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ON THE GOVERNANCE OF START-UPS

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Abstract

This paper examines an entrepreneur-investor relationship in a stylized model where (i) investment needs are unknown ex ante and arise sequentially, (ii) a major decision must be reached at a maturity stage, (iii) this decision depends on entrepreneur's private information, observable by the investor at some cost. The two partners agree on a corporate governance system which includes a split of future cash-flows and an allocation of control on the above decision contingently on investment. It turns out that control is assigned to the entrepreneur for low investment levels and then switches to the investor when investment exceeds a threshold.

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JEL classification: G24, G32, L22.

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1 Introduction

In their survey article, Shleifer and Vishny define corporate governance as "the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment" (Shleifer and Vishny, 1997). In practice, a governance system assigns specific rights and obligations among corporate shareholders and managers. Among these rights, cash-flow rights (a divide of cash flows) and control rights (the rights to make decisions) are certainly the most important ones. A good governance structure should allocate cash flow and control rights in a way to create the highest return from investment.

This paper focusses on the governance structure of start-ups firms. It models the following salient features of the venture capital industry. First, the funded projects are risky and long terms. Second, investment needs arrive over time so that the infusion of capital occurs in stages. Third, the entrepreneur[1] who runs the firm has more information (e.g. about the outcome of R&D) than her financial partner. The investor is able to gather information by exerting costless supervision/management activities. Fourth, at the maturity stage of the project, some strategic decisions (e.g. how to patent and licence, to form technological alliances) have to be made. Control rights are thus defined as the rights to select these decisions.

The framework is the one, for instance, of a biotech start-up. The entrepreneur is then a scientist who has an idea about how to obtain a new plant or medicine. She needs funds to cover the cost of R&D. At this stage, there is still high uncertainty about the return of R&D activities. Then, after several experimentations, the scientist acquires a more accurate idea on the real cost of making this innovation reality. During the R&D process, an investor provide the scientist with funds. The scientist accumulates information about the new plant or medicine (its efficient, effects on human health and on the environment, its patentability) which are crucial for future decisions at development and marketing stages. By being actively involved into management, the investor becomes better informed and, therefore, knows better what to do. However, investing himself into management has an opportunity cost for the investor as he devotes less time to other projects.

In this asymmetric information framework, control is certainly linked with superior information. Since the entrepreneur is the only one to know (at no cost) what decision maximizes the return of the venture, it is efficient to assign her control if she indeed undertakes it. She does select the right decision if she has incentives to do so, that is, if the division of cash-flows

[1]The entrepreneur (investor) will be referred as "she" ("he").

provides her with such incentives. An efficient corporate governance structure assigns control rights to the entrepreneur, and cash-flow rights in a way to provide her with incentives to maximize returns.

Such a governance structure leaves an informational rent to the entrepreneur. It is therefore feasible if, after paying for this rent, the investor still gets an expected return on investment.[2] Otherwise, i.e. when the expected return is too low to include both the entrepreneur's informational rent and the investor's opportunity cost, the two partners assign control to the investor. The investor exerts costly management activities which are dead-weight losses. The final outcome is then second-best. Cash-flow rights can be designed to provide the investor with incentives to undertake the right decisions (i.e. to maximize the project return), because a wrong decision might leads to bankruptcy and, therefore, very low repayments to the investor.

Thus, in the present framework, it turns out that control is correlated with expected returns. When high enough, control is assigned to the entrepreneur and the governance structure implements the first-best outcome. Otherwise, control is assigned to the investor and the governance structure implements a second-best outcome.

In real-world venture capital finance, a project return is very uncertain at the beginning of the contracting relationship but becomes more precise years after years once the firm has started performing R&D. During this R&D stage, the start-up firm makes negative profits so that its activities are founded by the investor. The infusion of capital arises sequentially through successive financing rounds during which investment needs are revealed. Long before having a return on investment, the investor gets a better idea about the real cost of the project and, thus, its return.

In the model, the contracting partners take advantage of this sequential arrival of information by assigning control contingently on investment. Higher financial needs means a more costly project and, therefore, a lower return on investment. As long as investment is low (and therefore the return is high in expectation), the entrepreneur retains control. However, once investment exceeds a threshold, control rights shift to the investor.

These results are consistent with empirical evidences on venture capital finance and technological alliances. According to Gompers and Lerner (1996) and Sahlman (1990), start-ups financed by venture-capital funds use prevalently convertible securities and covenants, which

[2]In other words, if the project expected return exceed the informational rent plus the opportunity cost of investment.

leave to the investor an option to shift control and cash-flow rights after some revelation of information related to firm's financial performance. Kaplan and Strömberg (2000) pointed out that the distinguishing feature of venture-capital financing is to assign control rights (voting rights, board rights, liquidation rights) and cash-flow rights separately and contingently on the firm's financial performance (e.g. shareholder's financial supply, sales or explicit objectives).[3] In their detailed empirical investigation, they found that control and cash-flow rights are allocated such that if *"the firm performs poorly, the venture capitalists obtain full control. As performance improves, the entrepreneur retains/obtains more control rights. If the firm perform very well, the [venture capitalists] retain their cash flow rights, but relinquish most of their control and liquidation rights"*. In addition, they report that *"founder's cash-flow, voting and board rights decline over financing rounds while [venture capitalist] rights increase"*.[4] This suggests that, when not explicit, this shift of control contingent on investment is implicit: The two contracting partners can reasonably expect a transfer of control from the founder to the venture-capitalists when financial supply increases.

Lerner and Merges (1998) provide similarly evidences in technological alliances between biotech and pharmaceutical companies. These alliances are contracts signed to develop, produce and sell new medicines. Drug companies provide to biotech firms with financial resources[5] to cover their development costs and with support at the manufacturing and selling stages. Remarkably, these deals specify explicitly the allocation of control rights in several tasks (e.g. management of clinical trial, manufacture of final product, marketing, right to expand the alliance) which seems to be, according to the authors, "a central issue" during the negotiations. The authors found strong evidences that the allocation of control rights depends mainly on the financial condition of the biotech firm. Biotech firms in bad financial condition tend to retain less control rights; thereby suggesting that biotech firms' control is negatively correlated with drug companies' investment.

The paper proceeds as follow. Section 2 links the paper with the literature. Section 3 introduces the model. In Section 4, I find out the equilibrium governance system. For this purpose, I examine successively the governance system with the entrepreneur in control

[3] "The distinguishing feature characteristic of venture capital financing is that they allow [venture capitalists] to separately allocate cash-flow rights, voting rights, board rights, liquidation rights and other control rights."...."Cash-flow rights, voting rights, control rights and future financing are frequently contingent on observable measures of financial and non-financial performance." Kaplan and Strömberg (2000).

[4] Obviously, more rounds means an increase of financial supply.

[5] According to Lerner and Merges (1998) "[i]n the biotechnological industry, ... alliances with pharmaceutical firms have become in recent years the single largest source of financing for biotech firms".

(Section 4.1), and with the investor in control (Section 4.2). I then derive the best governance system. Section 5 concludes the paper.

2 Related literature

Most of the literature addressing the issue of control in corporate governance relies on the assumption of contractual incompleteness. Following Grossman and Hart (1986), a branch of this literature focusses on (non-contractible) relation-specific investments. Cash-flow and control rights are both associated with ownership which is allocated in such a way to minimize the under-investment of each party. Recent papers (Casamatta, 2003, De Bettignies, 2003, Nöldeke and Schmidt, 1998, Renucci, 2001, Repullo and Suarez, 2004, Schmidt, 2003) show that a transfer of ownership from one partner to another during the contracting relationship mitigates, or even alleviates (Nöldeke and Schmidt, 1998), the under-investment problem.[6]

Also build on Grossman-Hart is Aghion and Tirole (1997)'s theory of real and formal control (applied to venture-capital finance by Cestone, 2002). In their model, the relation-specific investments are investments in information gathering. Information is then useful to select projects at a last decision-making stage. Unlike in Grossman-Hart, their model allows separate allocation of control rights (the right to select decisions) and cash-flow rights. Still, the governance structure is designed to mitigate the under-investment problem in information gathering.

Another branch of the incomplete contract literature is based on the assumption that the entrepreneur enjoys private and non-contractible benefits by misbehaving, i.e. selecting inefficient decisions (Aghion and Bolton, 1992, Dessein 2003, Kirilenko, 2001, Tirole, 2001). For instance, founders might enjoy private benefit when running a firm which makes him reluctant to liquidate (Berglöf, 1994) and/or to be replaced by professional managers (Hellmann, 1998) even if it is optimal to do so. The governance structure must prevent them to select these inefficient decisions. In the present model, there is no such exogeneous private benefit. Moreover, any decision is efficient in at least one situation/state of nature. Yet, the entrepreneur can take advantage of asymmetric information to undertake a decision which maximizes her own payoff (i.e. her share of the cash-flows) but not the project return. Doing so, she enjoys benefit which indeed depends on the distribution of cash-flows. In this sense,

[6]To be precise, some of these papers (e.g. Casamatta, 2003, Repullo and Suarez, 2004) model non-contractible specific investments as non-observable efforts, thereby relying on a double moral-hazard problem but not imposing contractual incompleteness. The driving of the two approach are simmilar.

the present model endogenizes the entrepreneur's private benefit from misbehaving. The governance structure is designed to alleviate such benefit whenever possible.[7]

The present paper deviates from the traditional incomplete contract approach in several features. First, the governance structure can be made contingent to any useful common information, including investment and decisions.[8] It also allow to separate control to cash-flow rights. It is therefore more suitable to explain explicit contingencies in real-word start-up governance structures as documented by Lerner and Merges (1998) and Kaplan and Strömberg (2000).[9] Second, the model does not focus on a moral hazard problem with non-observable and/or non-contractible actions (e.g. relation-specific investment or effort). In contrast, here, all actions are observable and contractible. Furthermore, they can be selected by any of the two partner, control defining who selects actions. The model is based on a hidden information game: The two partners contract with symmetric information but the entrepreneur becomes better informed later.[10]

Finally, I should add that my approach borrows from the state verification model of the financial contracting literature (Townsend, 1979, Gale and Hellwig, 1985, Lacker and Weinberg, 1989), which have endogenized debt contracts. Likewise, the investor can observe entrepreneur's information at a cost. However, to address the issue of control, I introduce a decision stage which provides a rational for investors' involvement into the management of the firm and, therefore, for more complex financial contracts than standard debt.

3 The model

Consider a risk-neutral entrepreneur (or a start up firm, referred as "she") E who has a project but lacks of financial means. She contracts with a risk-neutral financier F (refereed

[7]This will be indeed the case in the model when the project's expected return is high enough. Otherwise, the investor has no choice but to manage the project himself.

[8]Notice the contract is not made contingent to future profits because they remain entrepreneur's private information (if the investor is not involved in management).

[9]Remarkably, in their attempt to rationalize real-word venture capital contracts with contract theory, Kaplan and Strömberg (2000) write *"the allocation of control rights between [Venture capitalists] and the entrepreneur is a central feature of the financial contracts. This strongly suggests that despite the prevalence of contingent contracting, contracts are inherently incomplete."* This paper posits a theory which explain both the prevalence of contingent contracts and the importance of the allocation of control rights between entrepreneurs and venture capitalists.

[10]Although, in reality, the entrepreneur might also have private information at the contracting stage, I assume symmetric information to focus on the effect of the arrival of information during the relationship.

as "he") for financial support. At this stage, the contracting partners, E and F, do not know the total amount required I to complete the project. They contract on a seed investment normalized to 0. Then, after starting the project, they reach an expansion stage, which requires an expansion investment I. This expansion investment is unknown before starting the project and, therefore, the total investment level I is learnt only after the contracting stage. Before that, it is common knowledge that I is a random variable with support $\mathcal{I} = [\underline{I}, \bar{I}]$, distribution f and cumulative F. The projet fails if I is not invested. If I is invested, the project yields a cash-flow or profit $\pi(x, \theta)$ where x is a strategic decision and θ is a random variable describing the "state of nature". θ takes value g, for "good" state of nature (respectively, b for "bad" state of nature), with probability p_g (respectively $p_b = 1 - p_g$). It is assumed that cash-flows are always higher in the good state of nature g than in the bad state: $\pi(x, g) > \pi(x, b)$ for any x. For simplicity, we assume that x is binary decision taking values $\{x_b, x_g\}$, where $x_\theta = Argmax_x \pi(x, \theta)$.[11] The return of the project with decision x in state θ and investment needs I is $\pi(x, \theta) - I$.

Information. The parameter θ is E's private information. It can be observed by F by performing costly management activities which include active presence on the board, third party expertise, auditing, at a cost $\gamma > 0$.[12]

For concreteness, think the entrepreneur as an innovator who needs funds to perform research, develop and then market an innovation. Ex ante, she does not know for sure the cost and outcome of the R&D process. Ex post, she might have private information about it (e.g. the market value of the innovation), which can be high ($\theta = g$) or low ($\theta = b$). This information is crucial for major decisions (e.g. to form alliances or merge, submit a patent, sell licences, develop or not a project), which are summarized by the variable x.

The investment level $I \in \mathcal{I}$ is common knowledge. Both the loan and the actions are observable and can be contracted upon.[13]

Contract. The two partner sign ex ante a contract specifying:

- The investment I provided by F.

[11] Our assumptions imply $\pi(x_g, g) > \pi(x_b, b)$, $\pi(x_g, g) > \pi(x_b, g)$ and $\pi(x_b, b) > \pi(x_g, b)$.

[12] This cost can be seen as the cost of duplicating management activities (assuming that E manages also the firm anyway) or to supervise E's activities. It is assume strictly positive but not "too high" to exclude uninteresting pooling equilibria; formally $\gamma < \pi(x_b, g) - \pi(x_b, b)$.

[13] Notice that the informational structure implies that F cannot observe the profit if he has not observed θ (i.e. if he has not spend γ). Therefore, the contract cannot be contingent on profits.

- An allocation of authority or control rights $\mathcal{C}(I) \in \{E, F\}$ contingently on investment I.

- A repayment scheme, i.e. F's cash-flow rights,[14] $R(x, I)$ contingently on decision x and investment I.

Game. E makes a take-it-or-leave-it offer to F. F's outside option is $(1 + r)I$, where $r > 0$ is opportunity cost of capital (e.g. the market interest rate). It is assumed that E is protected by limited liability, which implies that her payoff cannot be negative, whereas F has "deep pocket" but he can decide to stop investing anytime (or, equivalently, cannot commit not to do so in the contract).

The two players play the following game:

1. E proposes a contract/governance system $\{R(x_\theta, I), \mathcal{C}(I)\}_{\theta=b,g, I\in\mathcal{I}}$ to F who accepts or refuses.

2. I is publicly observed.

3. F continues or stops financing the project.

4. F chooses to spend γ or not.

5. Player $\mathcal{C}(I)$ chooses an action x_θ.

6. Payments are made as prescribed by the contract.

I will focus on the equilibrium incentive contracts/governance systems of the above game, i.e. the contracts/governance systems which provide to the players with incentives to maximize the return of the project in a Perfect Bayesian Nash Equilibrium.

4 The corporate governance system

In this section, I characterize the equilibrium governance system. Since there is a cost for F to gather E's information, the two partners would avoid this inefficiency loss by assigning control to E. I therefore begin by focusing on a governance structure with E in control. First, I characterize the split of cash-flows under E's control. Second, I establish conditions

[14] E's cash-flow rights are $\pi(x, \theta) - R(x, I)$.

on investment I for which such a governance structure is feasible. Thirdly, I find out the split of cash-flows under F's control. Lastly, I describe the equilibrium governance structure.

4.1 Entrepreneur in control

Under E's control, the repayment scheme $\{R(x_\theta, I)\}_{\theta=b,g;I\in\mathcal{I}}$ maximizes E's expected payoff (over θ and I) $E_{\theta,I}[\pi(x_\theta,\theta) - R(x_\theta, I)]$ subject to the following constraints for every $\theta, \theta' = b, g, \theta \neq \theta'$ and $I \in \mathcal{I}$:

$$\begin{array}{rll} E_\theta[R(x_\theta, I)] & \geq (1+r)I & IR(I) \\ \pi(x_\theta,\theta) - R(x_\theta, I) & \geq 0 & LL(\theta) \\ \pi(x_\theta,\theta) - R(x_\theta, I) & \geq \pi(x_{\theta'},\theta) - R(x_{\theta'}, I) & IC_E(\theta) \end{array}$$

The first constraint $IR(I)$ is F's participation constraint, often called individual-rationality constraint, stipulating that F's expected payoff (over θ) from investing in the project compensates the opportunity cost of investment. The second set of constraints $LL(b)$ and $LL(g)$ are E's limited liability constraints, or *ex-post* participation constraints, stipulating that E's payoff cannot be negative in every state of nature $\theta \in \{b, g\}$. The last two constraints $IC_E(b)$ and $IC_E(g)$ are E's incentive compatibility constraints stipulating that E has incentive to choose the right decision (i.e. the decision that maximizes cash-flows) in every state of nature $\theta \in \{b, g\}$.

In the above program, F's participation constraint $IR(I)$ is binding. In addition, both $LL(b)$ and $IC(g)$ satisfied imply $\pi(x_g, g) - R(x_g) \geq \pi(x_b, g) - \pi(x_b, b) > 0$. Therefore, $LL(g)$ holds. Thus the set of constraints reduces to, for every $I \in \mathcal{I}$,

$$\begin{array}{rll} E_\theta[R(x_\theta, I)] & = (1+r)I & IR(I) \\ R(x_b, I) & \leq \pi(x_b, b) & LL_E(b) \\ R(x_g, I) & \leq R(x_b, I) + [\pi(x_g, g) - \pi(x_b, g)] & IC_E(g) \\ R(x_g, I) & \geq R(x_b, I) - [\pi(x_b, b) - \pi(x_g, b)] & IC_E(b) \end{array}$$

The above set of constraints is represented in Figure 1 below.

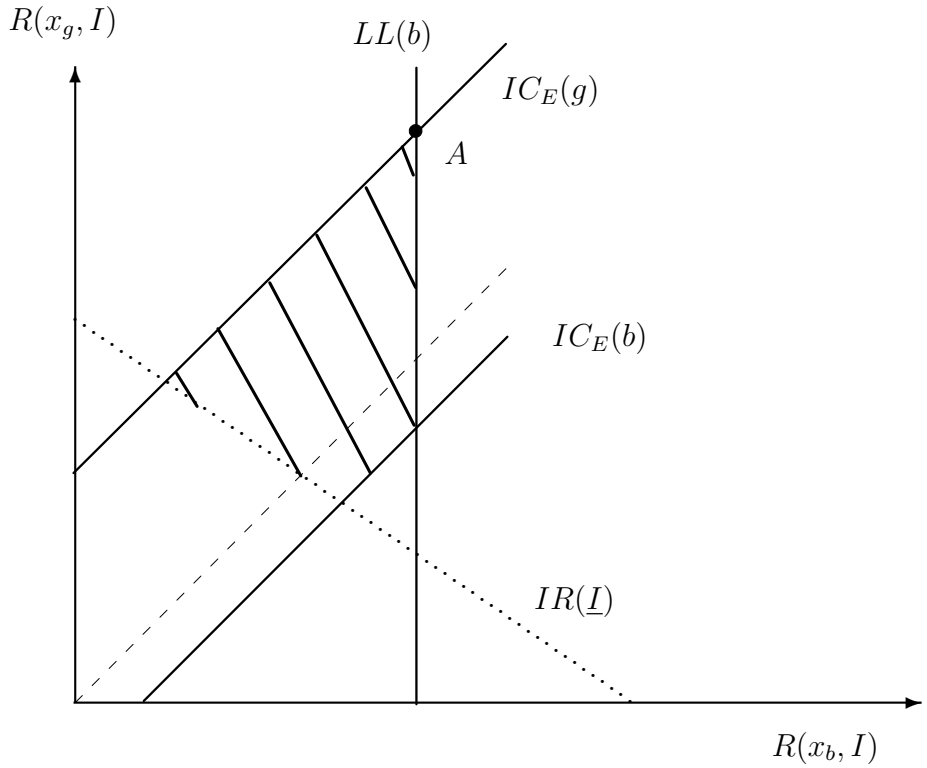

Figure 1

For any $I > \underline{I}$, F's participation constraint $IR(I)$ is a line parallel to and above $IR(\underline{I})$. Since E's indifference curves are parallels to F's participation constraints, the equilibrium repayments are on the part of the line $IR(I)$ located between the lines representing the other constraints in the shaded area . Both players are indifferent among all these repayments schemes. They include debt repayments $R(x_g, I) = R(x_b, I) = (1+r)I$ when $(1+r)I$ is low enough, that is when $(1+r)I \leq \pi(x_b, b)$. As $(1+r)I$ increases $IR(I)$ moves upward with the same slope. When $(1+r)I > \Pi(x_b, b)$, the repayments to F when x_g is implemented is higher. The highest level that can be invested under E's authority, denoted $\tilde{I}$, imposes unique repayments located at A in Figure 1. At this point, $IC_E(g)$ and $LL(b)$ are both binding, therefore $R(x_b, I) = \pi(x_b, b)$ and $R(x_g, I) = \pi(x_g, g) - \Delta\pi(x_b)$, with $\Delta\pi(x_\theta) \equiv \pi(x_\theta, g) - \pi(x_\theta, b)$. F's participation constraint binding writes $E_\theta[\pi(x_\theta, \theta)] - p_g\Delta\pi(x_b) = (1+r)\tilde{I}$. The threshold investment level is therefore:

$$\tilde{I} = \frac{1}{1+r}(E_\theta[\pi(x_\theta, \theta)] - p_g\Delta\pi(x_b)). \tag{1}$$

The set of equilibrium repayments for every $I \in [\underline{I}, \tilde{I}]$ is represented by the shaded area in Figure 1. For investment levels higher that $\tilde{I}$, the project cannot be financed under E's control. We now investigate wether it can be financed with F in control.

4.2 Financier in control

Under F's control, F observes θ by being actively involved into day-to-day management, which means incurring the cost γ. However, he must have incentive to i) exert management costs γ, ii) implement the right decision in the right state of nature.[15] Notice that, due to E's limited liability, F cannot ask for more than E's profit in a given state for any decision implemented. That means, for instance, that if the state of nature is b, and F implement x_g, he cannot ask for more than $\pi(x_g, b)$. In this case, F gets the minimal value among $R(x_g, I)$ and $\pi(x_g, b)$.

Under F's control, the equilibrium repayments $\{R(x_\theta, I)\}_{\theta=b,g,I\in(\tilde{I},\bar{I}]}$ must satisfy the following constraints for $\theta = b, g$, $\tilde{I} < I \leq \bar{I}$,

$$\begin{aligned}
E_\theta[R(x_\theta, I)] - \gamma &= (1+r)I && IR^\gamma(I) \\
\pi(x_\theta, \theta) - R(x_\theta, I) &\geq 0 && LL(\theta) \\
E_\theta[R(x_\theta, I)] - \gamma &\geq p_g R(x_g, I) + p_b \min\{R(x_g, I), \pi(x_g, b)\} && IC_F^\gamma(g) \\
E_\theta[R(x_\theta, I)] - \gamma &\geq p_g \min\{R(x_b, I), \pi(x_b, g)\} + p_b R(x_b, I) && IC_F^\gamma(b) \\
R(x_g, I) &\geq \min\{R(x_b, I), \pi(x_b, g)\} && IC_F(g) \\
R(x_b, I) &\geq \min\{R(x_g, I), \pi(x_g, b)\} && IC_F(b)
\end{aligned}$$

The first constraint $IR^\gamma(I)$ are F's binding participation constraints taking into account than F has to spend γ. The second set of constraints $LL(b)$ and $LL(g)$ are E's limited liability constraints. The third set of constraints $IC_F^\gamma(g)$ and $IC_F^\gamma(b)$ are F's incentive-compatible constraints to exert costly management activities. Constraint $IC_F^\gamma(\theta)$ stipulates that F is better off if he spends γ and undertakes the right decision rather than if he always chooses x_θ for every $x_\theta \in \{x_b, x_g\}$. The last two constraints $IC_F(g)$ and $IC_F(b)$ are F's incentive-compatibility constraints on decisions. Constraint $IC_F(\theta)$ stipulates that, after observing

[15] Notice that, when F knows θ, the contract or governance structure can be make contingent on profits (or on θ) in addition to decisions. Then F can be disciplined by imposing very high fines when decisions does not match with corresponding profits. I will show that adding such contingencies is useless because, without them, the governance structure provides to F with such incentives: The incentive-compatible constraints on decisions are not binding.

the state of nature θ, F has incentive to choose the decision that maximizes the project surplus.

The incentives constraints $IC_F^\gamma(g)$ and $IC_F^\gamma(b)$ simplify to, respectively, $R(x_b, I) \geq \frac{\gamma}{p_b} + \min\{R(x_g, I), \pi(x_g, b)\}$ and $R(x_g, I) \geq \frac{\gamma}{p_g} + \min\{R(x_b, I), \pi(x_b, g)\}$. These constraints are more stringent that the other incentive constraints $IC_F(g)$ and $IC_F(b)$, as well as the limited liability constraint $LL(b)$, which therefore hold. The remaining constraints are:

$$\begin{array}{rll} E_\theta[R(x_\theta, I)] - \gamma & = (1+r)I & IR^\gamma(I) \\ \pi(x_g, \theta) - R(x_g, I) & \geq 0 & LL(g) \\ R(x_b, I) & \geq \frac{\gamma}{p_b} + \min\{R(x_g, I), \pi(x_g, b)\} & IC_F^\gamma(g) \\ R(x_g, I) & \geq \frac{\gamma}{p_g} + \min\{R(x_b, I), \pi(x_b, g)\} & IC_F^\gamma(b) \end{array}$$

They are represented in Figure 2 below.

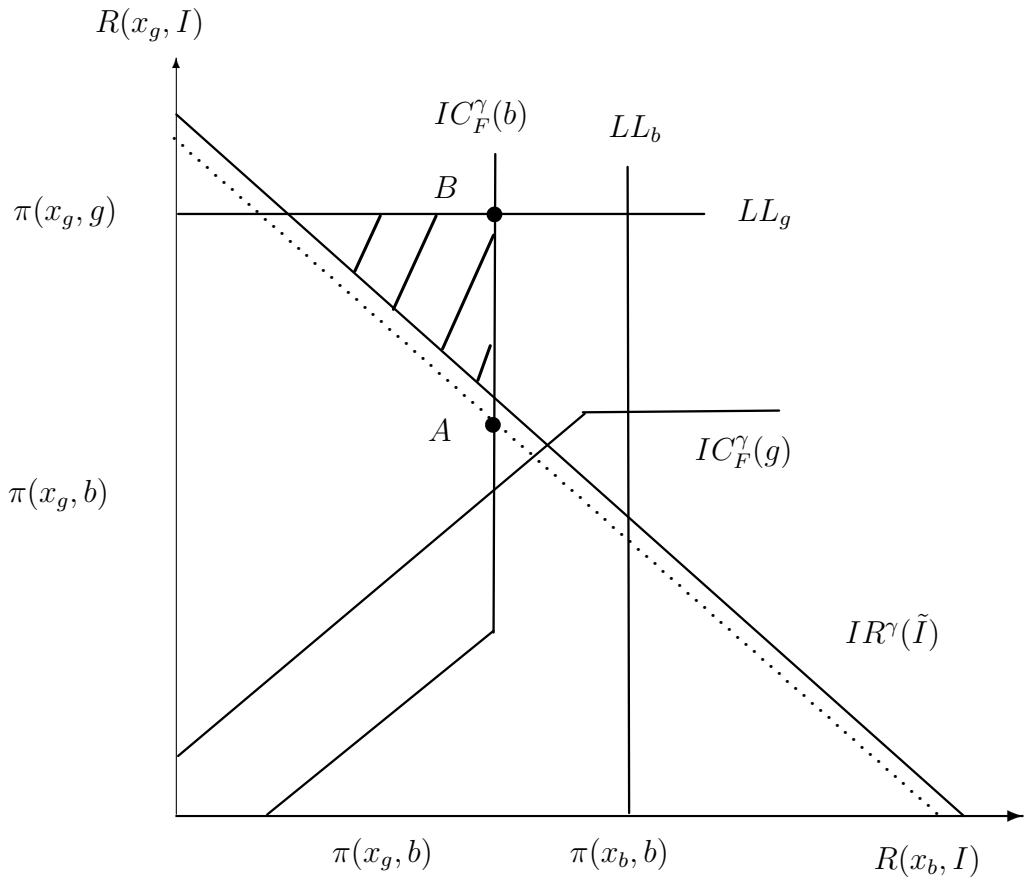

Figure 2

As before, the equilibrium repayments are located at F's participation constraint, here $IR^\gamma(I)$, for any $I \in (\tilde{I}, \bar{I}]$ within the bounds defined by the above constraints. They are on the lines parallel to and upward $IR^\gamma(\tilde{I})$ in the shaded area. They are such that $\pi(x_g, g) \geq R(x_g, I) > R(x_b, I) \geq \pi(x_b, b)$. Such repayments under F's control correspond, for instance, to a governance system where F has a majority share of the firm (with majority voting rules, board seats and cash-flow rights). The higher investment level that can be accepted by F (with repayments located at point B) is:

$$I_{max} = \frac{1}{1+r}(E_\theta[\pi(x_\theta, \theta)] - \gamma).$$

The entrepreneur's expected payoff is $E_\theta[\pi(x_\theta, \theta)] - \gamma - (1+r)I$.[16]

[16]The dead-weight loss γ is represented by the distance between the shaded line crossing A and the

To sum up, since there is a cost γ for F to gather E's information, the partnership would avoid this inefficiency loss whenever it is possible that is when $I \leq \tilde{I}$. When $I > \tilde{I}$, an incentive contract is not feasible because the informational rent left to E exceeds the project expected return. Hence, the contract calls for F's control and, therefore, some costly management. Such a contract is feasible as long as $I \leq I_{max}$. The main results are enunciated in the proposition below.

Proposition 1 *The governance system assigns control and cash-flows contingently on investment supply in the following way.*

- *For very low investment levels*[17] $I \leq \frac{1}{1+r}\pi(x_b, b)$*, E has control rights and repayments to F can be made constant like in a standard debt contract.*
- *For low investment levels $I \in [\frac{1}{1+r}\pi(x_b, b), \tilde{I}]$, E has control rights and both E and F get more cash-flow with higher profit.*
- *For high investment supply $I \in (\tilde{I}, I_{max}]$, F has control as well as more cash-flow with higher profit.*

In this entrepreneur-investor relationship, the partners share the expected return of the project $E_{\theta,I}[\pi(x_\theta, \theta) - I]$. In addition to F's opportunity cost rI, this return must cover E's informational rent $\Delta\pi(x_b)$ if E has control, or, F's management cost γ if F has control. To avoid the loss γ, the governance system assigns control to E whenever possible, that is, when the project expected return exceeds the sum of F's opportunity cost of investment and E's informational rent. Formally, when $E_\theta[\pi(x_\theta, \theta)] - I \geq rI + \Delta\pi(x_b)$, which leads to $I \leq \tilde{I}$. Otherwise, the governance structure implements a second-best outcome by assigning control to F. It is feasible if the expected return exceeds the sum of F's opportunity cost of investing I and management cost γ, formally if $E_\theta[\pi(x_\theta, \theta)] - I \geq rI + \gamma$, which leads to $I \leq I_{max}$. With the above contingent allocation of control, cash-flow rights can be designed to be incentive-compatibles so that the agent in control maximizes cash-flows.

5 Conclusion

By endogenizing the governance system of start-ups in a stylized formalization of the investor-entrepreneur relationship, the paper answers to the two following questions. First, why is

constraint $IR^\gamma(I)$. It creates a discontinuity of the expected return achieved when I increases.

[17] That means high expected return $E_\theta(\pi(x_\theta, \theta)] - (1 + r)I$.

control correlated with the firm's financial health? Essentially because when the start-up is in good financial condition, the governance system provides the entrepreneur with incentives to maximize the project return. As the project becomes more costly, such incentives cannot be provided. The firm is then leaded by the investor who duplicates costly management activities to make sure to get a return on his investment. Second, why does the governance structure assign contingent control? By assigning control and cash-flow rights contingently to the observable measure of financial performances (here the infusion of capital), the partners adapt the governance system to new information about expected returns.

I briefly conclude with three remarks. First, the model predicts that the investor is more likely to obtain more control as the external cost of funds increases. Indeed, simple comparative static shows that the threshold $\tilde{I}$ decreases with the interest rate r, a proxy for the opportunity cost of capital. This is because, as funds become more costly, everything else equal, a lower share of the expected return is devoted to the entrepreneur. This share is therefore less likely to cover the informational rents.

Second, financial needs are assumed here to be publicly observed by both partners. When not observable by the financier, the entrepreneur might be tempted to overstate her investment needs thereby enjoying private benefit from extra cash. By assigning control to the financier for high investment levels, and thereby adding management costs, the corporate governance structure mitigates such incentive.

Third, the paper deals with a quite general model that encompasses both financial and managerial decisions. Beyond the case of start-ups, it might be extended to model the evolution of control on managerial decisions with the infusion of capital in others corporations, such as business groups. It would then contribute to explain the switch of control from managers to financiers after refinancing plans. This extension would require further investigation which is beyond the scope of the paper.

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