large values of s : When s is large, competition may prompt the investor to choose venture capital (and not CVC financing) when they would otherwise prefer to have the manager as an employee. This may explain some firms' decision to set up an independent venture capital fund.

7 Discussion and Concluding Remarks

In this paper we have provided simple answers to two questions that are central to the empirical literature on corporate venturing. The first question is, "Why do firms continue to invest in corporate venture capital when they could make a higher return by investing in independent venture capital?" We have argued that the CVC's cost of yielding lower expected returns than the VC is more than offset by the superior ability to rehire entrepreneurs as employees when their venture fail, thus making CVC financing an attractive alternative for firms.

The second question that we tried to answer is, "What happened in the late 90s? Why was there such a dramatic increase in corporate venturing, which vanished as quickly when the e-commerce bubble burst?" We have argued that one of the explanations for this pro-cyclical investment in corporate venturing comes from competition for star managers. The media buzz around entrepreneurship in the mid to late 90s made employees more aware of their potential as entrepreneurs and became more open to such a career. Consequently, VC firms and corporations started to compete more fiercely for such managers. This resulted in an increase in managers' compensations, and in a strategy switch, by corporations, into corporate venturing.

This new interest from agents to become entrepreneurs may have come from more than just a media buzz. An increase in payoffs and returns may have increased their interest in the first place. How does an increase in the project's good payoff (π^h) affect our model?

An increase in project returns reinforces our main result. It increases the attractiveness of corporate venturing relative to corporate organization through both direct and indirect effects. The direct effect is simple: As the return rises, so does the expected payoff from the venturing project relative to that of the corporation, which remains constant. There are also two indirect effects. First, *ceteris paribus* a higher return (π^h) generates a higher difference between good and bad outcomes, and thus higher equilibrium effort with CVC financing relative to within a corporation. Second, it implies that the VC, who also benefits from this increase, has an increased advantage relative to the corporation when it comes to competing for the manager, and hence the opportunity cost of not choosing corporate venturing, in terms of risk of losing good managers, is higher.

In our paper, there is too little entrepreneurship in equilibrium from a social viewpoint. Entrepreneurial activity generates competition for star managers, which in turn induces efficiency and output gains. This result comes about because competition, by forcing the CVC to forfeit more rents to the manager, also allows her more freedom to provide incentives, and this in turn generates the aforementioned efficiency and output gains. This is to be contrasted with Gromb and Scharfstein, where suboptimal entrepreneurial activity arises because would-be entrepreneurs do not internalize the positive externality that they have on the labor market. Further analyses of the equilibrium level of entrepreneurial activity and the way it compares with the level that would be best for the economy will undoubtedly be the subject of much future research.

8 Appendix

8.1 Proof of Proposition 1

From the investor's objective (1) and the ICC in reduced form, (6), we note that a decrease in α^l leads to an increase in the equilibrium probability of success p , and to a decrease in the manager's expected compensation, $p\alpha^h\pi^h + (1-p)\alpha^l(\pi^l + y)$.

Consequently, it is optimal for the investor to set α^l as low as possible, as long as the manager's IR constraint holds, the wealth constraint $\alpha^l \geq 0$ is satisfied, and the equilibrium probability of success is lower than the first-best probability: $p^{**} \leq p^*$.

We first assume that $\alpha^l = 0$. Substituting $\alpha^l = 0$ into (1), (6), and (7), and then (6) into (1), we can re-write the investor's program as follows:

$$\max_p p\pi^h + (1-p)(\pi^l + y) - kp^2, \quad (12a)$$

subject to:

$$\frac{kp^2}{2} \geq w_0. \quad (13)$$

Solving for p , and then for α^l and α^h , we obtain $p_{cvc}^{**} = \frac{\pi^h - \pi^l - y}{2k}$, $\alpha_{cvc}^{h**} = \frac{kp_{cvc}^{**}}{\pi^h}$ (and $\alpha_{cvc}^{l**} = 0$). Thus, as long as w_0 is low enough for (13) to hold with $p = \frac{\pi^h - \pi^l - y}{2k}$, i.e. as long as $0 \leq w_0 < \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{2k} \right)^2$, these are the solutions to the investor's program.

For values of w_0 such that $\frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{2k} \right)^2 \leq w_0 < \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{k} \right)^2$, keeping $\alpha^l = 0$ implies that (13) is now binding, and the only way to satisfy (13) is by increasing the equilibrium probability of success with w_0 : $p_{cvc}^{**} = \sqrt{\frac{2w_0}{k}}$. From (6) we then derive $\alpha_{cvc}^{h**} = \frac{kp_{cvc}^{**}}{\pi^h}$ (and $\alpha_{cvc}^{l**} = 0$).

Finally, for values of w_0 such that $w_0 \geq \frac{k}{2} \left(\frac{\pi^h - \pi^l - y}{k} \right)^2$, if we continued with $p_{cvc}^{**} = \sqrt{\frac{2w_0}{k}}$ we would obtain an equilibrium probability that would be inefficiently high: $p_{cvc}^{**} > p_{cvc}^*$. Instead we choose $p_{cvc}^{**} = p_{cvc}^* = \frac{\pi^h - \pi^l - y}{k}$ and implement this with $\alpha_{cvc}^{h**} = \frac{w_0 - \frac{k}{2}p_{cvc}^{**2} + kp_{cvc}^{**}}{\pi^h}$, $\alpha_{cvc}^{l**} = \frac{w_0 - \frac{k}{2}p_{cvc}^{**2}}{\pi^l}$ which are derived from (6) and (7). ■

8.2 Proof of Proposition 5

In **region** 1_{cvc} , the market wage is so low that the expected compensation that is required to generate the first best effort level is higher than the market wage. To generate the

optimal effort level, the investor must offer a spread $\alpha^h \pi^h - \alpha^l \pi^l$ that is large enough. This is achieved by setting α^l to zero and α^h to a level that is high enough to generate the required incentives. The manager receives a compensation that resembles an “efficiency wage”. An increase in w_0 affects neither the shares allocated to the manager nor the equilibrium level of effort, and the investor’s payoff remains constant. An increase in w_0 reduces the payoff to the corporation, but not to the corporate venture.

In region 2_{cvc} , the market wage is so high that the IR constraint (3) is binding: The investor pays the manager his market wage plus his cost of effort. As the market wage goes up, the payment that the investor must make to the manager increases, and the investor responds by increasing the fraction of payoff α^h . This in turn increases the spread between the good and bad outcome for the manager, and hence his effort (from (6)). Unlike in a corporation where effort does not matter, with corporate venturing the negative effect of an increase in w_0 on the investor’s payoff is mitigated by the increase in managerial effort and in the expected payoff.

In region 3_{cvc} , the market wage is so high that for the manager’s participation constraint to hold, α^h must be sufficiently high to generate the first best effort level $p_{cvc}^{**} = p_{cvc}^*$ (see ICC (6)). Since the investor does not want the manager to exert an effort higher than p_{cvc}^* , as w_0 goes up the investor increases α^h and α^l to ensure that the equilibrium effort is $p_{cvc}^{**} = p_{cvc}^*$, and that the manager’s participation constraint still holds, and is binding. This implies that the expected return on the project is constant and equal to $p_{cvc}^* \pi^h + (1 - p_{cvc}^*) \pi^l$, and that the cost to the investor is equal to $\frac{k}{2} p_{cvc}^{*2} + w_0$ and increases at rate 1 with w_0 . Thus, in region 3_{cvc} the marginal cost to the investor of an increase in w_0 equals -1 both in the corporation and with corporate venturing. ■

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Figures

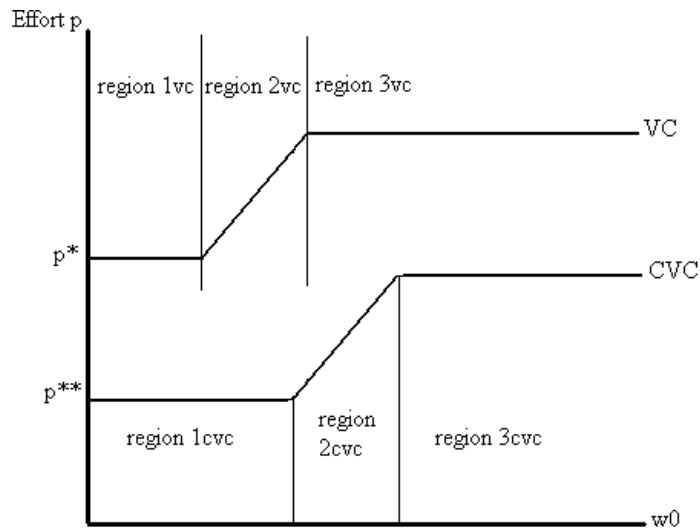


Figure 1

Figure 1: Managerial effort with VC and CVC. Managerial effort is always higher with VC than with CVC. In both organizational structures, it increases with the reservation wage.

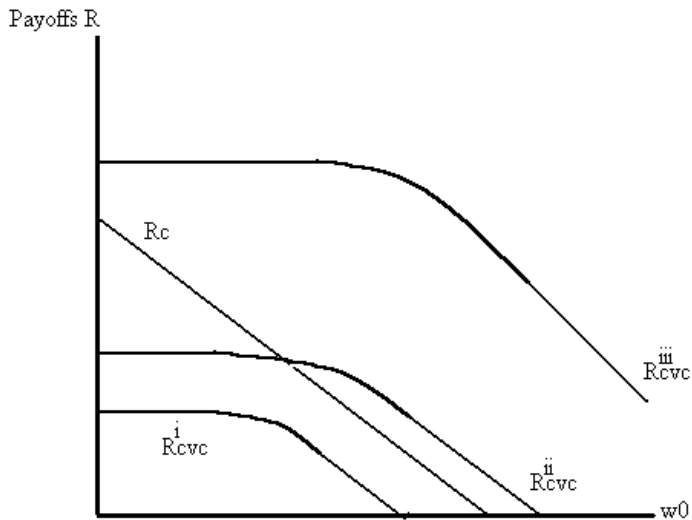


Figure 2

Figure 2: Return from CVC versus return from corporation. As the reservation wage increases, the CVC return always rises *relative* to that of the corporation. As compared to the return from corporation, the return from CVC may be i) always below, ii) below for low levels of reservation wage, and above for high levels, or iii) always above. In the paper we focus on the most interesting case ii).

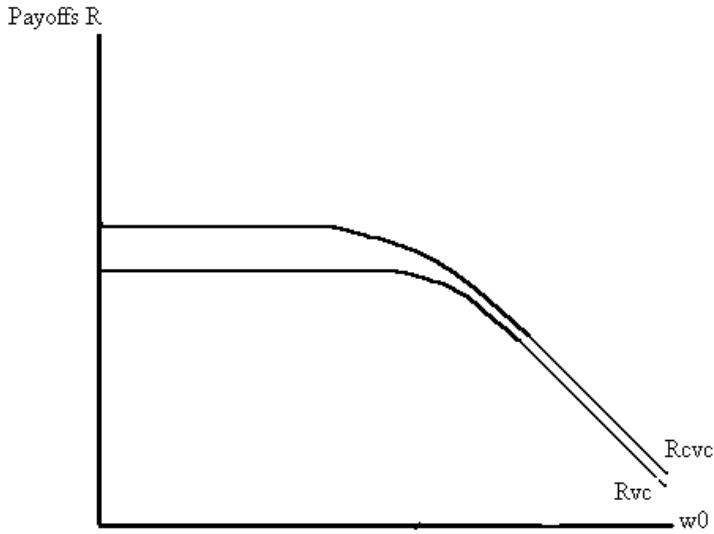


Figure 3

Figure 3: Return from CVC versus return from VC. As the reservation wage increases, VC becomes more attractive relative to CVC, but in our base case, the return from CVC remains higher throughout.

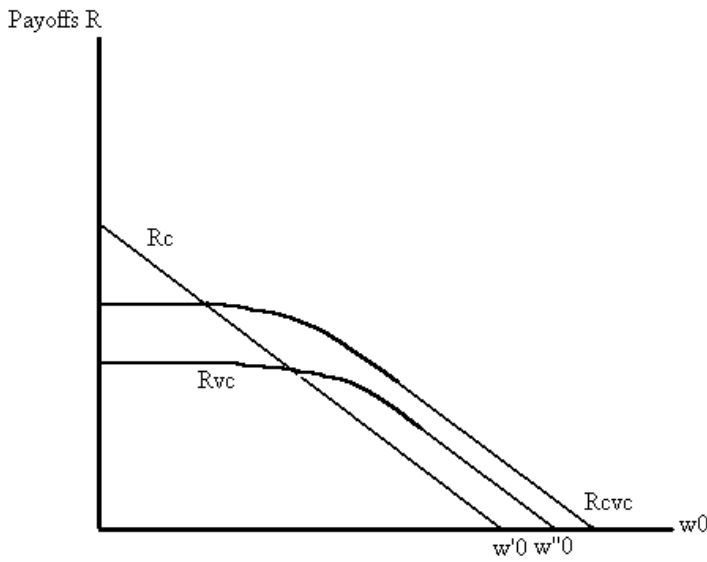


Figure 4

Figure 4: Organizational forms and the reservation wage. When there is little competition from VCs, the reservation wage is low and the corporate structure yields the highest return. When competing for star managers with VCs, they lose the employee if they keep the corporate structure (NE at $w'0$), but keep the manager and obtain a higher return if they choose intrapreneurship (NE at $w''0$).