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Advice and Monitoring: Venture Financing with Multiple Tasks

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Advice and Monitoring: Venture Financing with Multiple Tasks

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Abstract

This paper focuses on the conflicting dimensions of the involvement of venture capitalists as advisors and monitors in entrepreneurial projects. It argues that advising is congruent while monitoring is dissonant with respect to entrepreneurial preferences. Advising enhances the chance for a successful outcome in contrast to monitoring which aims at reducing potential losses while imposing a private cost on the entrepreneur. The analysis shows that despite the conflict of incentives between tasks, entrepreneurs with substantial capital needs prefer to contract with a multitask financier rather than with an advisor and a monitor separately. This provides one possible explanation for the existence of venture capital in the presence of both consulting firms and financial intermediaries engaged in monitoring of borrowers. The implications of the model coincide with observed features of venture capital firms and contracts. They predict the existence of both start-up financing and corporate venturing and the prevalent use of both equity and convertible securities together with control rights in venture capital contracting.

Keywords: Financial Contracting, Venture Capital, Multitask Moral Hazard

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A distinctive feature of venture capital financing is the active involvement of financiers in the realization of the projects funded. Available evidence suggests that advising and monitoring should be regarded as the two primary dimensions of the post-investment involvement of venture capitalists. Hellmann and Puri (2002) find that venture capitalists play both supportive and controlling roles in building up human resource policies at newly established companies. In line with this evidence, Kaplan and Strömberg (2003b) and Sapienza et al. (1996) consider the effect of different risk factors on the involvement of financiers distinguishing between measures of support and governance provided to entrepreneurial firms.

This observation raises three questions, unanswered by earlier contributions. First, why do we observe venture capital (multitask) financing at all in the presence of specialized consulting firms and financial intermediaries performing thorough monitoring of borrowers? Second, why a variety of venture capital companies exists? For example, why many start-up financiers become involved in both extensive advising and monitoring of entrepreneurs in contrast to others, such as corporate venturers, which provide support without requiring the necessary control to interfere? Third, what does it imply for financial contracting between a wealth-constrained entrepreneur and his financier that the latter performs multiple tasks? In particular, can a multitask theory of venture financing explain evidence unaccounted for in earlier studies such as the joint allocation of cash-flow and control rights[1] or the diversity of securities[2] used in venture capital contracts?

This paper provides an answer for each of the above questions highlighting the primary difference between the two activities: advising is congruent, while monitoring is dissonant with respect to entrepreneurial preferences. In other words, advising intends to enhance the chance for a successful outcome and thereby raise both the investor's and the entrepreneur's returns in contrast to monitoring which aims at reducing potential losses of verifiable project returns by eliminating private (non-verifiable) entrepreneurial rewards. Although, since non-verifiable rewards may be substantial, the entrepreneur prefers advising over monitoring, the latter is needed to increase the chance for obtaining

[1]Evidence suggests that venture capitalists require *both* substantial *cash-flow and control rights* in projects they provide financing for. Although in many venture financing deals cash-flow and control rights are separately allocated (Kaplan and Strömberg (2003a)), both seem to play a role in ensuring the provision of financing by venture capitalists. Yet, most venture capital theories focus on either the cash-flow or the control allocation in isolation.

[2]Existing theories do not account for the use of both convertible securities and equity claims by venture capitalists.

funding when he is highly wealth-constrained.

The above distinction reveals a conflict of incentives between the two tasks: intense advising requires the allocation of equity to the financier, while monitoring can be induced with a state-independent return claim like a standard debt contract. The incentive conflict generates a negative interaction between tasks, which implies that contracting separately with an advisor and a monitor may be more advantageous for an entrepreneur. The current paper derives the opposite result. It shows that in spite of the conflict of incentives efficiency gains can be realized from having the same financier to accomplish both the advising and monitoring tasks. In particular, if the parties' payoffs are constrained to be non-decreasing in project outcome, advising becomes less expensive to induce under multitask financing than under the separation of tasks, whenever positive monitoring is needed for funding to be worthwhile. As a result, entrepreneurial wealth-constraints endogenously give rise to the need for financing with multiple tasks.

The model is built on the presumption that the financier's contribution to the project in terms of advising and monitoring depends on the incentives embedded in the financial contract issued by the entrepreneur. Under both regimes, two equilibrium patterns of funding arise. With multitask financing, a highly capital constrained entrepreneur relinquishes control and issues a convertible claim.[3] He receives moderate advising since positive monitoring reduces the financier's incentives to provide advice. An entrepreneur with more self-financing is in contrast able to limit monitoring and stimulate advising by issuing a more cash-flow sensitive claim, such as equity. Under the separation of tasks, the project of a poor entrepreneur is funded by two financiers. An equity claim is offered to the advisor and a debt contract attached control to the monitor. In this case, an entrepreneur endowed with more capital contracts with a sole advisor. There exists a threshold of self-financing, above which the entrepreneur is indifferent between the combination and the separation of the two tasks. An entrepreneur with substantial capital needs prefers however a multitask financier (venture capitalist): if payoffs are non-decreasing in project outcome, multitask financing results in less intense monitoring and more advice, hence increased entrepreneurial welfare. The combination of the two tasks enhances incentives for advising whenever positive monitoring is required for financing to be worthwhile. Therefore multitask financing endogenously arises as the preferred form of funding for

[3]The optimal contract in this case can also be replicated as a mixture of debt and equity claims.

a highly wealth-constrained entrepreneur.

The intuition lies in the definition of the two tasks. Advising increases value by raising the chance for high returns thus at the same time decreases the probability of the low outcome state. Monitoring increases verifiable returns for the no success state and thereby reduces downside risk. As a consequence, advice lowers the ex-ante value of monitoring. In turn, monitoring reduces the incentives for advice. Whenever the entrepreneur relinquishes control, the allocation of liquidation returns to the financier facilitates financing, for it stimulates effort on monitoring. As a result, when the entrepreneur is highly capital constrained, there will be intense monitoring while advice will get less attention. If payoffs are non-decreasing in project outcome, the separation of tasks exacerbates this incentive conflict. Rewarding a second financier, a monitor, in the success state makes advice more difficult to obtain for any specific level of monitoring. As a consequence, when the need for funding calls for substantial monitoring, the combination of the two tasks provides higher expected returns for the entrepreneur.

Predictions of the model match existing patterns of venture capital and highlight a clear distinction between its two major forms: start-up financing and corporate venturing. The prevalent use of convertible securities and the provision of substantial control rights to financiers are typical features of the financing of capital poor start-up entrepreneurs. In turn, pure equity financing and the retention of control are defining characteristics of the corporate venturing process which usually links two independent companies.

These implications are consistent with the extensive use of both convertible securities and equity contracts by venture capitalists, documented in recent empirical studies. For instance, Kaplan and Strömberg (2003a) show that in the US convertible preferred equity is the most frequently used security but (multiple classes of) common stocks are also issued. Evidence from other countries indicates a larger variety in the forms of financing. Common equity is the most frequently issued security although straight and convertible debt, preferred equity, and combinations of these instruments are also used (see Cumming (2002), and Bascha and Walz (2001)).

Although in the literature on venture capital both advising and monitoring have received substantial attention, the interrelation of the two tasks has been neglected.[4] Most theory papers focus

[4]The only exception is Cestone (2001). The difference between this paper and hers is discussed in details in Section

on the advising task, emphasizing the double-sided nature of the moral hazard problem involved in the relationship of entrepreneurs and venture financiers (Casamatta (2003), Inderst and Müller (2004), Repullo and Suarez (2002), and Schmidt (2003)). Building on this literature, the current paper defines advising as effort by the financier which enhances the potential for a successful outcome of the investment. Monitoring by financial intermediaries has been modeled in a number of ways. In Holmström and Tirole (1997) and Dessi (2003), the monitoring activity indirectly increases the success probability and thus expected returns by reducing the opportunity cost of exerting effort for the entrepreneur. Several papers associate monitoring or intervention in entrepreneurial actions with the right to substitute the original founder with a professional manager, typically after a low state arises, in order to realign the preferences of the decision maker with those of the investors (Chan, Siegel, and Thakor (1990), and Hellmann (1998)). The monitoring activity defined here is different, but consistent with the above approaches: it implies interference in entrepreneurial project choice to control downside risk. I show that employing these definitions of advice and monitoring reveal that the two tasks require different incentives and that they produce an endogenous trade-off: stimulating monitoring decreases the intensity of advising.

The paper is closest in spirit to Cestone (2001). In that paper, advising (support) and monitoring (interference) are positively related: an investor holding a risky claim has incentives to exert effort on both tasks. Interference however hinders the entrepreneur's initiative. Therefore, the entrepreneur should retain control whenever the need for advising requires the allocation of a risky claim to the venture capitalist. In this paper, I obtain endogenously the opposite interaction between tasks: intensive monitoring limits the provision of advice. The control right is required to carry out the monitoring task, which needs to be stimulated when capital constraints are severe. As a result, entrepreneurial wealth constraints affect both equilibrium efforts and the allocation of cash-flow and control rights. In contrast, in Cestone financing constraints play no role. The entrepreneur voluntarily relinquishes control to maximize project value whenever the need for the financier's advising is not substantial.

The paper also relates to the literature on multitask moral hazard analysis. In Holmström and Milgrom (1991), agents performing two tasks have an effort allocation problem because their time and

III.

attention is limited. Although incentives for tasks do not conflict, a substitution of effort may occur because performance on one task is not observable. The problem I consider is closer to Dewatripont and Tirole (1999), where a direct incentive conflict between tasks arises. They point out that an efficient allocation of activities within organizations requires tasks with conflicting incentives to be accomplished by different interest groups. The current paper brings along the opposite result: in spite of the conflict of incentives, under plausible assumptions, the combination of advising and monitoring is more efficient than their separation. This may explain why many venture capital firms engage extensively in both activities.

The setup of the paper is as follows. The next section describes the model. Section III characterizes equilibrium efforts and financial contracts. First, I study the case of financing with multiple tasks: advising and monitoring are accomplished by the same financier. Then I consider the case of contracting with two financiers, an advisor and a monitor. Section IV focuses on the entrepreneur's choice between multitask financing and the separation of the two tasks. I discuss two variations of the model. In Section V, I assume sequential efforts by a multitask financier: advice in early and monitoring in a late stage after the observation of a low profitability signal. This set-up gives rise to state-contingent control allocation, a frequently observed feature of venture capital contracts. Section VI presents a simplified version of the model: bank financing. The comparison of the results with the multitask case highlights a primary difference between venture capital and bank financing. A subsequent section discusses the main empirical implications. The final section concludes. All proofs are in the Appendix.

I The Model

Consider an entrepreneur endowed with a project idea that requires investment I. The entrepreneur also has capital of an amount $\omega\,(<I)$. If I is invested, the idea can be turned into either a 'creative' or a 'mundane' project. Both projects are risky: they can either succeed or fail. The creative project generates a verifiable cash flow H in case of success and 0 in case of failure. In addition, it provides the entrepreneur unverifiable private benefits of size B in both states. The mundane project has less downside risk. Its verifiable returns are H and $L\,(<H)$ in the success and failure states. Private

benefits from the mundane project are 0.[5]

By undertaking a privately costly action, the entrepreneur may enhance the chance for success, independent of project choice. Incurring a positive effort cost C, the entrepreneur increases the probability of success to $p_h \in (0,1]$. If he avoids exerting effort, the success probability will be $p_l < p_h$, $p_l \in [0,1)$.

Three types of investors may provide external financing in the economy. First, the entrepreneur may turn to a passive financier who participates in his venture exclusively via the supply of investment capital. Second, he may obtain funding from a venture capitalist (multitask financier) who, besides the provision of financing, may contribute in two additional ways: monitoring the entrepreneur's project choice and/or giving advice. Last, the project can be financed by so-called one-task financiers who, besides ensuring the required capital, can either monitor or give advice.

The advising effort $e_a \in [0,1]$ increases the probability of success by $e_a\tau$, $0 < \tau < 1$, so that τ measures the efficiency of advising. The monitoring effort $e_m \in [0,1]$ ensures that with probability e_m the mundane project is being chosen and thus a positive return of size L in the failure state arises.[6] Thus advice enhances the chance for success, while monitoring represents the investor's effort to direct the entrepreneur towards the project with less downside risk.[7] The financier's effort costs for advising and monitoring are $\frac{e_a^2}{2K}$ and $\frac{e_m^2}{2K}$, such that $\frac{1}{K}$ represents the maximum cost of effort on the two tasks. Monitoring requires the investor to have the control right.

The model has two dates: $t \in \{0,1\}$. At $t = 0$ investment occurs and actions are taken simultaneously, and at $t = 1$ returns are realized. All agents are assumed to be risk-neutral and the

[5] We can think of the two projects as a scientific (creative) and a commercial (mundane) realization of the entrepreneur's idea. An innovative entrepreneur may favor a scientific approach which gives her opportunity for experimentation. The experience she gains could provide her benefits in the form of reputation or knowledge which can be applied in new projects. This approach may however be disliked by an investor who cares less about innovation.

[6] The monitoring effort is essentially a continuous version of 'interference' by the financier in Aghion and Bolton (1992): being in control, the financier may take an action to increase expected project returns through imposing a private cost on the entrepreneur.

[7] Monitoring in the model can also be defined as effort by the financier that increases verifiable returns for both the success and failure states by decreasing the entrepreneur's non-verifiable rewards. The only assumption for the results to hold in this case is that private benefits are greater in the failure than in the success state. Obviously this setup implies another interpretation of B than the current one. With the current setup, however, the analysis becomes more tractable.

entrepreneur is protected by limited liability. The financial market is competitive: financiers just break even on their investments.

I make the following assumptions. First, the cost of advice and monitoring is high. Receiving all cash flows would not provide the financier sufficient incentives to exert maximum effort on both tasks, even if success occurs with probability 1:

$$KH < 1. \tag{A.1}$$

Second, I assume that the efficiency of advising is small. In particular, even if the entrepreneur works and maximum incentives are provided for advising, the probability that final state returns are zero is positive and greater than τ. This assumption ensures the role for monitoring:

$$1 - p_h - K\tau^2 H > \tau. \tag{A.2}$$

Further, both projects have positive value when the entrepreneur works, even if the financier exerts no effort:

$$p_h H - I + B - C > 0, \tag{A.3}$$

$$p_h H + (1 - p_h) L - I - C > 0. \tag{A.4}$$

I also assume that the entrepreneur's work is indispensable for financing to be worthwhile: without his effort exertion, the idea has no value:

$$(p_l + \tau) H + B - I - \frac{1}{2K} < 0, \tag{A.5}$$

$$(p_l + \tau) H + (1 - p_l - \tau) L - I - \frac{1}{K} < 0. \tag{A.6}$$

As a benchmark, I determine the optimal levels of advising and monitoring assuming that effort is contractible. Since the mundane project will be chosen with probability e_m, the expected value of the venture is

$$V = (p_h + e_a\tau) H + e_m (1 - p_h - e_a\tau) L + (1 - e_m) B - C - \frac{e_a^2 + e_m^2}{2K} - I.$$

The relative size of private benefits and liquidation returns from the mundane project determines which activity is the socially more valuable task. Let e_m^{FB} and e_a^{FB} denote the first-best effort levels on the two tasks.

Lemma 1 *For given parameters (H, L, K, C, p_h, p_l, τ, I), there exists a critical level of private benefits, B^*, such that i) if $0 < B < B^*$, then $\left\{0 < e_a^{FB} < 1, 0 < e_m^{FB} < 1\right\}$ and the entrepreneur relinquishes control to the financier, ii) if $B^* \leq B$, then $\left\{0 < e_a^{FB} \leq 1, e_m^{FB} = 0\right\}$ and the entrepreneur retains control.*

Only when $B \geq B^*$ should the entrepreneur retain the control right and carry out the creative project. When private benefits are less important, positive monitoring is optimal.

Monitoring has two opposite effects on the parties' welfare. By ensuring a positive liquidation return, monitoring increases project value. At the same time, it reduces the value of private benefits, therefore the entrepreneur's welfare. Its first best level depends on the relative size of B to L. In what follows, I rule out the less interesting case when the entrepreneur values the monitoring activity. I assume that private benefits are large, thus monitoring lowers the entrepreneur's expected utility:[8]

$$B \geq B^*. \tag{A.7}$$

When assumption (A.7) holds, first best effort on monitoring is zero $\left(e_m^{FB} = 0\right)$. First-best advising is positive $\left(e_a^{FB} = K\tau H > 0\right)$.

II Optimal Contracts and Funding

This section determines the equilibrium levels of advising and monitoring and the entrepreneur's choice of the financial contract (cash-flow and control allocation), assuming non-verifiable efforts. Let H_e and H_f denote the cash-flows of the entrepreneur and the financier in the success state and L_e and L_f represent the allocation of liquidation returns from the mundane project. I_f stands for the financier's capital contribution to the venture.

As a benchmark, I consider the case of contracting with a passive financier.[9] In this case, the only information problem is entrepreneurial moral hazard. To ensure that the entrepreneur exerts effort

[8] Assumption (A.7) is consistent with Aghion and Bolton (1992). In that model, interference by the investor is assumed to be first-best inefficient in the sense that the cost of the value increasing action, imposed on the entrepreneur, is higher than the resulting increase in the expected value of the project.

[9] The benchmark analysis draws on Holmström and Tirole (1997).

and the financier participates to the contract, the cash-flow allocation must satisfy two conditions. First, the entrepreneur must be better off working than shirking:

$$p_h H_e - C \geq p_l H_e.$$

Second, returns accruing to the financier should be at least as high as his investment:

$$p_h \left(H - H_e\right) \geq I_f,$$

where $I_f = I - \omega$. The two conditions imply that the entrepreneur is able to obtain funding if and only if her capital contribution exceeds a threshold level, which we denote by $\omega^{\mathbf{P}}$:

$$\omega \geq \omega^{\mathbf{P}} = I - p_h \left(H - \frac{C}{p_h - p_l}\right).$$

The entrepreneur needs to contribute a sufficient amount to the investment outlay to be able to offer a contract that allows for her commitment to work and for the financier's participation, at the same time.

A Financing with Multiple Tasks: Advising and Monitoring

Next, I assume the entrepreneur contracts with a venture capitalist. In this case, the probability of success is determined through joint effort exertion by the two parties. The entrepreneur exerts effort if and only if her expected returns from working are greater than what she gains when shirking:

$$\left(p_h + e_a\tau\right) H_e + \left(1 - p_h - e_a\tau\right) e_m L_e + \left(1 - e_m\right) B - C \geq \left(p_l + e_a\tau\right) H_e + \left(1 - p_l - e_a\tau\right) e_m L_e + \left(1 - e_m\right) B.$$

Thus the entrepreneur's incentive compatibility condition, further referred to as (IC_e), is

$$H_e \geq \frac{C}{p_h - p_l} + e_m L_e.$$

The financier chooses effort levels to maximize his expected returns. The incentive compatibility conditions for advising and monitoring, $\left(IC_f^A\right)$ and $\left(IC_f^M\right)$, are

$$e_m = \arg \max_{0 \leq e_m \leq 1} \left\{ \left(p_h + e_a\tau\right) H_f + e_m \left(1 - p_h - e_a\tau\right) L_f - \frac{e_m^2 + e_a^2}{2K} - I_f \right\},$$

$$e_a = \arg\max_{0 \le e_a \le 1} \left\{ (p_h + e_a\tau) H_f + e_m (1 - p_h - e_a\tau) L_f - \frac{e_m^2 + e_a^2}{2K} - I_f \right\}.$$

From these constraints, equilibrium advising $\hat{e}_a$ and monitoring $\hat{e}_m$ can be expressed as functions of the contracted cash-flow allocation (H_f, L_f):

$$\left\{ \hat{e}_a(H_f, L_f) = K\tau \frac{H_f - KL_f^2 (1 - p_h)}{1 - K^2\tau^2 L_f^2},\ \hat{e}_m(H_f, L_f) = KL_f \frac{1 - p_h - K\tau^2 H_f}{1 - K^2\tau^2 L_f^2} \right\}.$$

These expressions identify a conflicting nature of advising versus monitoring: inducing one task decreases effort on the other. The incentive conflict arises because the two activities affect returns in different states of nature. Advice increases the success probability, while monitoring creates value for the less favorable state. If the outcome turns out to be success, effort on monitoring is ex-post inefficient. If no success occurs, the support activity will not add any value ex-post. Ex-ante, however, both tasks matter because of the uncertainty about the future state.

Lemma 2 *i) An increase in the financier's success state cash-flows (H_f) increases advising and decreases effort on monitoring.*
ii) An increase in the financier's liquidation returns (L_f) increases the intensity of monitoring and reduces effort on advice.

In other words, incentives for advising stimulate the investor to contribute to the venture's success potential, thus reduce the probability of the failure state and as a result the ex-ante value of monitoring. At the same time, the allocation of liquidation returns to the financier enhances monitoring, which decreases project risk and thus the need for advice.

Funding is obtained if and only if the required capital contribution to the investment does not exceed the financier's expected returns from the project:

$$I_f \le (p_h + \hat{e}_a\tau) H_f + \hat{e}_m (1 - p_h - \hat{e}_a\tau) L_f - \frac{\hat{e}_a^2 + \hat{e}_m^2}{2K}.$$

This constraint is referred to as the financing condition and is denoted by (IR_f).

Anticipating the financier's effort choices, the entrepreneur offers a contract that maximizes his expected returns, such that both parties' incentive compatibility constraints and the financing con-

dition are satisfied:[10]

$$\max_{e_a,e_m,H_e,L_e} (p_h + e_a\tau) H_e + e_m (1 - p_h - e_a\tau) L_e + (1 - e_m) B - C - \omega$$

subject to

$$(IC_e), \left(IC_f^A\right), \left(IC_f^M\right), (IR_f),$$

$$L_e \geq 0,$$

$$H = H_f + H_e,$$

$$L = L_f + L_e,$$

$$I = I_f + \omega.$$

Equilibrium efforts and the optimal financial contract are determined by the extent to which the entrepreneur is capital constrained.

Proposition 1 *For given parameters (H, L, K, C, p_h, p_l, τ, I), there exist critical wealth levels $\omega_{\mathbf{1}}^{\mathbf{M}} > 0$ and $\omega_{\mathbf{2}}^{\mathbf{M}} > \omega_{\mathbf{1}}^{\mathbf{M}}$ such that*

i) if $\omega < \omega_{\mathbf{1}}^{\mathbf{M}}$, the entrepreneur will not receive financing.

ii) if $\omega_{\mathbf{1}}^{\mathbf{M}} \leq \omega < \omega_{\mathbf{2}}^{\mathbf{M}}$, the venture is funded and the contract offered by the entrepreneur resembles to a convertible security. Equilibrium advising and monitoring are positive. The entrepreneur allocates control to the financier.

iii) if $\omega \geq \omega_{\mathbf{2}}^{\mathbf{M}}$, the venture is funded and the entrepreneur offers an equity contract. Equilibrium monitoring is zero and effort on advice is positive (and higher than in case ii). The entrepreneur retains control.

The intuition for the result is as follows. The entrepreneur favors the advising task and dislikes monitoring. Intense monitoring may however be necessary to obtain funding when the entrepreneur is wealth-constrained: the allocation of liquidation proceeds to the financier lowers the amount of capital he needs to provide to ensure external financing. Thus the entrepreneur faces a trade-off between the extent of monitoring and the possibility for financing. For incentives for the two tasks conflict, the trade-off is more complex: the entrepreneur faces a trade-off between receiving support and financing from, and being monitored by the financier. He may achieve better terms of financing

[10] The last four conditions include the entrepreneur's limited liability condition and three feasibility constraints.

at the price of relinquishing control, thus loosing the value of his private benefits and getting less support for the venture. Therefore, when being capital constrained, the entrepreneur offers a large proportion of the liquidation proceeds ($L_f \cong L, L_e \cong 0$) and allocates control to the financier, which induces monitoring and lowers effort on advice. If his capital endowment is somewhat higher, he will allocate a smaller share of the low state proceeds to the investor ($L_f < L, L_e > 0$), which results in less intense monitoring, higher effort on advice,[11] and increased entrepreneurial welfare. When his capital endowment exceeds a critical threshold, the entrepreneur will retain control and offer a sufficiently convex claim, which brings along zero monitoring and positive advising.

Given assumption (A.7), when effort exertion is non-verifiable, the advising activity is carried out at less than first-best intensity. In turn, monitoring will be equal to or higher than its first-best level. The financier exerts effort on the two tasks to the extent that his profits are maximized while ignores the value of entrepreneurial private benefits. The findings are, however, not based on the assumption that private benefits are large. Proposition 1 holds for any level of B. The tension between entrepreneurial moral hazard and investor's participation is sufficient to derive the above discussed implications, on the condition that the financier has two tasks with conflicting incentives. Assumption (A.7) concerns an extreme case, making explicit the entrepreneur's preference for maximum advice and least possible monitoring. It affects the socially desirable efforts by the financier, but not the Nash equilibrium outcome of the game. This is because private benefits play no role in the provision of incentives for the entrepreneur.

A striking implication of Proposition 1 concerns the joint allocation of cash-flow and control rights. According to the result, a financier having control will hold a less risky, convertible claim. In contrast, a financier with no control will be offered a riskier cash-flow such as equity.[12] This implication is similar to the one arising from the analysis in Cestone (2001), despite the two models are built on

[11] When L_e increases, the change in advising is not obvious. On one hand, an increase in L_e decreases the financier's incentives to monitor, and given the interrelation of the two tasks, it increases effort on advice. On the other hand, an increase in L_e decreases the financier's success state returns, and thereby the incentives for advising. This latter effect is because the appropriate provision of incentives requires that the entrepreneur has a higher share in the success state returns when she owns more of the liquidation proceeds. The first effect outweighs the second, thus an increase in L_e enhances effort on advice.

[12] This pattern is consistent with recent evidence: using a sample of about 200 venture capital transactions in Europe, Cumming (2002; Table 3a and Table 9) shows that convertible securities are associated with more control (in the form of veto and other rights), while equity contracts typically involve fewer control rights.

different assumptions. The current paper analyzes the impact of capital constraints on the design of financial claims assuming a financier with multiple tasks and a direct interaction of efforts. Cestone also considers advising and monitoring as the venture capitalist's primary tasks but assumes away entrepreneurial wealth constraints and the direct interaction of efforts. In her analysis the financier's late period advising and early period interference are positively related: offering a risky claim (such as equity) induces both tasks. The focus is on the negative impact of interference (monitoring) on the entrepreneur's initiative. In contrast, in the current model advising and monitoring negatively relate because of the conflict of incentives. In Cestone, control is retained by the entrepreneur whenever the need for late period advising requires the provision of a risky claim to the financier. Financing always occurs: the entrepreneur voluntarily relinquishes control in order to maximize project value, whenever the riskiness of the investor's claim is limited. In the current model entrepreneurs are credit rationed. A poor entrepreneur is forced to relinquish control in order to allow for positive monitoring and thereby obtain funding. This however has a negative impact on advising by the financier and thus entrepreneurial utility.

Proposition 1 implies that the involvement of a multitask financier may ease the tension between entrepreneurial moral hazard and investor participation. The monitoring and advising activities, when appropriately induced, increase ex-ante project value, thus allow the parties to share higher expected profits and, as a result, facilitate financing.

Corollary 1 *If* $\omega \in [\omega_{\mathbf{1}}^{\mathbf{M}}, \omega^{\mathbf{P}})$*, the venture will be funded by a multitask financier even though financing by a passive investor will not occur.*

B Separation of Tasks: Two Financiers

Here, I consider the involvement of two financiers, each investing funds in the venture.[13] Let H_a and H_m denote the success state cash-flows of the financier with the advising and the financier with the monitoring task. L_a and L_m represent the proceeds from the mundane project, to be transferred to the advisor and the monitor when no success occurs. I_a and I_m refer to the financiers' contributions to the investment outlay.

[13] The involvement of two (or more) financiers in the venture is a highly realistic assumption: venture capitalists often form syndicates and finance joint projects. Lerner (1994) provides related evidence.

I assume that payoffs are non-decreasing in project outcome:

$$H_a \geq L_a \geq 0, \tag{A.8}$$

$$H_m \geq L_m \geq 0. \tag{A.9}$$

This assumption implies that the entrepreneur offers cash-flows in the form of standard securities to the advisor and the monitor in exchange for their investments.

The equilibrium levels of advising and monitoring are determined by the incentive compatibility conditions of the advisor and the monitor, denoted by (IC_a) and (IC_m):

$$e_a = \arg \max_{0 \leq e_a \leq 1} \left\{ (p_h + e_a \tau) H_a + e_m (1 - p_h - e_a \tau) L_a - \frac{e_a^2}{2K} - I_a \right\},$$

$$e_m = \arg \max_{0 \leq e_m \leq 1} \left\{ (p_h + e_a \tau) H_m + e_m (1 - p_h - e_a \tau) L_m - \frac{e_m^2}{2K} - I_m \right\}.$$

Equilibrium efforts can be expressed as functions of the contracted cash-flows of the advisor (H_a, L_a) and the monitor (H_m, L_m):

$$\left\{ \hat{e}_a(H_a, L_a) = K\tau H_a,\ \hat{e}_m(H_m, L_m) = K \left(1 - p_h - K\tau^2 H_a\right) L_m \right\}.$$

A first result is that the entrepreneur offers different types of claims to the two financiers.

Lemma 3 *The entrepreneur offers the advisor an equity claim ($H_a > 0$, $L_a = 0$). If a monitor is hired, he is offered a debt contract ($H_m = L_m > 0$).*

The conflict between incentives for the two tasks is *partially* resolved through the involvement of two financiers: monitoring incentives do *not directly* affect effort on advice. The entrepreneur stimulates the support task by allocating the advisor a share in the success state returns and no share in the liquidation proceeds. The monitor receives equal cash-flows accross the positive outcome states. Monitoring has however no impact on the chance for success. Therefore, when anticipating high returns, the monitor will avoid accomplishing his task with intense effort exertion. As a result, the incentive conflict partially remains: incentives for advising still mitigate monitoring.

The advisor and the monitor will provide funding if the conditions for their participation are satisfied:

$$I_a \leq (p_h + \hat{e}_a \tau) H_a + \hat{e}_m (1 - p_h - \hat{e}_a \tau) L_a - \frac{\hat{e}_a^2}{2K},$$

$$I_m \leq (p_h + \hat{e}_a\tau) H_m + \hat{e}_m (1 - p_h - \hat{e}_a\tau) L_m - \frac{\hat{e}_m^2}{2K},$$

where $I_a + I_m = I - \omega$. Adding up the two inequalities, the condition for financing is obtained. Obviously, it is equivalent to the financing condition in the multitask case (IR_f):

$$\omega \geq I - (p_h + \hat{e}_a\tau)(H - H_e) - \hat{e}_m (1 - p_h - \hat{e}_a\tau)(L - L_e) + \frac{\hat{e}_a^2 + \hat{e}_m^2}{2K}.$$

The entrepreneur offers a cash-flow and control allocation that maximizes his expected returns, and satisfies all parties' incentive compatibility constraints and the financing condition:

$$\max_{e_a, e_m, H_e, L_e} (p_h + e_a\tau) H_e + e_m (1 - p_h - e_a\tau) L_e + (1 - e_m) B - C - \omega$$

subject to

$$(IC_e),\ (IC_a),\ (IC_m),\ (IR_f),$$

$$L_e \geq 0,$$

$$H = H_a + H_m + H_e,$$

$$L = L_a + L_m + L_e,$$

$$I = I_a + I_m + \omega.$$

The possibility for financing and the financial contract offered depend on capital constraints.

Proposition 2 *For given parameters (H, L, K, C, p_h, p_l, τ, I), there exist critical wealth levels $\omega_{\mathbf{1}}^{\mathbf{S}} > 0$ and $\omega_{\mathbf{2}}^{\mathbf{S}} > \omega_{\mathbf{1}}^{\mathbf{S}}$ such that*

i) if $\omega < \omega_{\mathbf{1}}^{\mathbf{S}}$, the entrepreneur will not receive financing.

ii) if $\omega_{\mathbf{1}}^{\mathbf{S}} \leq \omega < \omega_{\mathbf{2}}^{\mathbf{S}}$, the venture is jointly funded by two financiers, an advisor and a monitor. Financial claims are offered according to the results in Lemma 3. The entrepreneur relinquishes control to the financier with the monitoring task.

iii) if $\omega \geq \omega_{\mathbf{2}}^{\mathbf{S}}$, the venture is funded by a sole financier, an advisor. The entrepreneur offers an equity claim and retains control.

The intuition for this result is similar to the intuition behind Proposition 1. The entrepreneur likes advice and dislikes monitoring. Capital constraints may give rise to the need for positive monitoring

and thus the allocation of control to the financier with the monitoring task. More intense monitoring implies better terms of financing and less advice, just like in the multitask case. The trade-off here however arises for other reasons than in the multitask case. It is the assumption that the monitor's payoffs are non-decreasing in project outcome that creates the conflict of incentives.[14] Although he is hired to ensure positive liquidation returns, assumption (A.9) implies that the monitor receives equal cash-flows across the positive outcome states. This reduces the advisor's share in profits and thus the incentives for advice. As a result, an entrepreneur with sufficient self-financing contracts with only one financier: an advisor. In this case there is no incentive conflict, hence equilibrium advising will be high. A wealth constrained entrepreneur obtains funding from two financiers: an advisor and a monitor. He receives positive monitoring and therefore moderate effort on advice.

Proposition 2 implies that, similarly to the multitask case, advising and monitoring increase project value and thereby ease financing possibilities:

Corollary 2 *If* $\omega \in [\omega_{\mathbf{1}}^{\mathbf{S}}, \omega^{\mathbf{P}})$, *the venture will be funded jointly by an advisor and a monitor, even though financing by a passive investor will not occur.*

The findings in Corollaries 1 and 2 originate from the assumption that advice and monitoring are accomplished by the financiers of the entrepreneur's project. Value adding activities ease financial constraints if and only if they are performed by parties providing investment capital. This is because the financiers' participation constrains incentives for advising and monitoring. If financing and advising (or monitoring) were to be carried out by different parties, the involvement of an advisor (monitor) would make it more difficult for a poor entrepreneur to meet the condition for financing.[15]

III Choice between the Combination and Separation of Tasks

This section compares the results obtained in Propositions 1 and 2 in order to analyze the entrepreneur's choice between multitask financing and the separation of the two tasks.

Entrepreneurs with sufficient self-financing are indifferent between the possibilities for contracting with a multitask and two one-task financiers. This is because $\omega_{\mathbf{2}}^{\mathbf{M}} = \omega_{\mathbf{2}}^{\mathbf{S}}$ and the results in Proposition

[14] In the next section I discuss how relaxing assumption (A.9) would change the results.

[15] Casamatta (2003) provides a thorough analysis of this question.

2, case *iii* coincide with equity financing in the multitask case (Proposition 1, *iii*). Entrepreneurs with sufficient capital are able to receive maximum advising and least possible (zero) monitoring independent of the financing source. They can either contract with a multitask financier and restrict the monitoring effort to zero, by retaining all liquidation returns together with control, or simply avoid hiring a one-task monitor and contract with a sole advisor.

Wealth constrained entrepreneurs are however not indifferent in their choice of the financing source. When financing constraints give rise to positive monitoring (case (*ii*) in both Propositions 1 and 2), for any given level of entrepreneurial capital ω, advising is less, while monitoring is more intense under the separation of tasks than with multiple tasks. This is because with two financiers, success state returns are to be shared by three parties. As a consequence of assumption (A.9), it is more difficult to enhance the support task: whenever positive monitoring is needed, an advisor exerts less advising effort than a financier with multiple tasks. In this case, monitoring has an *indirect* negative effect on advising, which is even stronger than the direct effect realized in the multitask case. The following results arise under very general conditions in this model.

Proposition 3 *If* $\omega \in [\omega_{\mathbf{1}}^{\mathbf{M}}, \omega_{\mathbf{1}}^{\mathbf{S}})$*, the venture will be funded by a multitask financier even though joint financing by an advisor and a monitor will not occur.*

Proposition 4 *If* $\omega \in [\omega_{\mathbf{1}}^{\mathbf{S}}, \omega_{\mathbf{2}}^{\mathbf{S}}]$*, the entrepreneur prefers funding from a multitask financier to joint financing by an advisor and a monitor.*

The results suggest that multitask financing is particularly advantageous for entrepreneurs with low self-financing. The completion of the two tasks by the same financier both increases entrepreneurial welfare and expands financing possibilities. It is not surprising that in practice we observe many wealth-constrained entrepreneurs approaching venture capitalists rather than contracting simultaneously with a bank and a consulting firm.

Propositions 3 and 4 arise as a consequence of the assumption that the monitor's cash-flows are non-decreasing in project outcome. With assumption (A.9), the separation of tasks exacerbates rather than mitigates the incentive conflict between advising and monitoring. Relaxing this assumption would allow the incentive conflict to be resolved by separately contracting with an advisor and a monitor. This would give rise to opposite results with respect to the above propositions: the

separation of tasks would be more advantageous for poor entrepreneurs, in terms of both welfare and financing possibilities, than contracting with a venture capitalist. Assumption (A.9) is however very plausible for the problem considered in this paper. It constrains the space of available contracts such that compensation for effort is offered in the form of the cash-flow stream to a standard security. Since the advisor and the monitor are financiers to the project, it is highly reasonable to assume that their rewards are embedded in the cash-flows to specific securities with returns non-decreasing in the outcome of the project financed.

IV Multitask Financing with State-contingent Control

In previous sections, I assume that the cash-flow and control allocation are specified at the outset when the contract is signed and the investment is made. Evidence exists however that in many venture financing deals the allocation of control rights is contingent on future firm performance (Kaplan and Strömberg 2003a, page 14). In general, under good performance the entrepreneur regains control over the firm.[16] When the new firm is less successful, however, the financier remains in control.

State-contingent control allocation naturally arises in the model proposed when the financier is assumed to carry out his tasks sequentially. In what follows, I consider a set-up in which an entrepreneur and a multitask financier jointly determine the probability of success in an initial stage. Monitoring occurs in a second period after the observation of a bad interim signal.

There are three dates: $t \in \{0, 1, 2\}$. At $t = 0$ the contract is signed and the investment is made. Returns are realized at $t = 2$. After the first stage (at $t = 1$), an interim signal about profitability arrives. The signal is verifiable and can be high or low. If it is high, success occurs with probability one: a return of H is generated at $t = 2$. If the signal turns out to be low, success occurs with probability $\gamma \in [0, 1)$, and the venture is unsuccessful with probability $1 - \gamma$. In the latter scenario, project outcome can be 0 or L depending on whether the creative or the mundane project prevails.

The probability of a high first period signal depends on joint effort exerted by the entrepreneur and the financier. If the entrepreneur works and the financier exerts advising effort e_a, a high (low)

[16] This may occur at an IPO for example, when the venture capitalist (partially) exits the investment and the entrepreneur continues managing the firm.

signal arrives with probability $p_h + e_a\tau$ (with probability $1 - p_h - e_a\tau$). When the entrepreneur avoids incurring the cost of effort C, the probability of high and low signals will be $p_l + e_a\tau$ and $1 - p_l - e_a\tau$.

The monitoring task is accomplished in the second period, if, after a low interim signal at $t = 1$, control is transferred to the investor. In case of a good signal, there is no need for monitoring, thus the control right is retained by the entrepreneur. This set-up captures a highly realistic scenario in which control allocation is state-contingent and depends on a verifiable interim profitability signal.

If the conditional probability of success given a low interim signal is positive ($\gamma > 0$), under the above assumptions, equilibrium efforts on both tasks are lower than in the simultaneous effort exertion case (Section II.A). As a consequence, funding possibilities contract: the entrepreneur needs to contribute more to the investment outlay to ensure external financing. As γ decreases, efforts on both tasks intensify and financing possibilities expand. When $\gamma = 0$, the results coincide with those described in Proposition 1.

The intuition is as follows. The positive probability of success given a low interim signal ($\gamma > 0$), alleviates the need for excessive monitoring in the second period. Thus, for any given cash-flow allocation, monitoring is less intense than its equilibrium level when the two tasks are performed simultaneously. Advising, similarly to the simultaneous efforts case, raises the chance for success. At the same time, it decreases the probability of a low interim signal. However $\gamma > 0$ implies that there is a positive probability that success occurs after a low interim state. This lowers the equilibrium level of advice compared to the simultaneous tasks case.

In conclusion, when the financier performs his tasks sequentially, equilibrium advising and monitoring are less intense and the financing of a poor entrepreneur is more difficult than in the simultaneous tasks case. When the allocation of control and thus monitoring are contingent on an interim state, the resolution of uncertainty is postponed. As a result, the financier has less incentives to exert effort on his tasks. If uncertainty resolves at an early stage, in the sense that after a low interim signal final stage success is not possible ($\gamma = 0$), the equilibrium coincides to the Nash outcome of the simultaneous tasks case (Proposition 1).

V Venture Capital vs Bank Financing

This section highlights the difference between venture capital (multitask) financing and bank financing. Bank financing coincides with the case of a one-task monitor being the sole financier of the entrepreneur's project. I refer to the monitor's cash-flows in the success and failure states by H_f and L_f. His contribution to the investment outlay is denoted by I_f.

In this set-up, the probability of success is determined by the entrepreneur alone. The entrepreneur works if his incentive compatibility condition is satisfied:

$$H_e \geq \frac{C}{p_h - p_l} + e_m L_e.$$

If the financier has control, he chooses the level of monitoring to maximize his expected returns:

$$e_m = \arg \max_{0 \leq e_m \leq 1} \left(p_h H_f + e_m \left(1 - p_h\right) L_f - \frac{e_m^2}{2K} - I_f \right).$$

Equilibrium monitoring thus satisfies

$$\hat{e}_m(L_f) = K \left(1 - p_h\right) L_f.$$

Similarly to the multitask case, the higher the financier's share in liquidation returns, the more intense is his monitoring effort. The condition for financing is

$$I_f \leq p_h H_f + \hat{e}_m \left(1 - p_h\right) L_f - \frac{\hat{e}_m^2}{2K},$$

where $I_f = I - \omega$. The constraint shows that the amount of capital the entrepreneur needs to contribute to ensure external financing, ω, is decreasing in L_f. The result follows.

Proposition 5 *For given parameters (H, L, K, C, p_h, p_l, τ, I), there exists a critical wealth level $\omega^{\mathbf{B}} > 0$ such that*

i, if $\omega < \omega^{\mathbf{B}}$, the entrepreneur will not receive financing.

ii, if $\omega^{\mathbf{B}} \leq \omega < \omega^{\mathbf{P}}$, the venture is funded and the claim offered by the entrepreneur resembles to a debt contract. Equilibrium monitoring is positive. Control is transferred to the financie.

iii, if $\omega \geq \omega^{\mathbf{P}}$, the venture is funded and the financier is offered an equity contract. Equilibrium monitoring is zero. The entrepreneur retains control.

Obviously, the positive aspect of monitoring is that it eases the possibility for financing, compared to the passive investor's case: $\omega^{\mathbf{B}} < \omega^{\mathbf{P}}$. This result is in line with Holmström and Tirole (1997) and Dessi (2002). Both suggest that costly monitoring by an intermediary may increase access to financing for entrepreneurs whose wealth is insufficient to commit to an appropriate action choice in the presence of moral hazard. Monitoring in those models indirectly raises expected returns, by reducing the opportunity cost of working for the entrepreneur. Here, the monitoring activity directly increases the expected value of the venture: it decreases potential losses of verifiable returns through eliminating non-verifiable entrepreneurial rewards. The assumption of continuous effort has implications concerning the form of the monitor's financial claim: the more capital constrained an entrepreneur, the more likely that he relinquishes control and offers the financier a debt-like contract. Only entrepreneurs with sufficient capital can retain control and issue equity claims.

The entrepreneur's choice between multitask and bank financing depends on both financing constraints and expected returns.

Proposition 6 *If $\omega \in [\omega_{\mathbf{1}}^{\mathbf{M}}, \omega^{\mathbf{B}})$, the venture will be funded by a multitask financier even though financing by a bank will not occur.*

Although the financier's involvement in an additional task lowers his effort on monitoring, total value added is higher in the multitask case. As a consequence, for a poor entrepreneur it is easier to obtain financing from a venture capitalist than from a bank. An entrepreneur with more self-financing may also prefer funding from a venture capitalist since advising increases while monitoring decreases his utility. Thus venture capital may be preferred to bank financing also by less capital constrained entrepreneurs.

VI Empirical Implications

The model has empirical implications concerning the impact of financial constraints on the design of securities and the allocation of control rights in venture capital contracts. In particular, Propositions 1 and 2 imply two testable hypotheses.

Hypothesis 1 *Projects of poor entrepreneurs will be financed either with a convertible security or a mixture of debt and equity claims. Investors will be in control in such projects.*

Hypothesis 2 *Entrepreneurs with substantial self-financing retain control and issue equity contracts.*

Propositions 3 and 4 have predictions concerning the likely source of funding for entrepreneurs endowed with different amounts of capital.

Hypothesis 3 *Poor entrepreneurs are more likely to obtain funding from a venture capitalist than to contract with a consulting firm and a bank simultaneously.*

Hypothesis 4 *In projects of more established ventures, the participation of a venture capitalist and the joint participation of a consulting firm and a bank are both likely to be observed.*

Hypotheses 1 and 3 predict contracting solutions for entrepreneurs with severe capital needs. To the extent that start-up ventures are associated with capital poor entrepreneurs, hypotheses 1 and 3 match the existing evidence: in entrepreneurial start-ups, most financiers hold convertible preferred equity and have a large variety of control rights (Kaplan and Strömberg (2003a)). Moreover, start-up firms tend to be financed by venture capitalists rather than banks.

In turn, hypotheses 2 and 4 concern the financing of projects at more established ventures. Hypothesis 2 fits well the definition of corporate venturing: "The corporate venturing process focuses on the building of a partnership between two separate companies, in which one, usually the larger company 'invests' directly in the other in return for a share in that company's future. ... The return may be an equity stake, usually a minority shareholding allowing the smaller business to retain its independence."[17] Bank financing and contracting with consulting firms both characterize the realization of projects at more capital rich ventures.

VII Concluding Remarks

The primary tasks of venture capitalists, advising and monitoring, may require different incentives. This paper shows that even if incentives for the two tasks conflict, poor entrepreneurs prefer to contract with a multitask financier rather than with an advisor and a monitor separately. This provides one possible explanation for the existence of venture capital, as a form of financial intermediation, in which the tasks of advising and monitoring are fulfilled by a sole financier.

[17] The Corporate Venturing factsheet, www.is4profit.com.

The implications of the theory coincide, to a great extent, with observed features of venture capital firms and contracts. In particular, they justify the existence of both start-up financing and corporate venturing and the prevalent use of both equity and convertible securities together with control rights in venture capital contracting. In this respect, the paper provides one of the first theories accounting for a joint allocation of cash-flow and control rights in venture financing.

Focusing on the conflicting dimensions of the involvement of venture capitalists, the paper also contributes to the literature on multitask moral hazard analysis. In contrast to earlier results, it spells out an application in which, in spite of the conflict of incentives, the combination of the two tasks is more efficient than their separation. This indicates that in specific situations involving agents with multiple tasks, insights from the general theory may require further scrutiny.

The proposed theory of multitask financing certainly has limitations. The model does not account for a number of typical features of venture capital such as the staging and the syndication of investments, or the variety of different exit routes used by venture capitalists. It captures however, I believe, a core element in the complex phenomenon, which has implications for financiers' value adding and financial contract design. Available evidence, although not abound, confirms this view.

Appendix

Proof of Lemma 1: Under multitask financing the total value of the venture V can be written as

$$V = (p_h + e_a\tau)\, H + e_m\,(1 - p_h - e_a\tau)\, L + (1 - e_m)\, B - C - \frac{e_a^2 + e_m^2}{2K} - I. \tag{1}$$

First best advising and monitoring can be defined by maximizing (1) with respect to e_a and e_m:

$$e_a = K\tau(H - e_m L), \tag{2}$$

$$e_m = K\,(1 - p_h - e_a\tau)\, L - KB. \tag{3}$$

The first best advising e_a^{FB} and monitoring e_m^{FB} are equal to

$$e_a^{FB} = K\tau \frac{H - KL^2\,(1 - p_h) + KLB}{1 - K^2\tau^2 L^2}, \tag{4}$$

$$e_m^{FB} = K \frac{L\,(1 - p_h - K\tau^2 H) - B}{1 - K^2\tau^2 L^2}. \tag{5}$$

Since $e_m \in [0, 1]$, (5) suggests that a critical level of private benefits B^* can be defined such that for any $B \geq B^* = L\,(1 - p_h - K\tau^2 H)$, $e_m^{FB} = 0$ and for any $B < B^*$, $e_m^{FB} > 0$. Obviously, first best advising will be positive for any $B > 0$ (since $H > KL^2(1 - p_h)$ by assumption (A.1)).$\diamondsuit$

Proof of Lemma 2: The entrepreneur's problem when he contracts with a multitask financier is as follows:

$$\max_{e_a, e_m, H_e, L_e} (p_h + e_a\tau)\, H_e + e_m\,(1 - p_h - e_a\tau)\, L_e + (1 - e_m)\, B - C - \omega \tag{6}$$

subject to

$$H_e \geq \frac{C}{p_h - p_l} + e_m L_e, \tag{7}$$

$$L_e \geq 0, \tag{8}$$

$$e_a = \arg \max_{0 \leq e_a \leq 1} \left\{ (p_h + e_a\tau)\, H_f + e_m\,(1 - p_h - e_a\tau)\, L_f - \frac{e_m^2 + e_a^2}{2K} - I_f \right\}, \tag{9}$$

$$e_m = \arg \max_{0 \leq e_m \leq 1} \left\{ (p_h + e_a\tau)\, H_f + e_m\,(1 - p_h - e_a\tau)\, L_f - \frac{e_m^2 + e_a^2}{2K} - I_f \right\}, \tag{10}$$

$$I_f \leq (p_h + e_a\tau)\, H_f + e_m\,(1 - p_h - e_a\tau)\, L_f - \frac{e_m^2 + e_a^2}{2K}, \tag{11}$$

$$H = H_f + H_e, \tag{12}$$

$$L = L_f + L_e, \tag{13}$$

$$I = I_f + \omega. \tag{14}$$

The first two expressions include incentive compatibility and limited liability constraints for the entrepreneur. (9) and (10) express the financier's incentive compatible effort choices. The financier's participation condition is given in (11). Constraints (12)-(14) ensure the feasibility of the solution. To prove the result in Lemma 2, I express equilibrium efforts on advising $\hat{e}_a$ and monitoring $\hat{e}_m$ from (9) and (10):

$$\begin{aligned} \hat{e}_a(H_f, L_f) &= K\tau\left(H_f - \hat{e}_m L_f\right), & (15)\\ \hat{e}_m(H_f, L_f) &= KL_f\left(1 - p_h - \hat{e}_a\tau\right). & (16) \end{aligned}$$

The unique solutions are:

$$\begin{aligned} \hat{e}_a(H_f, L_f) &= K\tau\frac{H_f - KL_f^2\left(1 - p_h\right)}{1 - K^2\tau^2 L_f^2}, & (17)\\ \hat{e}_m(H_f, L_f) &= KL_f\frac{1 - p_h - K\tau^2 H_f}{1 - K^2\tau^2 L_f^2}. & (18) \end{aligned}$$

When $L_f \geq 0$ and $H_f \geq L_f$, and assumptions (A.1)-(A.2) hold, the solutions are:
a, If $L_f = 0$ and $0 < H_f < H$, then $\{\hat{e}_a = K\tau H_f, \hat{e}_m = 0\}$.
b, If $L_f > 0$ and $0 < H_f < H$, then $(0 < \hat{e}_a < 1,\ 0 < \hat{e}_m < 1)$; the solution in (17) and (18) applies.
The result in Lemma 2 is obtained from calculating partial derivatives of expressions (17) and (18) with respect to H_f and L_f (I use assumptions (A.1)-(A.2)):

$$\begin{aligned} \frac{\partial \hat{e}_a}{\partial H_f} &= \frac{\tau K}{1 - K^2\tau^2 L_f^2} > 0, & (19)\\ \frac{\partial \hat{e}_m}{\partial H_f} &= -\frac{K^2\tau^2 L_f}{1 - K^2\tau^2 L_f^2} < 0, & (20)\\ \frac{\partial \hat{e}_a}{\partial L_f} &= -\frac{2K^2\tau L_f\left[1 - p_h - K\tau^2 H_f\right]}{\left[1 - K^2\tau^2 L_f^2\right]^2} < 0, & (21)\\ \frac{\partial \hat{e}_m}{\partial L_f} &= \frac{K\left(1 + L_f^2 K^2\tau^2\right)\left[1 - p_h - K\tau^2 H_f\right]}{\left[1 - K^2\tau^2 L_f^2\right]^2} > 0. & (22) \end{aligned}$$

This completes the proof. $\diamondsuit$

Proof of Proposition 1: When the entrepreneur contracts with a multitask financier, the contract $\{H_e, H_f, L_e, L_f, I_f\}$ is a solution to the problem defined by equations (6)-(14). The condition for financing is expressed from (11):

$$\omega \geq I - (p_h + e_a\tau) H_f - e_m (1 - p_H - e_a\tau) L_f + \frac{e_m^2 + e_a^2}{2K}. \tag{23}$$

Therefore, in equilibrium, the following holds:

$$\omega \geq I - (p_h + \hat{e}_a\tau) H_f - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K}, \tag{24}$$

where $\hat{e}_a$, $\hat{e}_m$ depend on the contracted cash-flow allocation $\{H_e, H_f, L_e, L_f\}$ and satisfy (17), (18). Next, I consider the condition for financing under different cash-flow allocations.

a, When cash flows are such that $(L_f = 0, H > H_f > 0)$, equilibrium monitoring is zero, and there is positive effort on advice $\{\hat{e}_a = K\tau H_f, \hat{e}_m = 0\}$. The financing condition in this scenario is:

$$\omega \geq I - p_h H_f - \frac{1}{2} K\tau^2 H_f^2. \tag{25}$$

Maximum returns for the investor, such that the entrepreneur's incentive compatibility condition (7) holds, are $H_f^{\max} = H - \frac{C}{p_h - p_l}$. Thus a critical level of the entrepreneur's wealth $\omega_{\mathbf{2}}^{\mathbf{M}}$ can be derived, above which the condition for financing is satisfied such that the entrepreneur obtains funding with zero monitoring and positive advising:

$$\omega \geq \omega_{\mathbf{2}}^{\mathbf{M}} \quad = \quad \omega^{\mathbf{P}} - \frac{1}{2} K\tau^2 \left(H - \frac{C}{p_h - p_l} \right)^2, \tag{26}$$

where $\omega^{\mathbf{P}} = I - p_h \left(H - \frac{C}{p_h - p_l} \right)$ is the minimum capital the entrepreneur needs to provide to be able to contract with a passive financier.

b, If the cash-flow allocation is such that $(L > L_f > 0, H > H_f > 0)$, equilibrium efforts on both advising and monitoring will be positive: $\left\{ \hat{e}_a = K\tau \frac{H_f - K\tau L_f^2 (1 - p_h)}{1 - K^2\tau^2 L_f^2}, \hat{e}_m = K L_f \frac{1 - p_h - K\tau^2 H_f}{1 - K^2\tau^2 L_f^2} \right\}$.
Maximum returns for the investor are $L_f^{\max} = L$, $H_f^{\max} = H - \frac{C}{p_h - p_l}$ in the high and low states, respectively. The condition for financing (23) is satisfied if the entrepreneur's wealth exceeds a critical level, $\omega_{\mathbf{1}}^{\mathbf{M}}$:

$$\omega \geq \omega_{\mathbf{1}}^{\mathbf{M}} = \omega^{\mathbf{P}} - \hat{e}_a\tau \left(H - \frac{C}{p_h - p_l} \right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K}, \tag{27}$$

where $\left\{ \hat{e}_a = K\tau \frac{H_f^{\max} - KL^2 (1 - p_h)}{1 - K^2\tau^2 L^2}, \hat{e}_m = KL \frac{1 - p_h - K\tau^2 H_f^{\max}}{1 - K^2\tau^2 L^2}, H_f^{\max} = H - \frac{C}{p_h - p_l} \right\}$.

It remains to be shown that

$$\omega_{\mathbf{1}}^{\mathbf{M}} < \omega_{\mathbf{2}}^{\mathbf{M}}. \tag{28}$$

To prove this, I rewrite the above inequality using the results in (26) and (27):

$$-\hat{e}_a \tau \left(H_f^{\max}\right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K} < -\frac{1}{2} K \tau^2 \left(H_f^{\max}\right)^2, \tag{29}$$

where $\left\{\hat{e}_a = K\tau \frac{H_f^{\max} - KL^2(1-p_h)}{1-K^2\tau^2L^2}, \hat{e}_m = KL\frac{1-p_h-K\tau^2 H_f^{\max}}{1-K^2\tau^2L^2}, H_f^{\max} = H - \frac{C}{p_h-p_l}\right\}$.
Using (15), it can be shown that (29) is equivalent to the following condition:

$$1 > \tau^2 K^2 L^2. \tag{30}$$

The condition holds for all parameter values of the model due to assumption (A.1). $\diamondsuit$

Proof of Corollary 1: Corollary 1 follows from Proposition 1.

Proof of Lemma 3: I specify first the entrepreneur's problem, assuming he contracts with two financiers, an advisor and a monitor. I refer to the advisor and the monitor with subscripts 'a' and 'm':

$$\max_{e_a, e_m, H_e, L_e} (p_h + e_a\tau) H_e + e_m (1 - p_h - e_a\tau) L_e + (1 - e_m) B - C - \omega \tag{31}$$

subject to

$$H_e \geq \frac{C}{p_h - p_l} + e_m L_e, \tag{32}$$

$$L_e \geq 0, \tag{33}$$

$$e_a = \arg \max_{0 \leq e_a \leq 1} \left\{ (p_h + e_a\tau) H_a + e_m (1 - p_h - e_a\tau) L_a - \frac{e_a^2}{2K} - I_a \right\}, \tag{34}$$

$$e_m = \arg \max_{0 \leq e_m \leq 1} \left\{ (p_h + e_a\tau) H_m + e_m (1 - p_h - e_a\tau) L_m - \frac{e_m^2}{2K} - I_m \right\}, \tag{35}$$

$$I_a \leq (p_h + e_a\tau) H_a + e_m (1 - p_h - e_a\tau) L_a - \frac{e_a^2}{2K}, \tag{36}$$

$$I_m \leq (p_h + e_a\tau) H_m + e_m (1 - p_h - e_a\tau) L_m - \frac{e_m^2}{2K}, \tag{37}$$

$$H = H_a + H_m + H_e, \tag{38}$$

$$L = L_a + L_m + L_e, \tag{39}$$

$$I = I_a + I_m + \omega. \tag{40}$$

Constraints (32) and (33) represent incentive compatibility and limited liability conditions for the entrepreneur. (34) and (35) express the incentive compatible effort choices of the financier with the advising and the financier with the monitoring task, respectively. The two participation conditions are given in (36) and (37). Constraints (38)-(40) ensure the feasibility of the solution.

To prove the result in Lemma 3, we express efforts on advising and monitoring from (34) and (35):

$$\hat{e}_a(H_a, L_a) = K\left(\tau H_a - \hat{e}_m \tau L_a\right), \tag{41}$$

$$\hat{e}_m(H_m, L_m) = K\left(1 - p_h - \hat{e}_a \tau\right) L_m. \tag{42}$$

Providing a claim such that $L_a > 0$ to the advisor decreases effort on advice. Thus the entrepreneur, when maximizing expected returns, offers the advisor an equity claim, such that $L_a = 0$. At the same time, success state returns will not provide incentives for monitoring. Given assumption (A.9), the monitor's claim must be a straight debt contract: $H_m = L_m = L - L_e$. $\diamondsuit$

Proof of Proposition 2: When the entrepreneur contracts with two financiers, the problem is defined by equations (31)-(40). Given the results in Lemma (3) and conditions (38)-(40), equilibrium efforts on the two tasks can be expressed as

$$\hat{e}_a(H_a, L_a) = K\tau H_a, \tag{43}$$

$$\hat{e}_m(H_m, L_m) = K\left(1 - p_h - K\tau^2 H_a\right) L_m. \tag{44}$$

Adding up the two participation constraints (36) and (37) and using equations (38)-(40), the condition for financing can be written as

$$\omega \geq I - \left(p_h + e_a \tau\right)\left(H - H_e\right) - e_m\left(1 - p_h - e_a \tau\right)\left(L - L_e\right) + \frac{e_a^2 + e_m^2}{2K}. \tag{45}$$

Using (42) and (41), and the results in Lemma (3), I rewrite this condition to the following form:

$$\omega \geq I - \left(p_h + \hat{e}_a \tau\right)\left(H - H_e\right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K}, \tag{46}$$

where $\hat{e}_a$, $\hat{e}_m$ depend on the financiers' cash-flows $\{H_a, L_a, H_m, L_m\}$ and satisfy equations (43), (44). Last, I consider the condition for financing under different cash-flow allocations.

a, If cash-flow rights are such that $(H_a > 0,\ L_a = 0,\ H_m = L_m = 0)$, equilibrium monitoring is zero

while advising is positive $\{\hat{e}_a(H_a, L_a) = K\tau H_a;\ \hat{e}_m(H_m, L_m) = 0\}$. The incentive compatibility condition in (32) implies that $H_a^{\max} = H - \frac{C}{p_h - p_l}$. Thus a critical wealth level $\omega_{\mathbf{2}}^{\mathbf{S}}$ can be derived such that the entrepreneur the receives external funding with zero monitoring and positive advising:

$$\omega \geq \omega_{\mathbf{2}}^{\mathbf{S}} = \omega^{\mathbf{P}} - \frac{1}{2}K\tau^2\left(H - \frac{C}{p_h - p_l}\right)^2, \tag{47}$$

where $\omega^{\mathbf{P}}$ is the minimum capital the entrepreneur needs to provide to be able to contract with a passive financier. This condition is identical to (26).

b, If the cash-flow allocation is such that $(H_a > 0,\ L_a = 0,\ H_m = L_m > 0)$, equilibrium advising and monitoring are both positive: $\{\hat{e}_a(H_a, L_a) = K\tau H_a;\ \hat{e}_m(H_m, L_m) = K\left(1 - p_h - K\tau^2 H_a\right) L_m\}$. Conditions (32) and (33) suggest that $H_e^{\min} = \frac{C}{p_h - p_l}$ and $L_e^{\min} = 0$. Therefore, maximum returns to the financiers are: $H_m^{\max} = L_m^{\max} = L$ and $H_a^{\max} = H - \frac{C}{p_h - p_l}$. With maximum monitoring $(H_m^{\max} = L_m^{\max} = L)$, the advisor's maximum returns are $H_a = H - L - \frac{C}{p_h - p_l}$. Under this scenario, the entrepreneur receives funding if his capital endowment exceeds the critical level $\omega_{\mathbf{1}}^{\mathbf{S}}$:

$$\omega \geq \omega_{\mathbf{1}}^{\mathbf{S}} = \omega^{\mathbf{P}} - \hat{e}_a\tau\left(H - \frac{C}{p_h - p_l}\right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K}, \tag{48}$$

where $\left\{\hat{e}_a = K\tau H_a;\ \hat{e}_m = K\left(1 - p_h - K\tau^2 H_a\right) L;\ H_a = H - L - \frac{C}{p_h - p_l}\right\}$.

It remains to be shown that

$$\omega_{\mathbf{1}}^{\mathbf{S}} < \omega_{\mathbf{2}}^{\mathbf{S}}. \tag{49}$$

To prove this, I rewrite the inequality using the results in (47) and (48):

$$-\hat{e}_a\tau\left(H - \frac{C}{p_h - p_l}\right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K} < -\frac{1}{2}K\tau^2\left(H - \frac{C}{p_h - p_l}\right)^2. \tag{50}$$

Using (41) and (42), it can be shown that (50) is equivalent to the following condition:

$$1 - p_h - K\tau^2 H_a > \tau. \tag{51}$$

The condition holds for all parameter values of the model due to assumption (A.2). $\diamondsuit$

Proof of Corollary 2: Corollary 2 follows from Proposition 2.

Proof of Proposition 3: To show that

$$\omega_{\mathbf{1}}^{\mathbf{M}} < \omega_{\mathbf{1}}^{\mathbf{S}} \tag{52}$$

I substitute back $\left\{\hat{e}_a = K\tau\frac{H_f^{\max}-KL^2(1-p_h)}{1-K^2\tau^2L^2};\ \hat{e}_m = KL\frac{1-p_h-K\tau^2H_f^{\max}}{1-K^2\tau^2L^2};\ H_f^{\max} = H - \frac{C}{p_h-p_l}\right\}$ to expression (27) and $\left\{\hat{e}_a = K\tau H_a;\ \hat{e}_m = K\left(1-p_h-K\tau^2H_a\right)L;\ H_a = H - L - \frac{C}{p_h-p_l}\right\}$ to expression (48). After simplification, condition (52) can be written as

$$\frac{1}{1-K^2\tau^2L^2}\left(2\tau^2\alpha\left(\alpha - KL^2\left(1-p_h\right)\right) - \tau^2\alpha^2 + \left(1-p_h\right)^2L^2\right) \tag{53}$$

$$> \quad \tau^2\alpha^2 - \tau^2L^2 + L^2\left(1-p_h-K\tau^2\left(\alpha-L\right)\right)^2, \tag{54}$$

where $\alpha = \left(H - \frac{C}{p_h-p_l}\right)$. The inequality is equivalent to

$$\frac{1}{1-K^2\tau^2L^2}\left(\tau^2\alpha^2 + \left(1-p_h\right)^2L^2 - 2K\tau^2L^2\left(1-p_h\right)\alpha\right) \tag{55}$$

$$> \quad \tau^2\alpha^2 + \left(1-p_h\right)^2L^2 - 2K\tau^2L^2\left(1-p_h\right)\left(\alpha-L\right) - \tau^2L^2\left(1-K^2\tau^2\left(\alpha-L\right)^2\right). \tag{56}$$

Due to assumption (A.1), the condition holds for the parameters of the model. $\diamondsuit$

Proof of Proposition 4: Proposition 4 follows from the fact that advising is more while monitoring is less intense under multitask financing than under the separation of the two tasks. When positive monitoring is required, the entrepreneur will choose a multitask financier since advising increases while monitoring, given assumption (A.7), decreases her expected returns. $\diamondsuit$

Proof of Proposition 5: The entrepreneur's problem, when he contracts with a one-task monitor, can be specified as follows:

$$\max_{e_m,H_e,L_e}\left(p_hH_e + \left(1-p_h\right)e_mL_e + \left(1-e_m\right)B - C - \omega\right) \tag{57}$$

subject to

$$H_e \geq \frac{C}{p_h-p_l} + e_mL_e, \tag{58}$$

$$L_e \geq 0, \tag{59}$$

$$e_m = \arg\max_{0\leq e_m\leq 1}\left\{p_hH_f + e_m\left(1-p_h\right)L_f - \frac{e_m^2}{2K} - I_f\right\}, \tag{60}$$

$$I_f \leq p_hH_f + e_m\left(1-p_h\right)L_f - \frac{e_m^2}{2K}, \tag{61}$$

$$H = H_f + H_e, \tag{62}$$

$$L = L_f + L_e, \tag{63}$$

$$I = I_f + \omega. \tag{64}$$

The first two inequalities are the incentive compatibility and limited liability constraints of the entrepreneur. (60) and (61) represent the financier's incentive compatibility and participation conditions. The last three equations ensure feasibility of the solution. Equilibrium monitoring is given by the financier's incentive compatibility condition (60):

$$\hat{e}_m(L_f) = K\left(1 - p_h\right) L_f. \tag{65}$$

The condition for financing is derived from the participation constraint (61):

$$\omega \geq \omega^{\mathbf{B}} = \omega^{\mathbf{P}} - \frac{1}{2} K \left(1 - p_h\right)^2 L^2, \tag{66}$$

where $\omega^{\mathbf{P}} = I - p_h \left(H - \frac{C}{p_h - p_l}\right)$. If condition (66) is not satisfied, the entrepreneur will not receive financing. When $\omega^{\mathbf{B}} < \omega < \omega^{\mathbf{P}}$, the entrepreneur receives financing and the financier exerts positive monitoring effort: $\hat{e}_m = K\left(1 - p_h\right)\left(L - L_e\right)$. The entrepreneur relinquishes control and offers a debt contract: $\{H_f = L_f,\ L_f = L - L_e\}$. If $\omega \geq \omega^{\mathbf{P}}$, the entrepreneur retains control together with all liquidation returns: $\{L_f = 0,\ L_e = L\}$. The monitor is rewarded only in the good outcome state: he is offered an equity contract. $\diamondsuit$

Proof of Proposition 6: To show that

$$\omega_{\mathbf{1}}^{\mathbf{M}} < \omega^{\mathbf{B}} \tag{67}$$

I substitute back $\left\{\hat{e}_a = K\tau \frac{H_f^{\max} - KL^2(1-p_h)}{1 - K^2\tau^2 L^2},\ \hat{e}_m = KL \frac{1 - p_h - K\tau^2 H_f^{\max}}{1 - K^2\tau^2 L^2},\ H_f^{\max} = H - \frac{C}{p_h - p_l}\right\}$ to (27) and compare the resulting expression to (66). (67) turns out to be equivalent to:

$$\frac{1}{\left(1 - K^2\tau^2 L^2\right)} \left[-2\tau^2\alpha\left(\alpha - KL^2\left(1 - p_h\right)\right) + \left(\tau^2\alpha^2 - L^2\left(1 - p_h\right)^2\right)\right] < -\left(1 - p_h\right)^2 L^2, \tag{68}$$

where $\alpha = H - \frac{C}{p_h - p_l}$. This expression can be written as:

$$\left(\alpha - KL^2\left(1 - p_h\right)\right)^2 > 0. \tag{69}$$

(69) holds for all parameter values of the model. $\diamondsuit$

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