Corporate Venturing, Allocation of Talent, and Competition for Star Managers

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We provide new rationales for corporate venturing, based on competition for talented managers. As returns to venturing increase, firms engage in corporate venturing for reasons other than capturing these returns. First, higher venturing returns increase managerial compensation, to which firms respond by increasing incentives. Managers increase effort, prompting firms to reallocate them to new ventures, where the marginal product of effort is highest. Second, as returns to venturing become large, corporate venturing emerges as a way to recruit/retain managers who would otherwise choose alternative employment. We derive several testable empirical predictions about the determinants and structure of corporate venturing.

Key words: corporate venturing; corporation; rival investor; star managers; effort; competition

History: Accepted by David A. Hsieh, finance; received October 10, 2003. This paper was with the authors 2 years for 2 revisions. Published online in Articles in Advance December 11, 2007.

1. Introduction
At its peak in 2000, corporate venturing represented $16.7 billion of investments in the United States. At the time, 16 cents out of every dollar invested in new ventures came from corporate venturing firms, who participated in about 27% of all deals. Corporate venturing investments had risen dramatically with entrepreneurial activity during the Internet boom, up from $1 billion in 1997, and evaporated just as quickly afterwards, down to $1.3 billion in 2002 (National Venture Capital Association 2007). Despite their importance, the nature of corporate venturing and its procyclical fluctuations with entrepreneurial activity are still largely unexplained. Is corporate venturing simply a way for firms to capture some of the high returns that they observe in entrepreneurial ventures—a “gravy train” rationale—or is it part of a broader corporate strategy? In this paper, we propose two novel and complementary explanations for corporate venturing that are based on competition for talent.

We present a model where a firm and a rival investor compete for the recruitment of a star manager who has an idea and a unique skill to run a new venture. The star may choose the investor’s offer, in which case he finances her project, and she manages the new venture. Alternatively, she may choose the firm’s offer, in which case her task depends on the firm’s organizational structure: if organized as a corporation, the firm will assign the star the task of managing its main line of business; while if organized for corporate venturing, it can finance the star’s project investment went from $14.6 billion in 1997 to $105 billion in 2000, down to $17.3 billion in the first nine months of 2002 (Brander and de Bettignies 2007). This procyclicality is not new. In the previous two venture capital “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).

3 For expositional reasons, throughout this paper we refer to the star manager as female, the firm as neutral, and the rival investor as male.
and let her manage the new venture. The main difference between the new venture and the firm’s main business is that the star’s marginal product of effort is higher in the new project than in the more routine main business.

When returns to venturing are low, financing the star’s project is not lucrative for the firm, and competition from the rival investor is low for the same reason. The firm prefers to organize as a corporation, recruiting the star to manage its main business. As returns to venturing increase, the relative attractiveness of corporate venturing increases as well for two reasons. First, investing in a new venture enables the firm to capture some of the higher returns associated with venturing. This is the gravy train effect mentioned above. Second, the rival investor’s willingness to bid for the star also increases with returns to venturing, and the star’s equilibrium compensation goes up. The firm responds to higher compensation costs by offering higher-powered incentives, which in turn elicit higher managerial effort. Foresighted firms may thus choose corporate venturing as a way of allocating stars where the marginal product of their effort is highest, i.e., in new ventures. We call this the “incentives” rationale for corporate venturing.

Beyond a certain threshold level of returns to venturing, recruiting the star would become too expensive for the firm, if it were organized as a corporation. Faced with constant benefits but rising compensation costs, it could no longer match offers made by the rival investor, who would steal away the star manager. We show that when returns to venturing are high enough for this problem to arise, corporate venturing emerges as a solution, enabling the firm to hire/retain talented managers who would otherwise take another job. We call this the “recruitment/retention” rationale for corporate venturing.

The key difference between the gravy train and incentives rationales on the one hand, and the recruitment explanation on the other hand, is that they take place at different levels of returns to venturing. Indeed, at low and moderate levels, the firm anticipates that it can successfully recruit the star regardless of its organizational form, and therefore its organizational choice is more about how to best allocate the star across its activities. When the gravy train and incentives effects become sufficiently large, the optimal allocation of talent switches from the main business (corporation) to a new venture (corporate venturing).

In contrast, at high levels of returns to venturing, the firm anticipates that if it organizes as a corporation, it will not recruit the star. This adds both a cost and a benefit to the relative attractiveness of corporate venturing. On the one hand, by organizing for corporate venturing, the firm must pay a large compensation cost to recruit the star, a cost that would be avoided if it organized as a corporation and did not recruit. In our stylized model, this cost exactly offsets the gravy train and incentives effects mentioned above because competition for talent ensures that the star extracts all expected rents from the new venture.

On the other hand, organizing for corporate venturing and allowing the star to develop her idea inside the firm may be a way to prevent her from developing it somewhere else, e.g., with the rival investor.

Suppose that the new venture is correlated to the firm’s main business, e.g., through spillovers, which could be positive or negative. These spillovers will likely benefit the main line of business less, or hurt it more, if the venture is developed by the rival investor than if it is developed under the umbrella of corporate venturing because unlike the firm, the rival investor will not internalize the impact of the new venture on the firm’s main line of business. Hence, at high levels of returns to venturing, although the gravy train and incentives effects disappear, a benefit from recruitment and retention of star employees emerges as the firm attempts to internalize new venture spillovers on its main business.

Despite growing interest, only a few papers have explicitly addressed the question of corporate venturing theoretically. Anton and Yao (1994, 1995), as well as Anand et al. (2004), examine this theme in the context of weak property rights. Hellmann (2002) argues that an entrepreneur should seek corporate venturing funding when the venture project is complementary to the parent corporation’s main line of business. Amador and Landier (2003) investigate whether innovation is to be implemented inside incumbent firms or outside by venture capitalists, in a model of entrepreneurial optimism. Gromb and Scharfstein (2003) analyze how the trade-off between information and incentives affects firms’ choice between intrapreneurship and direct venture capital financing. Hellmann (2007) explores a firm’s decision to encourage or discourage exploration of new ideas by employees, and shows that it depends chiefly on the allocation of intellectual property (IP) rights and

4 For an excellent review of this literature, and of employee innovation in general, see Hellmann (2007).

5 Gromb and Scharfstein (2003) consider the “safety net” that intrapreneurship provides to entrepreneurs, who can get their corporate job back in case of failure. Intrapreneurship provides lower incentives than venture capital financing because of the safety net, but it comes with an informational advantage about the quality of the failed intrapreneur. In their paper, as well as in Landier’s (2006), the market perception of the reasons for failure plays a central role in reaching the equilibrium level of entrepreneurship. Dix and Gandelman (2007) also look at a similar choice between intrapreneurship and corporate venture capital, but the trade-off is based on somewhat different informational asymmetries.
the relative value of innovation inside and outside the firm.

The thrust of our contribution to this literature is to place competition for talent at the forefront of the analysis. This enables us to highlight several new insights and empirical implications. First, we provide the two new explanations for corporate venturing and its procyclical fluctuations that we mentioned: one based on managerial incentives and the optimal allocation of talent; the other based on recruiting and retaining star managers as a spillover internalization strategy. Second, we highlight the importance of competition for talent as a determinant of firms’ organizational strategy. We show that by generating the incentives and recruiting effects, competition has an unambiguously positive impact on corporate venturing, inducing firms to switch to corporate venturing sooner as returns to venturing increase. Third, we suggest that spillovers from the new venture to the firm’s main business may have a positive impact on corporate venturing. Interestingly, in contrast with Helmann (2002), corporate venturing may still be optimal even when spillovers are large and negative, as the firm attempts to preempt the rival investor’s development of the new venture, which would lead to a negative spillover effect of an even greater magnitude. Fourth, we extend the model to address issues related to “contractual incompleteness.” This enables us to examine the impact of IP rights on the prevalence of corporate venturing, as well as the effects of returns to venturing on the optimal allocation of control rights between the star and the corporate parent. We suggest that weaker IP protection may be favorable to corporate venturing, and that increased venturing returns may induce corporate venturing firms to allocate more control rights to the star, thereby switching from tighter controlled structures, such as internal ventures, to more autonomous structures, such as corporate venture capital. Finally, we underline the link between competition for talent, economic efficiency, and corporate venturing: we point out that there may be less corporate venturing in equilibrium than is socially desirable, but that competition—by increasing the prevalence of corporate venturing—may improve economic efficiency.

This paper is organized as follows. Section 2 describes the model. Section 3 analyzes competition for star managers when the firm is organized as a corporation, while §4 looks at these issues in the context of corporate venturing. In §§5, we characterize the optimal organizational choice and how it is affected by returns to venturing, competition for talent, and spillover effects. Section 6 extends the model to contractual incompleteness and examines the optimal structure of corporate venturing, while §7 discusses other extensions to the model. Section 8 presents the key empirical implications of the model, and relates them to the empirical literature. Section 9 concludes. The characterization of the main optimization program is in the appendix. All proofs are in the online supplement (provided in the e-companion).

2. The Model

2.1. Basic Setup

A company intends to recruit a star manager/entrepreneur, and anticipates competition from other institutions in the “market for talent.” This star manager has an idea for a new venture that requires financing. The firm must choose between two organizational forms $F \in \{C, V\}$, which differ primarily in the way they allocate talent.

If organized as a “traditional” corporation (C), the firm focuses on its core competency, and devotes all its attention and resources to its existing line of business. If recruited, the star would manage the main business, and her idea for a new venture is not pursued.

If organized as a corporate venturing firm (V), the company does not focus exclusively on its main business, and is organized so as to be able to pursue new opportunities. This organizational change could take various forms, from setting up a committee in charge of evaluating employees’ new venture ideas, to the

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6 Amador and Landier (2003) and Anand et al. (2004) also developed models in which a manager/entrepreneur with an innovative idea chooses between contracts offered by an incumbent firm and a venture capitalist. A key feature of Amador and Landier’s (2003) model is that the entrepreneur is subject to an optimism bias about her idea. The venture capitalist’s advantage in recruiting her lies in its superior ability to exploit her bias through contracts, while the incumbent firm has a cost advantage due to potential synergies with existing assets. Interestingly, the authors find that the relative recruiting advantage of the venture capitalist increases with project value—a variable similar to the “returns to venturing” measure used in our model—and predict that high-value projects will be financed outside the firm. In contrast, our model suggests that high-value projects may still be developed inside the firm because it attempts to internalize the spillovers on its main line of business. In Anand et al. (2004), the focus is on studying how the strengths of property rights, and the centralization of operations, affect a firm’s ability to recruit a talented manager. They do not analyze the effects of changes in returns to venturing and competition for talent.

7 An electronic companion to this paper is available as part of the online version that can be found at http://mansci.journal.informs.org/.

8 In this paper, 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 (see Footnote 25 in §8). This contrasts with, for example, Lazear (2005), who argues that entrepreneurial talent requires a broad range of skills, while managerial talent requires perhaps more outstanding, but also more specialized skills.
funding of a full-fledged fund devoted to new venture investments, similar to standard venture capital funds. Under this organizational form, conditional on recruiting the manager, the firm finances her idea, and the star manages the new venture.

For simplicity, we assume that the main business yields a (dollar) return $M$ with certainty if managed by the star, and $M^- < M$ otherwise. The new venture can only be valuable if it is run by the star manager, and it can turn out to be of two types. It may be a “base hit,” in which case it yields a base dollar return $\Pi \geq \Pi^{\text{min}}$ (net of initial capital outlay), or a “home run,” in which case the return is $\Pi + \pi$, with $\pi > 0$. The star exerts a nonverifiable effort $e$ that strictly increases the probability of a home run. For simplicity, we assume this probability to be $e$. Hence, the new venture yields an expected return $\Pi + e\pi$ (gross of effort cost) when managed by the star, and zero otherwise. The star is assumed to be risk neutral and wealth constrained, and her cost of effort is $k(e) = (\mu/2)e^2$.

A key difference between the main line of business and the new venture is that the star’s marginal product of effort is larger in the latter than in the former. The basic idea is that while new ventures are highly risky and the star can have a large impact on the probability of success, the main line of business may include (relatively) more of a routine job where the star’s effort has a lower impact. One could also argue that the management of the new venture likely involves a product that is closer to the beginning of the life cycle than its main business counterpart, and that managerial effort has a larger impact at the beginning of a product’s life cycle than at its end.

The main business and the new venture are linked in that the new venture yields a spillover, $S \in \mathbb{R}$, on the main business. The spillover could be positive and represent superior access to a new technology for the main line of business, for example, or may capture a reduced-form complementarity between the products developed in the new venture and those developed in the main business. Alternatively, $S$ may be negative and capture some form of cannibalization of the main venture products by the new venture products. The spillovers enable us to take into account the idea, highlighted by Hellmann (2002), that the venturing firms’ objective is not restricted to maximizing the value of the stand-alone ventures. Here, the broader objective is the value created by the project as a stand-alone entity, plus the spillovers to the main line of business. In our setting, conditional on hiring the star, the firm’s gross (i.e., excluding the compensation cost) expected return is $M$ when organized as a corporation, and $\Pi + e\pi + M^- + S$ when organized for corporate venturing.

The firm may fail to recruit the star, who may turn to a rival investor ($R$)—e.g., an angel investor or a venture capitalist—to finance her new venture idea. If the star chooses to develop the new venture with the rival investor, the firm, regardless of its organizational form ($C$ or $V$), has no access to the star’s talent, but may still receive a spillover $(S - \delta)$ from the new venture to its main business. In other words, the spillover from the new venture to the firm’s main business is lower, be it positive or negative, if the new venture is developed by the venture capitalist than if it is developed under corporate venturing, and $\delta \geq 0$ represents this spillover differential. This is simply a reduced-form way of capturing the idea that, unlike the firm, the rival investor does not internalize the impact of spillovers on the firm’s main line of business. Thus, if the star chooses to go with the rival investor, the firm’s expected payoff is $M^- + S - \delta$ regardless of its organizational form. The rival investor expects a gross payoff $\Pi + e\pi$ from the project if he can recruit the star and finance the venture, and zero otherwise.

Finally, the following two regularity conditions on the parameters will simplify our analysis (our results still obtain without these conditions, unless otherwise specified):

$$M - (M^- + S) \geq \frac{\pi^2}{8\mu} + \epsilon, \quad \text{with } \epsilon \to 0, \quad (1)$$

$$\Pi^{\text{min}} = -\frac{\pi^2}{4\mu} + \epsilon, \quad \text{with } \epsilon \to 0. \quad (2)$$

2.2. Contracts

An equilibrium contractual offer made to the star manager depends on (at least) two key factors. First, it depends on the organization designing the contract: ceteris paribus, $C$, $V$, and $R$ offer different contracts. Second, it depends on whom this organization is competing with to recruit the star. For example, rival investor $R$ will offer different contracts depending on whether he is competing with $C$ or with $V$. To identify the various possibilities in a simple way, throughout this paper all contractual variables and related payoffs are associated with a two-letter subscript. The first letter identifies the organization designing the contract, while the second letter identifies its competitor.\(^{10}\)

If the firm is organized as a traditional corporation focused on its main business, the star’s output, and hence the value of recruiting her, do not depend on her noncontractible effort. The corporation’s equilibrium contractual offer is therefore a constant wage $W^*_C$. The star exerts no effort and receives

\(^{9}\)There may be more than one rival investor, but there is no loss of generality in focusing on the most productive one (in the use of the star’s talent/idea).

\(^{10}\)In §5.2, we also examine the special cases where there is no rival investor competing with the firm (organized as $C$ or $V$) for the recruitment of the star. These cases are identified by replacing the second letter of the subscript with zero.
an equilibrium net payoff $U^e_{CR} = W^e_{CR}$. Superscript “∗” denotes the equilibrium value of a variable.

In contrast, if the firm engages in corporate venturing, its expected payoff depends on the effort level $e$ exerted by the star manager, who must thus be incentivized. Because effort cannot be contracted upon, the star’s compensation package is made contingent on the new venture’s realized payoff. Specifically, the star manager receives a fixed wage $\alpha^*_{VR}$ with certainty and a fraction $\beta^*_{VR}$ of incremental payoff $\pi$ in case of a home run. The fraction $\beta^*_{VR}$ can be interpreted as a fraction of call options allocated to the star manager, and will affect her effort choice, $e^*_{VR} = e(\beta^*_{VR})$.

The star’s expected payoff can thus be expressed as $W^e_{VR} = \alpha^*_{VR} + e^*_{VR}\beta^*_{VR}\pi$, and her net expected payoff is $U^e_{VR} = W^e_{VR} - k(e^*_{VR})$. Similarly, the rival investor also offers a fixed wage, $\alpha^*_{RF}$, and a fraction of call options, $\beta^*_{RF}$, with the following expected compensation $W^e_{RF} = \alpha^*_{RF} + e^*_{RF}\beta^*_{RF}\pi$, and a net payoff $U^e_{RF} = W^e_{RF} - k(e^*_{RF})$, to the star, with $F = C, V$.

2.3. Timing of the Game

The timing is as follows:
- At date 0, nature reveals parameters $\Pi$, $\pi$, $M$, $M', S$, $\mu$, and $\delta$, and the firm chooses its organizational form $F \in \{C, V\}$.
- At date 1, the firm and the rival investor both make contractual offers to the star manager. Specifically, if $F = C$, the firm offers $W^e_{CR}$ to the star. If $F = V$, the firm offers $\{\alpha^*_{VR}, \beta^*_{VR}\}$, which implies a net expected payoff $U^e_{VR}$ to the star. The rival investor offers $\{\alpha^*_{RF}, \beta^*_{RF}\}$, which yields $U^e_{RF}$ to the star, with $F \in \{C, V\}$.
- At date 2, the star chooses one of the two offers.
- At date 3, the star exerts effort.
- At date 4, the returns are generated and the payoffs are distributed.

We determine the subgame-perfect equilibrium of the game by backward induction. First, in §§3 and 4, we analyze competition for the star manager at date 1, in the case of the corporation and in that of corporate venturing, respectively. Then, in §5, we examine the firms’ optimal organizational choice.

3. The Corporation

3.1. Contract Offered by the Corporation, Taking $U^e_{RC}$ as Given

To obtain the equilibrium contract, the corporation first determines the optimal contractual variables and the expected payoff if it recruits the star, and if it does not. We identify endogenous variables under these two alternatives with superscripts “∗” (for “recruiting”) and “∗∗” (for “not recruiting”), respectively. The corporation then chooses among these two strategies the one that maximizes its payoff.

If it intends to recruit the star manager, the firm maximizes the following program:

$$\max_W M - W,$$

subject to the star’s individual rationality (IR) constraint:

$$W \geq U^e_{RC},$$

where $U^e_{RC}$ represents the star manager’s (net) reservation payoff (RP), i.e., her net expected payoff if she chooses the rival investor’s offer to finance the new venture. We assume that if indifferent, the star will choose the firm’s offer, hence the weak inequality in (4). The solution is simple: The corporation offers $W^e_{CR}(U^e_{RC}) = U^e_{CR}$ to the star, recruiting her at minimum cost, and generating a net payoff $P^e_{CR}(U^e_{RC}) = M - W^e_{CR}(U^e_{RC}) = M - U^e_{RC}$. In contrast, if it does not intend to recruit the star, the firm offers any $W^e_{CR}(U^e_{RC}) < U^e_{RC}$, and obtains total expected payoff $P^e_{CR} = M^* + S - \delta$.

We define $U^e_{RC}$ as the threshold RP to the star (from $R$) such that the corporation is indifferent between recruiting her or not: $U^e_{RC} = M - M^* - (S - \delta)$. Regularity condition (1) implies $U^e_{RC} > \pi^2/8\mu$.

Because $P^e_{CR}(U^e_{RC})$ is strictly decreasing in $U^e_{RC}$, the corporation’s best response is to recruit the star with an offer $W^e_{CR}(U^e_{RC})$ if $U^e_{RC} \leq U^e_{CR}$, and to not recruit her and offer any $W^e_{CR}(U^e_{RC}) \leq W^e_{CR}(U^e_{RC})$ if $U^e_{RC} > U^e_{RC}$.

3.2. Contract Offered by the Rival Investor, Taking $U^e_{CR}$ as Given

The same type of (backward induction) process can be used to determine the rival investor’s best-response correspondence. The characterization of the optimal contract is detailed in the appendix. If it intends to recruit the star manager, the rival investor maximizes the following program:

$$\max_{\alpha, \beta} \Pi + e\pi - (\alpha + e\beta\pi),$$

subject to the star’s incentive compatibility (IC) constraint (6), individual rationality (IR) constraint (7), and limited liability (LL) constraint (8):

$$\begin{align*}
e & \in \arg \max_e \alpha + e\beta\pi - \frac{\mu}{2}e^2, \\
U^e_{CR} & < \alpha + e\beta\pi - \frac{\mu}{2}e^2, \\
\alpha & \geq 0, \quad \beta \geq 0,
\end{align*}$$

\[\text{as } \alpha \text{ and } \beta \text{ are non-negative.}\]
where $U_{CR}$ is the star’s RP (offered by the corporation). The optimal contract can be described as follows:

$$\left\{ e_{RC}', \alpha_{RC}', \beta_{RC}' \right\}(U_{CR}) = \left\{ \begin{array}{ll} \frac{\pi}{2\mu}, & 0 \leq \frac{1}{2} \\ \frac{\sqrt{2\mu U_{CR}}}{\pi}, & \frac{1}{2} < \frac{\sqrt{2\mu U_{CR}}}{\pi} \end{array} \right. \quad \forall U_{CR} \in \left[ 0, \frac{\pi^2}{8\mu} \right],$$

$$\left\{ \frac{\pi}{\mu}, U_{CR} + \varepsilon - \frac{\pi^2}{2\mu}, 1 \right\} \quad \forall U_{CR} \in \left[ \frac{\pi^2}{2\mu}, \infty \right).$$

It is easy to check that in the first-best environment where effort is contractible—identified throughout this paper with superscript $t$—one would obtain effort $e^t = \pi/\mu$. As is well known, in our setting with nonverifiable effort and LL for the star, the (second-best) effort level is weakly lower than the first-best level: $e_{RC}(U_{CR}) \leq e^t$. More interestingly for our purpose below, the following result emerges from this characterization:

**Lemma 1.** The power of incentives $\beta_{RC}'$ offered by the rival investor, and the star’s effort $e_{RC}'$, are both weakly increasing in the star’s reservation payoff $U_{CR}$.

When $U_{CR}$ is low ($U_{CR} \in [0, \pi^2/8\mu]$), the contract offered by the rival investor to hire the star would leave rents to the star to elicit the desired effort level. An increase in $U_{CR}$ would simply reduce the rent, but would have no impact on the contract $[0, \frac{1}{2}]$, offered, nor on the resulting effort $e_{RC}' = \pi/\mu$. However, when $U_{CR}$ belongs to $[\pi^2/8\mu, \pi^2/2\mu)$, IR constraint (7) is binding; the rival investor can no longer offer $[0, \frac{1}{2}]$ because the star would turn down the offer and take the superior offer $U_{CR}$ from the corporation. Indeed, the rival investor offers a contract such that the star’s net expected payoff is higher than $U_{CR}$ by a small amount $\varepsilon$. As $U_{CR}$ rises, the rival investor must increase his bid, which he does by increasing $\beta_{RC}'$, thus “killing two birds with one stone”: First, he increases the star’s expected compensation and ensures her participation. Second, he increases the star’s marginal benefit from effort, $\beta_{RC}'$, and these higher-powered incentives lead to a higher effort level. This is the key intuition behind Lemma 1.

Finally, as $U_{CR}$ becomes “high” and enters $[\pi^2/2\mu, \infty)$, offering the same contract as in $[\pi^2/8\mu, \pi^2/2\mu)$ would lead to an excessively high effort. Instead, the rival investor offers a contract that elicits the first-best effort and ensures participation.

Using (9), one can easily derive the expected net payoff for the star,

$$U_{RC}'(U_{CR}) = W_{RC}'(U_{CR}) - k(c_{RC}'(U_{CR})),$$

for the rival investor, $P_{RC}'(U_{CR}) = \Pi + e_{RC}'(U_{CR}) \pi - W_{RC}'(U_{CR})$, if the star is hired by $R$:

$$\left\{ U_{RC}', P_{RC}' \right\}(U_{CR}) = \left\{ \begin{array}{ll} \frac{\pi^2}{2\mu}, & \Pi + \frac{\pi^2}{4\mu} \end{array} \right. \quad \forall U_{CR} \in \left[ 0, \frac{\pi^2}{8\mu} \right],$$

$$\left\{ \frac{\pi^2}{\mu}, U_{CR} + \varepsilon, \frac{\pi^2}{2\mu}, 1 \right\} \quad \forall U_{CR} \in \left[ \frac{\pi^2}{2\mu}, \infty \right).$$

The rival investor will recruit the star provided his recruitment payoff $P_{RC}' > P_{RC} = 0$. We show that for each value of $\Pi \geq \Pi_{\min}$, there exists a unique threshold reservation payoff $\bar{U}_{CR} \geq \pi^2/8\mu$ defined implicitly as the solution to

$$P_{RC}'(\bar{U}_{CR}) = \Pi + e_{RC}'(\bar{U}_{CR})\pi - W_{RC}'(\bar{U}_{CR}) = 0, \quad (11)$$

such that, if $U_{CR} < \bar{U}_{CR}$, the rival investor recruits the star with a contract $\left\{ \alpha_{RC}'(U_{CR}), \beta_{RC}'(U_{CR}) \right\}$ to the star; and if $U_{CR} \geq \bar{U}_{CR}$, the rival investor does not recruit the star (and offers any contract $\left\{ \alpha_{RC}', \beta_{RC}' \right\}$ such that $\beta_{RC}' \leq \bar{\alpha}_{RC}'$).

### 3.3. Nash Equilibria of the Subgame

In the foregoing two subsections, we characterized the corporation’s best response for any $U_{CR} \geq 0$, and the rival investor’s best response for any given $U_{CR} \geq 0$. The determination of Nash equilibria (NE) follows directly by intersecting these two correspondences.

**Proposition 1.** The NE in this subgame are characterized as follows:

Case 1: $\bar{U}_{CR} < \bar{U}_{CR}$. The corporation offers $W_{CR}'(\bar{U}_{CR}) = W_{CR}'(\bar{U}_{CR}) = U_{CR}$, which is also the payoff to the star. The rival investor offers all of one of the possible contracts $\left\{ \alpha_{RC}', \beta_{RC}' \right\}$, such that $U_{RC}'(\alpha_{RC}', \beta_{RC}') = \bar{U}_{CR}$. The star takes the corporation’s offer, and this leads to payoffs $P_{CR}'(U_{CR}) = M - W_{CR}'(\bar{U}_{CR})$ to the corporation and $P_{RC}' = 0$ to the rival investor.
Case 2: \( \bar{U}_{CR} > \bar{U}_{RC} \). There exists a unique NE, where the corporation offers \( W_{CR}^* = \bar{U}_{RC} \) and the rival investor offers \( \{\alpha_{RC}^*, \beta_{RC}^*\}(\bar{U}_{RC}) = \{\alpha_{RC}, \beta_{RC}\}(\bar{U}_{RC}) \). The star takes the rival investor’s offer, which gives her a payoff \( U_{CR}^*(\bar{U}_{RC}) = \bar{U}_{RC} + \varepsilon \) with \( \varepsilon \rightarrow 0 \), and yields payoffs \( P_{CR}^*(\bar{U}_{RC}) = P_{RC}^*(\bar{U}_{RC}) = \Pi + \varepsilon_{RC}^*(\bar{U}_{RC})\pi - W_{RC}^*(\bar{U}_{RC}) \) and \( P_{CR}^* = M^* + S - \delta \) to the rival investor and the corporation, respectively.

Consider the case where \( \bar{U}_{CR} \leq \bar{U}_{RC} \). Clearly, the star cannot receive less than \( \bar{U}_{RC} \) otherwise at least one of the rivals would make a higher offer to attract the star. By definition of \( \bar{U}_{CR} \), the rival investor will not outbid an offer from the corporation that equals (or is higher than) \( \bar{U}_{CR} \). Hence, the corporation recruits the star at the lowest possible cost, i.e., \( \bar{U}_{CR} \). Note that there exist many NE, all with \( W_{CR}^*(\bar{U}_{CR}) = \bar{U}_{CR} \), but each with a different combination of \( \{\alpha_{RC}^*, \beta_{RC}^*\} \). Importantly, all of these NE yield the same outcome, and the same payoffs to the different players. In the case where \( \bar{U}_{CR} > \bar{U}_{RC} \), the intuition is similar, with the rival investor offering \( \bar{U}_{RC} + \varepsilon \) and hiring the star at minimum cost.

The base return to venturing \( \Pi \) is one factor that will affect the relative threshold RPs, and hence whether the star is hired by the corporation or by the rival investor, and in turn the corporation’s net expected payoff.\(^{13} \) When \( \Pi \) increases, the rival investor’s net expected payoff after hiring the star also increases. Hence, threshold RP \( \bar{U}_{CR} \) goes up as well. In contrast, the corporation, which focuses on its main line of business, remains unaffected by an increase in \( \Pi \), so its threshold RP, \( \bar{U}_{RC} \), does not vary with \( \Pi \).

**Lemma 2.** If the firm is organized as a corporation, there exists a threshold level of return to venturing \( \Pi \geq \Pi_{\min} \) – defined as the level of \( \Pi \) such that \( \bar{U}_{CR}(\Pi) = \bar{U}_{RC} \) – such that the firm recruits the star when \( \Pi \) belongs to region \( A_1 = [\Pi_{\min}, \Pi] \) and the rival investor recruits the star when \( \Pi \) belongs to region \( A_2 = (\Pi, \infty) \). The expected net payoff to the corporation can be written as

\[
P_{CR}^*(\Pi) = \begin{cases} 
M - W_{CR}^*(\bar{U}_{CR}(\Pi)) = M - \bar{U}_{CR}(\Pi) & \text{for } \Pi \in A_1, \\
M^* + S - \delta & \text{for } \Pi \in A_2.
\end{cases}
\]

(12)

When the return to venturing \( \Pi \) is small and close to \( \Pi_{\min} \), the rival investor has little to gain from recruiting, and the maximum amount it can bid for the star, \( \bar{U}_{CR}(\Pi) \), is low. The corporation can therefore recruit the star by offering a salary \( W_{CR}^*(\bar{U}_{CR}(\Pi)) \), which grants the star the same payoff as the rival investor’s best bid. As the return to venturing increases, so does the rival investor’s bid for the star because \( d\bar{U}_{CR}(\Pi)/d\Pi > 0 \). The corporation must increase its offer to the star accordingly, and this negative “compensation cost” effect (of an increase in \( \Pi \)) decreases its net payoff. As the return to venturing becomes large, crosses the threshold \( \Pi \), and enters region \( A_2 \), it becomes too expensive for the corporation to match the rival investor’s offer. Therefore, beyond \( \Pi \) the corporation does not match the rival investor’s offer, who successfully recruits the star.

**Proposition 2.** An increase in returns to venturing \( \Pi \) increases the rival investor’s valuation for the star. This prompts the corporation to make a higher bid for the star, thereby reducing its net expected payoff. Due to this “compensation cost” effect, the relative attractiveness of recruiting the star decreases with \( \Pi \), and it is negative when \( \Pi > \Pi \).

4. Corporate Venturing

4.1. Contract Offered by the Corporate Venturing Firm, Taking \( U_{RV} \) as Given

The corporate venturing firm’s program is nearly identical to the rival investor’s program examined in §3.2. If it intends to recruit the star manager, the objective function is the same, up to constant \( (M^* + S) \):

\[
\max_{e, \alpha, \beta} \Pi + e\pi - (\alpha + e\beta\pi) + M^* + S. \quad (13)
\]

The IC and LL constraints are the same as in (6) and (8), respectively; and the IR constraint,

\[
\alpha + e\beta\pi - \frac{\mu}{2}e^2 \geq U_{RV}, \quad (14)
\]

differs from (7) only in that the star’s RP is the rival investor’s offer \( U_{RV} \) rather than \( \bar{U}_{CR} \), and in that the inequality is weak.\(^{14} \)

Hence, the equilibrium \( e_{VR}^*, \alpha_{VR}^*, \beta_{VR}^* \), and \( W_{VR}^* = \alpha_{VR}^* + e_{VR}^*\beta_{VR}^*\pi \) are as described in (9), but with \( e = 0 \) and \( U_{RV} \) instead of \( U_{CR} \). As in §3.2, for any \( \Pi \geq \Pi_{\min} \), there exists a unique threshold RP to the star \( \bar{U}_{RV} \) such that if \( U_{RV} \leq \bar{U}_{RV} \), the corporate venturing firm recruits the star with an offer \( \{\alpha_{VR}^* (U_{RV}), \beta_{VR}^* (U_{RV})\} \); and if \( U_{RV} > \bar{U}_{RV} \), the corporate venturing firm offers any contract \( \{\alpha_{VR}^*, \beta_{VR}^*\} \) such that \( U_{VR} (\alpha_{VR}^*, \beta_{VR}^*) < U_{RV} \) and does not hire the star. Here, \( U_{RV} \) is defined implicitly as the solution to \( P_{VR}^*(\bar{U}_{RV}) = P_{VR}^* \), that is,

\[
\Pi + e_{VR}^*(\bar{U}_{RV})\pi - W_{VR}^*(\bar{U}_{RV}) = M^* + S - \delta, \quad (15)
\]

where the first square-bracketed term represents the corporate venturing firm’s expected payoff from the new venture, the second square-bracketed term represents its payoff from the main business, and the right-hand side represents its payoff if it does not recruit.

\(^{14}\) The weak inequality reflects the assumption that if indifferent, the star will choose the firm’s offer.
4.2. Contract Offered by the Rival Investor, Taking $U_{VR}$ as Given

The program is the same as in §3.2, and hence so is the contract offer, simply replacing $U_{CR}$ by $U_{VR}$, $\bar{U}_{CR}$ by $\bar{U}_{VR}$, and subscript $RC$ by $RV$. For each value of $\Pi \geq \Pi^{\text{min}}$, there exists a unique threshold $\bar{U}_{VR} = \bar{U}_{CR}$, defined in (11), such that if $U_{VR} < \bar{U}_{VR}$, the rival investor recruits the star with a contract offer $(\alpha_{RV}^{*}, \beta_{RV}^{*})(U_{VR})$; and if $U_{VR} \geq \bar{U}_{VR}$, the rival investor does not recruit the star, and offers any contract $(\alpha_{RV}^{*}, \beta_{RV}^{*})$ such that $U_{RV}(\alpha_{RV}^{*}, \beta_{RV}^{*}) \leq U_{VR}$.

4.3. Nash Equilibria of the Subgame

As noted above, the corporate venturing firm’s program and the rival investor’s program generate the same equilibrium effort functions $(e_{VR}^{*}(-) = e_{RV}^{*}(-))$, and very similar managerial compensation functions ($W_{VR}^{*}(-) \approx W_{RV}^{*}(-)$). Comparing (11) and (15), because $\delta \geq 0$, the surplus generated by the star for the corporate venturing firm is always higher than for the rival investor.

If the rival investor recruits the star, the effects of spillovers on the corporate venturing firm’s main line of business will not be internalized, and hence the spillovers will be smaller—by an amount $\delta$—than if the firm recruits the star and internalizes the impact of spillovers. This benefit $\delta$ from recruiting does not accrue to the rival investor, who has only one project and is not affected by spillovers. As a result, the corporate venturing firm’s threshold RP is higher than the rival investors, and the corporate venturing firm successfully recruits the star. The highest bid the rival investor can offer the star is $\bar{U}_{VR}$, but because $\bar{U}_{RV} \geq \bar{U}_{VR}$, the corporate venturing firm matches that bid and hires the star. Formally, the equilibria can be characterized as follows.

**Proposition 3.** In equilibrium, the corporate venturing firm recruits the star by offering contract $(\alpha_{VR}^{*}, \beta_{VR}^{*})(U_{VR}) = (\alpha_{VR}^{*}, \beta_{VR}^{*})(U_{VR})$. This generates a payoff $U_{VR}(\bar{U}_{VR}) = \bar{U}_{VR}$ to the star, a compensation cost $W_{VR}^{*}(\bar{U}_{VR}) = W_{VR}(\bar{U}_{VR})$ to the firm, and an equilibrium effort $e_{VR}^{*}(\bar{U}_{VR}) = e_{VR}(\bar{U}_{VR})$. The rival investor offers one of many possible contracts $(\alpha_{RV}^{*}, \beta_{RV}^{*})$ such that $U_{RV}(\alpha_{RV}^{*}, \beta_{RV}^{*}) = \bar{U}_{VR}$. The net expected payoffs to the corporate venturing firm and to the rival investor are $P_{VR}(\bar{U}_{VR}) = \Pi + e_{VR}(\bar{U}_{VR}) - W_{VR}(\bar{U}_{VR}) + M^{+} + S$ and $P_{RV} = 0$, respectively.16

In this subgame, returns to venturing II have no impact on recruitment. The corporate venturing firm recruits the star for all $\Pi \geq \Pi^{\text{min}}$ because an increase in $\Pi$ affects the threshold RP levels for both the corporate venturing firm and the rival investor, $\bar{U}_{RV}$ and $\bar{U}_{VR}$, similarly, such that $\bar{U}_{RV}$ remains higher than $\bar{U}_{VR}$ for all $\Pi$.

Returns to venturing do affect the expected net payoff from corporate venturing in several ways, however. Note that the corporate venturing firm’s compensation cost can be expressed as the sum of the star’s net payoff and her cost of effort, $W_{VR}^{*}(\bar{U}_{VR}) = \bar{U}_{VR} + k(e_{VR}(\bar{U}_{VR}))$; and recall from the previous subgame that $U_{VR}(U_{VR}^{II}) = U_{CR}(U_{II})$ is a strictly increasing function of $\Pi$ for all $\Pi \geq \Pi^{\text{min}}$. We can write the corporate venturing firm’s payoff as

$$P_{VR}(\Pi) = \Pi - \bar{U}_{VR}(\Pi) + e_{VR}(\bar{U}_{VR}(\Pi)) \pi - k(e_{VR}(\bar{U}_{VR}(\Pi)))$$

$$+ [M^{+} + S],$$

where $\Pi$ is the base return to venturing, $\bar{U}_{VR}(\Pi)$ is the net payoff captured by the star, the first square-bracketed term represents the marginal expected return from a home run, and the second one represents the return from the main line of business.

Intuitively, an increase in $\Pi$ has:

- A positive “gravy train” effect that takes place through $\Pi$, and that increases the payoff to firms involved in new ventures, including the corporate venturing firm.

- A negative “compensation cost” effect that takes place through $\bar{U}_{VR}(\Pi) = \bar{U}_{VR}(\Pi)$, and that is identical to the one faced by the corporation. An increase in $\Pi$ increases the rival investor’s ability to “bid” for star managers; and this prompts the corporation to increase its own bid for the star, thereby reducing its net expected payoff.

- A positive “incentives” effect that takes place through $[e_{VR}(\bar{U}_{VR}(\Pi)) - k(e_{VR}(\bar{U}_{VR}(\Pi)))]$ because an increase “incentives” effect exactly offsets the gravy train.

**Proposition 4.** An increase in returns to venturing $\Pi$ has three effects on the expected net payoff from engaging in corporate venturing: A positive gravy train effect, the same negative compensation cost effect as in the corporation, and a positive incentives effect. In equilibrium, the compensation cost effect exactly offsets the gravy train.

Clearly, $\bar{U}_{VR}(\Pi) = \bar{U}_{VR}(\Pi)$ because these two thresholds make the same rival investor indifferent between recruiting or not. As discussed in the previous subgame, $d\bar{U}_{VR}(\Pi)/d\Pi > 0$ for all $\Pi \geq \Pi^{\text{min}}$.}

15 Spillovers to the rival investor’s other projects or lines of business are examined in §7.2.

16 As in the previous subgame, there exist many NE, all with contractual offer $(\alpha_{RV}^{*}, \beta_{RV}^{*})$ by the corporate venturing firm, but each with a different combination of $(\alpha_{RV}^{*}, \beta_{RV}^{*})$. All of these NE yield the same outcome, and the same payoff to the different players.

17 Clearly, $\bar{U}_{VR}(\Pi) = \bar{U}_{VR}(\Pi)$ because these two thresholds make the same rival investor indifferent between recruiting or not. As discussed in the previous subgame, $d\bar{U}_{VR}(\Pi)/d\Pi > 0$ for all $\Pi \geq \Pi^{\text{min}}$. 
and incentives effects, and payoff $P^*_{VR}$ is a constant function of $\Pi$:

$$P^*_{VR} = M^- + S + \varepsilon, \text{ with } \varepsilon \rightarrow 0. \quad (17)$$

This result that the compensation effect offsets the two other positive effects comes from competition in compensation packages between the rival investor and the corporate venturing firm. Because of the technological symmetry between the corporate venturing firm and the rival investor, neither the corporate venturing firm nor the rival investor can make any profit on the new venture. This discourages the rival investor from recruiting the star, while the corporate venturing firm still keeps the rents on the main line of business, $M^- + S + \varepsilon$.

5. Organizational Choice

The last step in the characterization of the subgame-perfect equilibrium is the determination of the firm’s organizational choice at date 0. The firm will organize for corporate venturing rather than as a corporation if and only if the relative attractiveness of the former organizational form vis-à-vis the latter, $\Delta P^* = P^*_{VR} - P^*_{CR}$, is positive. In the following subsections, we characterize the firm’s optimal organizational form, and how it is affected by returns to venturing, competition for talent, and spillover effects.

5.1. Impact of Returns to Venturing

5.1.1. Region $A_1$: $\Pi \in [\Pi^{min}, \Pi]$. The Firm Can Hire the Star Regardless of Its Organizational Form.

Using (12) and (16), we can express the relative attractiveness of corporate venturing $\Delta P^* = P^*_{VR} - P^*_{CR}$ in region $A_1$ as

$$\Delta P^* = \Pi + \left[ e^*_{VR}(\bar{U}_{VR}(\Pi))\pi - k(e^*_{VR}(\bar{U}_{VR}(\Pi))) \right] - [M - (M^- + S)] \text{ for } \Pi \epsilon A_1. \quad (18)$$

In this region, the relative attractiveness of corporate venturing is the net (of effort cost) expected surplus from the new venture—i.e., the base return to venturing plus the expected marginal benefit from hitting a home run—minus the foregone rents on the main business $[M - (M^- + S)]$.

Intuitively, the impact of returns to venturing on $\Delta P^*$ includes the positive gravy train effect and the positive incentives effect on $P^*_{VR}$. Because $P^*_{CR}$ is not subject to these two effects, they increase the relative attractiveness of corporate venturing. In contrast, the compensation costs $\bar{U}_{VR}(\Pi)$ and $\bar{U}_{CR}(\Pi)$—and hence compensation cost effects of a change in $\Pi$—affect both payoffs in the same way and hence have no impact on $\Delta P^*$.

Note that there may also be an incentives effect with the corporation if we assumed a strictly positive marginal product of effort in the main line of business. The results of the model still hold as long as the marginal product of effort is higher in the new venture than in the main line of business. The intuition is that as the payoff that must be given to the star increases (due to an increase in $\Pi$), the firm’s optimal response is to increase the power of incentives. The resulting higher effort increases the attractiveness of the organizational forms that allocate the star to a higher marginal product of effort activities, i.e., here, corporate venturing.

Lemma 3. In region $A_1$, returns to venturing increase the relative attractiveness of corporate venturing through the gravy train and the incentives effects.

5.1.2. Region $A_2$: $\Pi \in (\Pi, \infty)$. The Firm Only Hires the Star if Organized for Corporate Venturing.

In region $A_2$, the relative attractiveness of corporate venturing can be written as

$$\Delta P^* = \Pi + \left[ e^*_{VR}(\bar{U}_{VR}(\Pi))\pi - k(e^*_{VR}(\bar{U}_{VR}(\Pi))) \right] - \bar{U}_{VR}(\Pi) + \delta \text{ for } \Pi \epsilon A_2. \quad (19)$$

The relative attractiveness of corporate venturing $\Delta P^*$ in region $A_2$ differs from $\Delta P^*$ in region $A_1$ in two important ways. First, in region $A_2$, the payoff to the star under corporate venturing is no longer offset by an identical payoff if she is hired by the corporation because in the latter case there is no recruitment. Hence, $-\bar{U}_{VR}(\Pi)$ appears in $\Delta P^*$ in region $A_2$ and it has a negative impact on the relative attractiveness of corporate venturing. Second, the fact that the corporation does not recruit in region $A_2$ affects the rents on the main line of business through spillovers from the new venture. With corporate venturing, the new venture is developed under the umbrella of the firm, which yields spillovers $S$ on its main line of business. With the corporation, it is the rival investor who recruits the star and develops the new venture, leading to smaller spillovers $S - \delta$. The rents on the main line of business are therefore larger under corporate venturing than with the corporation, by an amount $\delta$, the spillover differential; and this has a positive impact on $\Delta P^*$ in region $A_2$.

We know from §4.3 that the rents extracted by the star under corporate venturing exactly offset the expected benefit from the new venture. This has two consequences in region $A_2$. First, the expression for the relative attractiveness of corporate venturing simplifies to $\Delta P^* = \delta > 0$: corporate venturing is the optimal organizational form in that region because it allows the firm to successfully recruit the star and internalize the spillover differential. Second, returns
to venturing have no impact on $\Delta P^\ast$. This is because the compensation cost effect associated with corporate venturing (which cancels out in region $A_1$ but not in region $A_2$) exactly offsets the direct effect and the managerial effect (which are present in both regions $A_1$ and $A_2$).

**Lemma 4.** In region $A_2$, $\Delta P^\ast = \delta \geq 0$. An increase in returns to venturing has no impact on the relative attractiveness of corporate venturing, and corporate venturing is the optimal organizational form.

Lemmas 3 and 4 imply that the relative attractiveness of corporate venturing (weakly) increases with returns to venturing over $(0, \infty)$. Together with regularity conditions (1) and (2), which ensure $\Delta P^\ast(0) < 0$, they yield the following proposition.

**Proposition 5.** There exists a threshold level $\tilde{\Pi} \in (\Pi^\ast, \Pi]$ such that organizing as a corporation is optimal for all $\Pi \in [\Pi^\ast, \tilde{\Pi})$, and organizing for corporate venturing is optimal for all $\Pi \in [\tilde{\Pi}, \infty)$. When returns to venturing are moderate ($\Pi \in (\tilde{\Pi}, \Pi]$), the firm chooses corporate venturing to take advantage of the gravy train and incentives benefits. When returns to venturing are high ($\Pi \in (\tilde{\Pi}, \infty)$), the firm chooses corporate venturing for recruitment/retention purposes, in an attempt to internalize the impact of spillovers on its main business.

### 5.2. Impact of Competition for Talent

Competition for talent and its interaction with returns to venturing are central features of our analysis. As a benchmark, suppose that the firm does not face competition for the star manager (e.g., there is no rival investor interested in her), and can recruit her as long as it pays her at least some reservation payoff $U_0 \geq 0$. The expected net payoff to the firm (which successfully recruits the star for all $\Pi \geq \Pi^\ast$) depends on whether it is organized as a corporation or for corporate venturing, and is written as $P^\ast_{\Pi_0} = M - U_0 = M$ or $P^\ast_{V_0} = \Pi + \pi^2/4\mu + M - S$, respectively.$^{18}$ The subscript zero refers to the “no competition” scenario examined here. Clearly, the relative attractiveness of corporate venturing in the absence of competition, $\Delta P^\ast_0 = \Pi + \pi^2/4\mu - [M - (M - S)]$, is increasing in $\Pi$, and one can easily verify that there exists a threshold level $\Pi_0 > \Pi^\ast$ such that organizing as a corporation is optimal for all $\Pi \in [\Pi^\ast, \Pi_0)$ and organizing for corporate venturing is optimal for all $\Pi \in (\Pi_0, \infty)$. The impact of competition for talent on corporate venturing can then be captured as follows.

**Proposition 6.** Competition for talent has a positive impact on the prevalence of corporate venturing. The threshold level of return to venturing at which the firm switches to corporate venturing is lower in presence of competition for talent than in its absence: $\tilde{\Pi} < \Pi_0$. Hence, for all $\Pi \in [\Pi, \tilde{\Pi})$, competition for talent prompts the firm to engage in corporate venturing, when it would otherwise organize as a corporation.

The intuition for this result is simple. Absent competition from the rival investor, both the incentives benefit and the recruitment/retention benefit associated with corporate venturing disappear, and the firm only switches to corporate venturing at $\Pi_0$, where the gravy train benefit $\Pi$ (together with the expected marginal benefit from hitting a home run, $\pi^2/4\mu$) exactly offsets the opportunity cost of not employing the star in the main business, $[M - (M - S)]$.

Competition from the rival investor prompts the firm to react in several ways. In region $A_1$, it increases the star’s compensation whether the firm is organized as a corporation or for corporate venturing, with zero net effect on $\Delta P^\ast$; but under corporate venturing it has the additional effect of increasing the power of incentives. This leads to higher effort, yielding an incentives benefit like the one discussed above. In region $A_2$, competition for talent creates a recruiting problem for the corporation, and corporate venturing is the solution to that problem: It enables the firm to successfully recruit a star who would otherwise accept the rival investor’s offer, and to internalize the differential impact of new venture spillovers on its main business.

Thus, whether $\Pi_0$ is located in region $A_1$ or $A_2$, the marginal firm, which is indifferent between the two organizational forms absent competition at $\Pi_0$, would strictly prefer corporate venturing in a competitive market for talent, in an attempt to capture either incentives benefits or recruitment/retention benefits. The implication, then, is that $\tilde{\Pi} < \Pi_0$. Competition for talent strictly increases the prevalence of corporate venturing over $(\Pi, \tilde{\Pi})$.

### 5.3. Impact of Spillovers

Spillovers also have an impact on the firm’s optimal organizational form. Indeed, at the switching threshold level of returns to venturing $\Pi \in A_1$, the surplus created with corporate venturing increases with $S$, while the payoff when organizing as a corporation is not affected.

**Proposition 7.** Spillovers $S$ increase the relative attractiveness of corporate venturing, and hence decrease the threshold level of returns to venturing $\Pi$ beyond which corporate venturing is the optimal organizational form.

This result is related to Hellmann (2002), who finds that when products of the new venture and the main

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$^{18}$ These expressions are obtained by substituting $W_{C_0}(\tilde{\Pi}) = U_0 = 0$ into (12), and $U_{V_0} = U_0 = 0$ into $P^\ast_{V_0}(U_{V_0})$, on the left-hand side of (15), respectively.
line of business are complements (which is captured by $S > 0$ in our model), the new venture is developed with corporate venturing; while when the two products are substitutes ($S < 0$), the new venture is developed by a venture capitalist, or via syndication. Thus, both in his model and in ours, complementarity between new venture products and main business products favors corporate venturing.

Interestingly, however, in contrast to his model, here corporate venturing may still be optimal even if $S$ is negative. Important for this result is the fact that even when the new venture has a very negative impact on the main business, corporate venturing may still be optimal if it prevents the rival investor from recruiting the star and starting the venture, in which case the impact on the main business would be even worse, by an amount $\delta$. (Another difference with his model is that here spillovers are not restricted to product-market complementarity or substitutability, and may take a more general form. See the discussion in §8.)

6. Control Rights Allocation and the Different Types of Corporate Venturing

Corporate venturing is a general expression that is typically used to describe all types of investments made by corporations into new ventures that are distinct from their core business. In practice, however, corporate venturing investments can take many forms. At one end of the spectrum is the "internal venture": The parent company invests in a new venture that is legally part of the organization, even if somewhat independent from the main line of business. At the other end of the spectrum is "corporate venture capital": The parent company invests in an external start-up company through a "captive" fund (Hellmann 2002), of which the corporate parent acts as a general partner. The key difference between the various types of corporate venturing is the allocation of control rights over the idea/venture: In internal ventures, the allocation of control, and hence bargaining power, is clearly tilted in favor of the parent company, but the relative allocation of control becomes more favorable to the star in organizational structures closer to corporate venture capital.

In our model where payoffs are contractible, all agency problems are addressed using payoff-contingent contracts, and there is no scope for discussion of property/control rights allocation. Regardless of who owns the intellectual property—be it the firm or the star—the two parties are bound by the verifiable contract signed at date 1, and there is no scope for renegotiation, ex post bargaining, and the like. Contracts are complete. As we have shown throughout the paper, this complete contracting approach yields interesting and tractable results. In this extension, we depart from this framework and introduce contractual incompleteness by assuming that part of the realized payoff from the new venture is not contractible at date 1. Introducing contractual incompleteness is interesting for two reasons. The first one is realism: New ventures are typically very uncertain, with the nature of the innovation difficult to describe, and contracts are likely to be incomplete. The second reason is that it generates scope for discussion of the optimal allocation of property/control rights and of the different types of corporate venturing.

To make this framework comparable to our base complete contracting model, we assume that the home run marginal payoff $\pi$ is not contractible, while the base payoff $\Pi$ is. The initial contract at date 1 therefore specifies only a payoff $\gamma \leq \Pi$ to be paid to star at date 4, and the remaining payoff $\Pi - \gamma$ to the firm. The contract may also specify the relative allocation of control/property rights over the idea, $\lambda$. The variable $\lambda$ may, for example, represent the fraction of the realized payoff that the star can obtain (or the probability that she would successfully replicate the venture elsewhere) if bargaining breaks down, while the firm gets $(1 - \lambda)$. The marginal payoff $\pi$ is bargained over at date 4 if it is realized. Assuming Nash-like bargaining, the fraction $h$ of $\pi$ extracted by the star will depend on both negotiating parties' relative threat points at that time, which in turn depend on $\lambda$. In the example just given, Nash bargaining implies $h(\lambda) = \lambda$.

Then, the problem with incomplete contracting becomes exactly the same as the one in the base case, replacing $\alpha$ by $\gamma$ and $\beta$ by $\lambda$.

**Lemma 5.** All the key results of the model still hold in an incomplete contracts framework. The main difference comes from the interpretation of the source of incentives for the star. In the complete contracting scenario, it was the result of explicit profit sharing contracted at date 1. In this incomplete contracting scenario, it comes from control rights assigned at date 1, and the associated bargaining power at date 4.

In the complete contracting base model, $\beta$ (weakly) increases with returns to venturing under corporate venturing. An interesting implication in the context of incomplete contracting and the various types of corporate venturing is the following.

**Proposition 8.** In the presence of competition for talent, when corporate venturing is optimal, the firm allocates control rights differently depending on returns to venturing: as returns to venturing increase, more control rights are allocated to the star, gradually switching from types of

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19 For a thorough discussion on analogies between complete and incomplete contracts settings, see Tirole (1999).
Venturing that are closer to internal ventures, to ones that resemble more corporate venture capital.

The foregoing results shed light on how the interaction between returns to venturing and competition for talent affects the endogenous allocation of control rights between the corporate venturing firm and the star, and the different types of corporate venturing. In contrast, other authors, including Anand et al. (2004), and Hellmann (2007), have examined the way changes in the exogenous allocation of IP rights affect corporate venturing. Interestingly, our model could also be extended to address this issue. Suppose that neither π nor σ are contractible at date 0, and that the star and the firm or the rival investor bargain over the realized payoff at date 4. Consider two IP regimes. In the entrepreneur-friendly regime, the star owns the idea and can costlessly replicate the new venture somewhere else if bargaining breaks down. Assuming Nash bargaining, for example, the star extracts all rents in renegotiation at date 4. In the firm/investor-friendly regime, the firm or the rival investor (depending on whom the star chose) owns the idea, and extracts all rents at date 4.

In the firm/investor-friendly regime, the intuition is very similar to that of our main model, but with zero effort from the star because she anticipates that all rents will be extracted by her employer. In that case, the gravy train and recruitment/retention effects are still present and there still exists a threshold level of returns to venturing such that corporate venturing is optimal beyond that threshold.

In the entrepreneur-friendly regime, if the venture were financed, the star would have first-best incentives because she anticipates extracting all rents. However, for the same reason the rival investor expects a zero return and does not compete for the star. The firm obtains a payoff $M^* + S$ if organized for corporate venturing, and $M$ if organized as a corporation. By regularity condition 1, $M > M^* + S$, hence the firm organizes as a corporation in equilibrium, and the venture is not financed. The key implication, then, is that while entrepreneur-friendly regimes yield higher entrepreneurial effort and higher success probability in ventures that are financed, they generate less corporate venturing and new venture creation than firm/investor-friendly regimes. This result is consistent with Anand et al. (2004), and contrasts with Hellmann (2007), where corporate venturing (intrapreneurship) is more prevalent entrepreneur-friendly IP regimes.

7. Other Applications and Extensions

7.1. Competition, Efficiency, and Economic Activity

Corporate venturing is socially optimal if and only if the total surplus generated in the first-best (net of effort cost), $\Pi + \pi^2/2\mu + M^- + S$, is higher than both (i) the total surplus that could be created by allocating the star manager to the competitor, i.e., $\Pi + \pi^2/2\mu$ from the venture plus $M^- + S - \delta$ from the main line of business; and (ii) the total surplus that could be generated when organizing the firm as a corporation, $M$:

$$\Pi + \frac{\pi^2}{2\mu} + M^- + S \geq \Pi + \frac{\pi^2}{2\mu} + M^- + S - \delta$$

and

$$\Pi + \frac{\pi^2}{2\mu} + M^- + S \geq M.$$  

Condition (20) reduces very simply to $-\delta \leq 0$, which always holds in our model; and inequality (21) holds if and only if $\Pi \geq \Pi'$ with $\Pi' = [M - (M^- + S)] - \pi^2/2\mu$. Thus, corporate venturing is socially optimal for all $\Pi \geq \Pi'$. The following result then obtains.

**Proposition 9.** In equilibrium there is less corporate venturing than is socially optimal: $\Pi > \Pi'$. Competition for talent simultaneously increases the prevalence of corporate venturing and improves economic efficiency.

This inefficiency is due to agency costs in corporate venturing. When effort is not directly contractible, the firm can only imperfectly provide incentives to the star, and this usually leads to a second-best effort level from the star. This agency cost reduces the firm’s payoff if it engages in corporate venturing, and induces firms to switch to corporate venturing too late relative to the social optimum: for all $\Pi \in [\Pi', \Pi)$, the firm chooses to remain organized as a corporation even though from a social point of view it should organize for corporate venturing.

This inefficiency is even larger absent competition for talent because as shown in Proposition 6, in that case the firm switches to corporate venturing even later, at $\tilde{\Pi}_0 > \Pi$. As discussed in §5.2, competition for talent increases equilibrium compensation for the star, and under corporate venturing leads to higher-powered incentives and higher effort exertion. This simultaneously improves the relative attractiveness of corporate venturing and its prevalence in the $[\tilde{\Pi}_0, \Pi)$ region, and economic efficiency.

7.2. Spillovers for the Rival Investor

So far we have assumed that spillovers affect only the firm’s main line of business, and that the rival investor receives no spillovers on other ventures in its portfolio. This assumption was made both for simplicity, and to yield starker results. In this subsection, we generalize the model to allow the rival investor’s

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20 The same results obtain if, as before, $\Pi$ is contractible.

21 Alternatively, we could interpret the entrepreneur-friendly regime as one in which the entrepreneur benefits from strong IP protection, and the firm/VC-friendly regime as one in which IP protection for the entrepreneur is weak. This interpretation is more closely related to Anton and Yao (1995) and Anand et al. (2004).
other projects to benefit from spillovers from the new venture. The following results can readily be shown.

Proposition 10. In the more general model where the rival investor also enjoys a spillover $S_R$ if it recruits the star, and $S_R - \delta_S$ if she does not, all results remain unchanged as long as $\delta_R \leq \delta$, i.e., as long as the spillover differential is higher for the firm than for the rival investor. If $\delta_R > \delta$, then for all $\Pi \in A_1$, the firm chooses to organize as a corporation rather than for corporate venturing; and for all $\Pi \in A_2$, the firm is indifferent between the two organizational forms.

As long as $\delta_R \leq \delta$, if organized for corporate venturing, the firm has a higher incentive to recruit the star than the rival investor; and therefore, as before, it recruits the star under this organizational form. On the other hand, if $\delta_R > \delta$, the rival investor benefits more from recruiting the star, and it recruits the star whenever the firm is organized for corporate venturing. Hence, organizing as a corporation is optimal when it yields a higher payoff than not recruiting, i.e., in region $A_1$. In region $A_2$, the firm cannot recruit the star regardless of its organizational form, and is therefore indifferent between the two.

8. Empirical Implications

Our model yields a number of empirical predictions that can improve our understanding of corporate venturing in general, and of its structure in particular. Beyond corporate venturing, it also points to a potential link between labor market competition and firm productivity. In what follows, we discuss these predictions and their relation to the empirical literature.

8.1. Determinants of Corporate Venturing Investments

A key contribution of our model is to shed light on the reasons why firms engage in corporate venturing activities, and we identify three key explanations.

The gravy train rationale simply states that firms engage in corporate venturing in an attempt to capture some the high returns they observe in new ventures, and therefore suggests that higher returns to entrepreneurship should increase corporate venturing investments.

The incentives rationale captures the idea that as the star’s reservation payoff (the compensation she expects to obtain in the labor market) increases, firms respond by offering higher-powered incentives, which induce stars to exert more effort, and increases the relative attractiveness of venturing activities where the star’s marginal product of effort is higher. This increase in the star’s market compensation may come from higher returns to venturing, which prompt employers to bid higher to recruit star managers. Alternatively, it may come from a rise in the degree of competition for talent for a given level of venturing returns. For example, the shortage of talent may vary across industries/sectors and across time, generating variation in the intensity of competition to recruit stars. Thus, the incentives rationale suggests that both higher venturing returns and stronger competition for talent should increase corporate venturing investments.

Finally, the recruitment/retention suggests that firms may engage in corporate venturing in an attempt to successfully recruit stars who would otherwise take employment elsewhere. This explanation is echoed by the Corporate Venturing Journal (2000), which stated, “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 [...]”

Firms’ concern about failing to recruit or retain star managers is stronger when these stars have access to higher levels of market compensation, which again could result from high levels of venturing returns or from strong competition for talent. Corporate venturing investments should therefore increase in both of these situations.

22 This is consistent with Lindsey (2002), who finds evidence of a keiretsu effect in venture capital, suggesting that venture capitalists do benefit from spillovers by facilitating collaborations between their portfolio ventures.

23 Another possible extension is to take into account the potentially state-contingent nature of spillovers. For example, product market competition or complementarities may vary with the success of the venture. Alternatively, a successful venture may provide a technological breakthrough that will help the main business, while a failed venture may be a relatively cheap way of testing an uncertain technology. Or the relationship between the star and the firm may provide the former with a rehiring rent in case of failure. The most interesting aspect of state-contingent spillovers is that they may enhance incentives if they are procyclical, or instead lead to the traditional trade-off between incentives or insurance if they are counter-cyclical. They would likely affect the balance between the firm and the rival investor through their relative magnitude and through this incentives effect only.

24 This is consistent with findings by Core and Guay (2001) and Oyer and Schaefer (2005), who document the positive relation between firms’ use of stock-options plans (i.e., high-powered incentives) and the degree of competition in the labor market.

25 Losing employees was a real problem for firms at the peak of the entrepreneurial boom in the late 1990s, as noted in Computer World (2000, p. 56): “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.”
Thus, our three rationales point to two primary factors that will likely affect corporate venturing investments:

**Prediction 1.** Higher returns to venturing should increase corporate venturing investments.

**Prediction 2.** Stronger competition for talent should increase corporate venturing investment.

Prediction 1 is consistent with the procyclicity of corporate venturing with entrepreneurial activity to which we referred to in the introduction to motivate the model. It is also consistent with the literature, which identifies financial returns as primary determinants of corporate venturing (Siegel et al. 1988, Winters and Murfin 1988, Chesbrough 2002). This prediction is also broadly consistent with Dushnitsky and Lenox (2005a), who find that greater technological opportunities, which are presumably associated with higher expected returns to venturing, have a positive impact on corporate venturing. They report that a large fraction (79%) of corporate venture capital funds is invested in sectors in the top quartile in terms of technological opportunities.

Prediction 2 is more novel, and may stimulate future empirical research. To that end, one could proxy competition for talent, which in our model arises from the presence of a rival investor competing with the firm for the recruitment of a star manager, with measures of labor mobility, for example. Indeed, Fallick et al. (2006) find higher job mobility in Silicon Valley’s computer industry than in computer clusters elsewhere, and a natural application of our model would be to relate variation in job mobility to variation in corporate venturing investments. Another possible proxy for labor market competition would be the geographic proximity of firms to centers of venture capital activity: firms closely located to Silicon Valley, for example, would likely face stronger competition for talent from local venture capitalists and startups. Finally, temporal and industry variations in the university wage premium (i.e., the difference in wages between university graduates and high-school graduates) may also adequately capture variations in the degree of competition for talent. Using these measures of competition for talent to examine its impact on corporate venturing investment would, it seems, be fruitful.

Our analysis also suggests that corporate venturing investments may be affected by two other factors. One such factor is spillovers, broadly defined as any (positive or negative) impact of the new venture on the main business.

Spillovers are sometimes grouped under the more generic name of “strategic factors” in the corporate venturing literature. Block and MacMillan (1993) and Chesbrough (2002) report that these strategic factors play an important role in the decision to pursue corporate venturing activities. In the United States, for example, 76% of corporate venturing firms pursue these activities for strategic purposes (Block and MacMillan 1993). Spillovers could be interpreted in several ways. For example, they could be technology spillovers, allowing the firm to gain access to a new technology for the main business; knowledge spillovers, enabling the firm to improve its expertise; or product-market spillovers such as complementarity/substitutability between the new venture product and the main business product. All three types of spillovers have been identified in the empirical literature as having an impact on corporate venturing. Siegel et al. (1988, p. 236) identify “exposure to new technologies and markets” as a key objective for corporate venturing firms, while Winters and Murfin (1988, p. 212) underline how corporate venturing may enable firms to gain a “window on new technology/business.” Dushnitsky and Lenox (2005a, p. 959) document the impact of knowledge spillovers, reporting that “the more closely aligned the domains of expertise of the firm and a particular sector, the greater the likelihood that the firm will invest in [corporate venturing] in that sector.” Finally, Dushnitsky and Shaver (2006) find that the greater the complementarity between the products of the corporate parent and those of the entrepreneur, the greater the likelihood of a corporate venturing relationship to form.

Our model also predicts that the strength of IP protection for the inventor should have an impact on corporate venturing. Corporate venturing should be more prevalent when IP protection is weaker because in such cases investors (in the form of firms or venture capitalists) anticipate reaping rewards from the...
new venture, and are more willing to finance ventures in the first place.

**Prediction 4.** Weaker IP protection for the inventor should increase corporate venturing investments.

This prediction is consistent with recent empirical work on corporate venturing and its connection to IP protection. Dushnitsky and Lenox (2005a), for example, derive a measure of the effectiveness of patents in protecting inventors’ profits, and find that the weaker IP protection for the inventor (i.e., the lower the effectiveness of these patents), the higher the prevalence of corporate venturing. They also show that weaker IP protection may improve the innovation rate in firms engaged in corporate venturing (Dushnitsky and Lenox 2005b).

### 8.2. Structure of Corporate Venturing

The literature on corporate venturing suggests that it may be structured in many ways, differing mainly in the degree of autonomy of the new venture from the corporate parent (Rind 1981, Roberts and Berry 1985, Bleicher and Paul 1987, Gompers 2002). Our model captures this idea explicitly: The structure of corporate venturing is defined in terms of relative control rights allocation, and hence in terms of the star’s autonomy from the corporate parent. Prior work also suggests that a key advantage of autonomy in the structure of corporate venturing is improved innovative activity (Fast 1981, Sykes 1986, Russell 1995, Thornhill and Amit 2000). This is consistent with our model where more autonomy in the form of control rights increases the star’s ex post bargaining power, and hence her ex ante incentives to exert effort.

Dushnitsky and Shaver (2006) argue that the degree of autonomy of the new venture might facilitate the formation of corporate venturing activities by alleviating the star/entrepreneur’s concerns about imitation/expropriation by the corporate parent, and find empirical support for this hypothesis. But what exogenous factors might affect the optimal choice of corporate venturing structure? Our model suggests that returns to venturing may play a role in that regard. It predicts that as returns to venturing increase, more autonomy (i.e., control rights) should be allocated to the star, and the organization of corporate venturing should gradually switch from a structure closer to internal ventures, to one that resembles more corporate venture capital.

**Prediction 5.** Higher returns to venturing should affect the organization of corporate venturing activities, leading to structures where the new venture gradually becomes more independent from the corporate parent.

### 8.3. Beyond Corporate Venturing: Competition for Talent and Productivity

Finally, the model allows us to make a more general prediction about the connection between labor market competition and firm productivity.

**Prediction 6.** Competition for talent should increase firm productivity.

Competition for talent, through its positive impact on equilibrium compensation and the power of incentives, may lead to increased managerial effort toward the first-best, thus generating productivity gains. Investigating this link empirically would be the logical next step, and in our opinion is a promising avenue for future research.  

### 9. Conclusion

A natural explanation for corporate venturing and its procyclicality with returns to entrepreneurship is that firms engage in corporate venturing in an attempt to capture a share of these returns when they are high. This “gravy train” effect may explain the positive impact of venturing returns on corporate venturing. This seems unlikely to be the only explanation, however. The lower returns associated with corporate venturing investments, relative to venture capital investments returns (Fast 1981, Zahra 1996, Gompers and Lerner 1998, Gompers 2002), suggest that investments through traditional venture capital funds would likely be a better way to scoop the “gravy.”

In this paper, we propose two novel explanations for corporate venturing and its procyclical fluctuations with entrepreneurial activity. We argue that firms may engage in corporate venturing activities also to benefit from the superior managerial incentives in new ventures, and to recruit or retain key talent. A important insight to emerge from our analysis is that competition for talent is a key factor in determining corporate venturing investments. This and the other testable predictions of the model suggest several fruitful avenues for future empirical research.

### 10. Electronic Companion

An electronic companion to this paper is available as part of the online version that can be found at http://mansci.journal.informs.org/.

### Acknowledgments

The authors thank an anonymous referee, the associate editor, and the department editor, David Hsieh, for very

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27 Finding evidence confirming this prediction would also corroborate Prediction 2 because in our model the increase in productivity is associated with increased corporate venturing.
insightful suggestions and advice. They also thank Jim Brander, Avi Goldfarb, Thomas Hellmann, Augustin Landier, John Ries, Tom Ross, Bryan Routledge, Scott Shane, Ralph Winter, and seminar participants at the Association Francaise de Finance (AFFI), the CEPR European Summer Symposium in Financial Markets, Imperial College London, Queen’s University, the University of Alberta, the University of Paris-Dauphine, and the University of Warwick for helpful comments. Able research assistance was provided by Chris Bidner. The first author gratefully acknowledges the financial support of the Social Sciences and Humanities Research Council of Canada and the Robert and Carol Friesen Research Fellowship. All errors are the authors’ responsibility.

Appendix. Characterization of R’s Optimal Contract

The IC and IR constraints, respectively, reduce to

\[ \beta = \frac{\mu e}{\pi} > 0, \]  
\[ \alpha + \frac{\mu^2}{2} > U_{CR}. \]

(22)

(23)

Replacing \( \beta \) in the objective function (5), we can rewrite R’s program as follows:

\[ \max e \pi - \alpha - \mu e^2, \]

subject to (23) and \( \alpha \geq 0 \). Solving (24) for \( e \), we obtain \( e^*(U_{CR}) = \pi/2\mu \), which implies \( \beta^*(U_{CR}) = \mu e/\pi = \frac{1}{2} \). Hence the following:

(1) When \( U_{CR} \in [0, \pi^2/8\mu] \), (23) and (8) hold with \( e = e^*(U_{CR}) = \pi/2\mu \) and \( \alpha = 0 \). Therefore, \( \{e^*_R, \alpha^*_R, \beta^*_R(U_{CR})\} = \{\pi/2\mu, 0, \frac{1}{2}\} \).

(2) When \( U_{CR} \in [\pi^2/8\mu, \pi^2/2\mu] \), (23) no longer holds with \( \{e^*_R, \alpha^*_R, \beta^*_R(U_{CR})\} = \{\pi/2\mu, 0, \frac{1}{2}\} \). This is solved by increasing effort along with \( U_{CR} \), so that \( (\mu/2)e^2 = U_{CR} \) or \( e^2(U_{CR}) = (2/\mu)U_{CR} \) and by setting \( \beta^*_R(U_{CR}) = \mu e/\pi = \sqrt{2\mu U_{CR}/\pi} \) and \( \alpha^*_R(U_{CR}) = e \), with \( e \rightarrow 0 \).

(3) When \( e \in [\pi^2/2\mu, \infty) \), keeping \( e = (2/\mu)(U_{CR} - e) \) would generate an effort level that would be (inefficiently) higher than first-best effort \( e^* \). Instead, the rival investor elicits \( e^*(U_{CR}) = e^* = \pi/\mu \) by setting \( \alpha^*_R(U_{CR}) = U_{CR} + e - \pi^2/2\mu \) and \( \beta^*_R(U_{CR}) = 1 \), so that the IC, IR, and LL constraints all hold.

The star’s and the rival investor’s expected payoffs when \( R \) recruits the star, \( U^*_R(U_{CR}) = W^*_R(U_{CR}) = P^*_R(U_{CR}) \), are described in (10). If the rival investor does not intend to recruit the star, he offers any \( \{e^*_R(U_{CR}), \beta^*_R(U_{CR})\} \) such that \( U_{CR}(\alpha^*_R, \beta^*_R(U_{CR})) = 0, U_{CR}(0, U_{CR}) \). As long as \( U_{CR}^*(\alpha^*_R, \beta^*_R(U_{CR})) < U_{CR} \), the star chooses the corporation’s offer, and the rival investor receives a payoff \( P^*_R = 0 \).

We define \( U_{CR} \) as the threshold RP to the star (from the corporation) such that the rival investor is indifferent between recruiting or not, i.e., such that \( P^*_R(U_{CR}) = P^*_R(U_{CR}) \) which is expressed more precisely in (11). Regularity condition (2) ensures that, for any given \( II \geq \Pi \), \( P^*_R(U_{CR}) = \Pi + \pi^2/4\mu > 0 \) for all \( U_{CR} \in [0, \pi^2/8\mu] \). Because \( P^*_R(U_{CR}) \) is continuous over \( R \) and strictly decreasing in \( U_{CR} \) over \( [\pi^2/8\mu, \infty) \), and because \( P^*_R(\infty) = -\infty \), there must exist a unique \( U_{CR} \) as \( \pi^2/8\mu \) defined as in (11), such that it is optimal for the rival investor to recruit if and only if \( U_{CR} < U_{CR} \).

References


28 If regularity condition (2) does not hold, there are two possibilities. If \( \Pi \neq -\pi^2/4\mu \), then: (i) for all \( II \in [\Pi \Pi, -\pi^2/4\mu] \), there exists no value of \( U_{CR} \) such that \( P^*_R(U_{CR}) = 0 \); and (ii) for \( II = -\pi^2/4\mu \), there exists an infinite number of values of \( U_{CR} < U_{CR} \) such that this is the case. If \( II \Pi > -\pi^2/4\mu + e \), there are no changes to the model.


