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Chapter 2

Advice and Monitoring: Venture Financing with Multiple Tasks*

Abstract: This essay focuses on the dual role of venture capitalists as both advisors and monitors in entrepreneurial firms. It proposes a distinction between the two tasks based on the principle that advising is congruent while monitoring is dissonant with respect to entrepreneurial preferences. The analysis shows that despite the conflict of incentives between the two tasks, in equilibrium, an entrepreneur with substantial capital needs will enter into a contract with a multitask financier rather than with an advisor and a monitor separately. This provides an explanation for the existence of venture capital, a form of financial intermediation, in which the tasks of advising and monitoring are fulfilled by a sole financier. Consistent with observed features of venture capital contracting, the model predicts the prevalent use of convertible securities together with control rights in the financing of capital-constrained start-up entrepreneurs.

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2.1 Introduction

A distinctive feature of venture capital financing is the active involvement of financiers in the realization of the projects funded. The various value-adding roles venture capitalists perform have been documented by Sahlman (1988, 1990), Gompers (1995), Lerner (1995), Gorman and Sahlman (1989), and Hellmann and Puri (2000, 2002). Recent 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 these hands-on investors play both supportive and controlling roles in building up human resource policies at newly established companies. In line with their finding, Kaplan and Strömberg (2004) and Sapienza et al. (1996) distinguish between measures of support and governance when analyzing the determinants of venture funds' involvement in the management of entrepreneurial firms.

This paper provides a theory for the dual role of venture financiers as advisors and monitors in entrepreneurial firms. It argues that advising is congruent, while monitoring is dissonant with respect to entrepreneurial preferences. In other words, the financier's incentives for advising are in line with entrepreneurial incentives, while those for monitoring are in contrast. Based on this principle, the following distinction between the two tasks is proposed. Advising seeks to enhance the chance for a successful project outcome and thereby increase both the venture capitalist's and the entrepreneur's expected returns. Aiming at reducing potential losses, monitoring increases verifiable returns too. At the same time, however, it imposes a cost on the entrepreneur by eliminating his private (non-verifiable) rewards. These definitions give rise to an incentive conflict between the two tasks: advising lowers the venture capitalist's effort on monitoring, while monitoring reduces his effort on advice. Intuitively, the negative interaction arises because advice and monitoring affect project returns in different realizations of the future state.

I analyze a model where, in order to realize his project idea, a wealth-constrained entrepreneur needs funding from a financier who may perform advising and/or monitoring...
activities. The project requires that, besides the financier, also the entrepreneur exerts effort. In line with the view that advising is congruent with the entrepreneur’s interests, I assume that the financier’s advice together with the entrepreneur’s effort enhances the chance for project success. The nature of monitoring is different. Monitoring increases verifiable returns for the no-success state at the price of reducing the entrepreneur’s private (non-verifiable) rewards. Although, since private rewards may be substantial, the entrepreneur prefers advising over monitoring, the latter is needed to increase the chance for obtaining funding when he is highly wealth-constrained.

The first question considered in the paper is: What does the conflict of incentives between advising and monitoring imply for financial contracting between entrepreneurs and venture capitalists? In particular, can a multitask theory of venture financing explain evidence unaccounted for by earlier theories such as the joint allocation of convertible securities and control rights to venture capitalists? I show that under multitask financing two equilibrium patterns of funding arise. A highly wealth-constrained entrepreneur relinquishes control and issues a convertible claim. He receives moderate advising since positive monitoring reduces the financier’s incentives to provide advice. An entrepreneur with more self-financing is able to limit monitoring and stimulate advising by issuing a more cash-flow sensitive claim, such as equity. The intuition arises from the fact that the entrepreneur likes advice and dislikes monitoring. Wealth-constraints, however, give rise to the need for monitoring. To induce advising, the entrepreneur will offer the financier an equity contract. To provide incentives to monitor, he will allocate the financier (some of the) returns in the no-success state and will issue a debt-like claim. The more capital constrained the entrepreneur, the more difficult it is to alleviate the consequences of moral hazard. As a result, the higher the financier’s effort on monitoring, the lower his effort on advice, and the less convex the security he holds. Therefore, highly capital constrained

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1Although in many venture financing deals cash-flow and control rights are separately allocated (Kaplan and Strömberg (2003)), both seem to play a role in ensuring the provision of financing by venture capitalists. Yet, most theories focus on either the cash-flow or the control allocation in isolation.

2The optimal contract can also be replicated as a mixture of debt and equity claims.
ventures will be financed by a convertible security, will be monitored extensively and will be offered limited professional support. Only entrepreneurs with sufficient self-financing can afford to issue equity and gain substantial advising.

The incentive conflict between the two tasks implies that hiring both an advisor and a monitor may be more advantageous for an entrepreneur than entering into a contract with a multitask financier. Why do we still observe venture capital (multitask) financing in the presence of specialized consulting firms and financial intermediaries that perform thorough monitoring of borrowers? Answering this question is the second objective of the paper. I show that there exists a threshold of self-financing, above which entrepreneurs are indifferent between the combination and the separation of tasks. A poor entrepreneur prefers however engaging a multitask financier (venture capitalist). Furthermore, I show that an entrepreneur not eligible for joint financing by an advisor and a monitor may be funded by a multitask financier. Thus, entrepreneurial wealth-constraints give rise to both a need and a preference for financing with multiple tasks. The intuition for these results is as follows. Under the assumption that payoffs are non-decreasing in the project’s outcome, the separation of tasks exacerbates rather than mitigates the incentive conflict between advice and monitoring. If positive monitoring is required for funding to be worthwhile, the participation of two financiers with different tasks leaves less incentives for advising than the participation of a multitask financier. Since monitoring improves the outcome only for the no-success state, rewarding a second financier, a monitor, in both the success and failure states constrains the possibility to provide final state rewards for the advisor. As a result, advising becomes more difficult to induce under the separation of tasks than under multitask financing.

When sophisticated contracts with payoffs decreasing in the project’s outcome can be designed, the results concerning the choice between multitask financing and the separation of tasks are partially modified. In particular, capital-poor entrepreneurs will prefer joint financing by an advisor and a monitor to funding from a multitask financier. Below a certain level of entrepreneurial self-financing, however, joint financing by an advisor and a
monitor is not feasible. The participation of a multitask financier allows for funding even under this scenario. The joint provision of efforts on advice and monitoring enhances investor’s total value added to a greater extent than the separation of the two tasks, even if payoffs are allowed to be decreasing in the outcome. The poorest entrepreneurs will therefore be forced to obtain external funding from multitask financiers even if sophisticated contracts with decreasing payoffs can be designed.

The results are consistent with observed patterns of entrepreneurial finance. Venture capitalists finance capital-constrained entrepreneurs, acquire convertible securities, and demand a variety of control rights (Kaplan and Strömberg (2003)). The use of equity contracts and the entrepreneur’s retention of control are associated with other forms of entrepreneurial finance. In exchange for an equity stake, angel investors provide capital and business advice, but refrain from interference (Penn, Liang, and Prowse (1998)). Furthermore, corporate venturers are sometimes defined as minority shareholders who allow for the independence of the firms funded. The implications of the analysis thus relate patterns of financial contracting to institutionalized forms of financing and can account for the simultaneous participation of various value enhancing financiers in the capital market. To this extent, the model contributes to our understanding of the observed variety of venture capital and private equity funds.

Although in the literature both advising and monitoring have received substantial attention, the interrelation of the two tasks has so far been neglected. Most theory papers focus on the advising task (Casamatta (2003), Inderst and Müller (2004), Repullo and Suarez (2004), and Schmidt (2003)). Building on the literature, the current paper defines advising as effort to enhance the chance 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), monitoring increases returns by reducing

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3 The only exception is Cestone (2001). In that paper, a venture capitalist performs advising (support) and monitoring (interference) sequentially, thus no multitask problem arises. The difference between the two papers is discussed in details in Section III.
the opportunity cost of exerting effort for the entrepreneur. Several papers associate monitoring with intervention in the entrepreneur’s actions (Chan, Siegel, and Thakor (1990), and Hellmann (1998)). The definition I use is different but consistent with the above approaches: it implies interference in project choice to increase returns while diminish the entrepreneur’s private rewards. Applying these definitions reveals the trade-off between the two tasks: stimulating monitoring decreases the financier’s incentives to give advice.

The paper is closest in spirit to Casamatta (2003). In her model of two-sided moral hazard, advising is the only task the financier performs. Since financial investment is an up-front payment that decreases the costs of moral hazard, the entrepreneur (although not wealth-constrained) prefers to obtain a substantial amount of outside capital. In the current paper, the entrepreneur prefers to have the minimum external funding that allows for his project to be realized. A higher amount of financing calls for more intense monitoring and, as a result, less advising and decreased entrepreneurial welfare. Consequently, in contrast to Casamatta (2003), in this paper the entrepreneur wants the venture capitalist to finance the investment only up to the extent of his wealth-constraints.4

The paper is closely related to the literature on multitask moral hazard analysis.5 Contrary to Dewatripont and Tirole (1999), it claims that an efficient allocation of activities may require tasks with conflicting incentives to be accomplished by the same agent. In the venture financing context, the combination of advising and monitoring turns out to be more efficient than the separation of tasks. This may shed light on 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 2.4 characterizes equilibrium efforts and financial contracts. First, I study the case of

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4This implication is consistent with the evidence that wealthier entrepreneurs tend to have larger ownership shares as pointed out by Bitler et al. (2004).

5In Holmström and Milgrom (1991), the classical paper on multitask moral hazard, agents performing two tasks have an effort allocation problem because their time and attention are limited. The problem I consider is closer to Dewatripont and Tirole (1999), where a direct incentive conflict between tasks arises.
financing with multiple tasks: advising and monitoring are accomplished by the same financier. Then I consider the possibility that the entrepreneur obtains funding from two financiers, an advisor and a monitor. Section 2.5 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 2.6, 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. A subsequent section 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. Section 2.8 discusses the model’s empirical implications. The final section concludes. All proofs are in the Appendix.

2.2 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.\(^6\)

\(^6\)One may think of the two projects as a scientific (creative) and a commercial (mundane) realization of the entrepreneur’s idea. An innovative entrepreneur may favor the scientific approach that gives him opportunity for experimentation. The experience he gains may provide him benefits in the form of reputation or knowledge that can be applied to subsequent projects. This approach may however be disliked by an investor who cares less about experimentation and learning.
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 $q \in (0, 1]$. If he avoids exerting effort, the success probability will be $p < q$, $p \in [0, 1)$.

Three types of investors may provide external financing in the economy. First, the entrepreneur may turn to a passive financier who participates in the 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 $\tau$ 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.\(^7\) 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.\(^8\) The financier’s effort costs of advice 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. Returns are realized at $t = 1$. All agents are assumed to be

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\(^7\)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. This action however imposes a private cost on the entrepreneur.

\(^8\)Monitoring in the model can also be defined as effort by the financier to increase verifiable returns for both the success and failure states through 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 of the model implies another interpretation of $B$ than the current one. With the current setup, however, the analysis turns out to be more tractable.
risk-neutral and the entrepreneur is protected by limited liability. The financial market is competitive: financiers break even on their investments but earn zero net profits.

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:

\[ KH < 1. \]  \hfill (A.1)

Second, I assume that the efficiency of advising is small. 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 \( \tau \). This assumption ensures the role for monitoring:

\[ 1 - q - K \tau^2 H > \tau. \]  \hfill (A.2)

Further, both projects have positive value when the entrepreneur works, even if the financier exerts no effort:9

\[ qH - I + B - C > 0, \]  \hfill (A.3)

\[ qH + (1 - q)L - I - C > 0. \]  \hfill (A.4)

### 2.3 The First-Best Outcome

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

\[ V = (q + e_a \tau) H + e_m (1 - q - e_a \tau) L + (1 - e_m) B - C - \frac{e_a^2 + e_m^2}{2K} - I. \]  \hfill (1)

---

9A subsequent assumption (A.7) describes the relative value of the creative vis-à-vis the mundane project.
The relative size of private benefits and liquidation returns from the mundane project determines which activity is the socially more valuable task. Let \( e^F_B \) and \( e^E_B \) denote the first-best effort levels on the two tasks.

**Lemma 1 (First-best efforts)** For given parameters \( (H, L, K, C, q, p, \tau, I) \), there exists a critical level of private benefits, \( B^* \), such that 

1. if \( 0 < B < B^* \), then \( 0 < e^F_B < 1, 0 < e^E_B < 1 \) and the entrepreneur relinquishes control to the financier,
2. if \( B^* \leq B \), then \( 0 < e^F_B \leq 1, e^E_B = 0 \) and the entrepreneur retains the control right.

When \( B \geq B^* \), the creative project is socially more valuable. Therefore, if private benefits are large, the entrepreneur should retain the control right and carry out the creative project. When private benefits are less important, positive monitoring is optimal. As a consequence, control should be allocated to the financier.

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 expected 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:\(^{10}\)

\[
B \geq B^*. \tag{A.7}
\]

When assumption (A.7) holds, first-best effort on monitoring is zero \( (e^F_B = 0) \). First-best advising is positive \( (e^E_B = K \tau H > 0) \).

Finally, I assume that the entrepreneur’s work is indispensable for financing to be worthwhile. When the entrepreneur does not work the project idea has no value, even if

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\(^{10}\)Assumption (A.7) is in line with Aghion and Bolton (1992). In that model, interference by an 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.
the financier exerts his first-best efforts on the two tasks:

\[
(p + e_a^{FB} \tau) H + B - I - \frac{(e_a^{FB})^2}{2K} < 0, 
\]

\[
(p + e_a^{FH} \tau) H + e_m^{FH} (1 - p - e_a^{FB} \tau) L - I - \frac{(e_a^{FB})^2 + (e_m^{FB})^2}{2K} < 0. 
\]

(A.8) (A.9)

2.4 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 while \( L_e \) 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 possibility for entering into a contract with a passive financier.\(^{11}\) In this case, the only information problem is entrepreneurial moral hazard. To ensure that the entrepreneur exerts effort and the financier accepts the contract, the cash-flow allocation must satisfy two conditions. First, the entrepreneur must be better off working than shirking:

\[ qH_e - C > pH_e. \]

(2)

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

\[ q(H - H_e) \geq I_f, \]

(3)

where \( I_f = I - \omega \). The two conditions imply that the entrepreneur is able to obtain funding if and only if his capital contribution exceeds a threshold level denoted by \( \omega^P \):

\[ \omega \geq \omega^P = I - q \left( H - \frac{C}{q - p} \right). \]

(4)

\(^{11}\)The benchmark analysis draws on Holmström and Tirole (1997).
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In other words, under moral hazard the entrepreneur needs to contribute a sufficient amount to the investment outlay to be able to offer a contract that allows for his commitment to work and for the financier's participation, at the same time. If the entrepreneur's capital contribution is below the threshold level \( \omega^P \), the financier will not expect to break even on his investment and the project will not be realized.

In what follows, I first analyze the extent to which the participation of a multitask financier eases the condition for financing described in (4). Then I consider whether, in comparison with the multitask case, the separation of the two tasks, advising and monitoring, could further facilitate the financing of projects of highly capital constrained entrepreneurs.

2.4.1 Financing with Multiple Tasks: Advising and Monitoring

In this section, I assume the entrepreneur enters into a contract 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 his expected returns from working are greater than what he gains when shirking:

\[
\begin{align*}
(q + e_a \tau) H_e + (1 - q - e_a \tau) e_m L_e &+ (1 - e_m) B - C \\
\geq \langle q + e_a \tau \rangle H_e + (1 - p - e_a \tau) e_m L_e + (1 - e_m) B.
\end{align*}
\]

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

\[
H_e \geq \frac{C}{q - p + e_m L_e}. \tag{7}
\]

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

\[
\epsilon_m \in \arg \max_{0 \leq \epsilon_m \leq 1} 
\left\{(q + e_a \tau) H_f + e_m (1 - q - e_a \tau) L_f - \frac{e_m^2 + e_a^2}{2K} - I_f\right\}. \tag{8}
\]
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\[
e_a \in \arg \max_{0 \leq e_a \leq 1} \left\{ (q + e_a \tau) H_f + e_m (1 - q - e_a \tau) L_f - \frac{\hat{e}_m^2 + e_a^2}{2K} - I_f \right\}. \tag{9}
\]

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

\[
\begin{align*}
\hat{e}_a(H_f, L_f) &= K \tau \frac{H_f - KL_f^2 (1 - q)}{1 - K^2 \tau^2 L_f^2}, \\
\hat{e}_m(H_f, L_f) &= KL_f \frac{1 - q - K \tau^2 H_f}{1 - K^2 \tau^2 L_f^2}.
\end{align*} \tag{10}
\]

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 (Conflict of incentives between tasks)**

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 decreases 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. Intensive monitoring decreases project risk and thus the need for advice.

The entrepreneur obtains funding if and only if the required capital contribution to the project will not exceed the financier's expected returns from the investment:

\[
I_f \leq (q + \hat{e}_a \tau) H_f + \hat{e}_m (1 - q - \hat{e}_a \tau) L_f - \frac{\hat{e}_m^2 + \hat{e}_a^2}{2K}. \tag{11}
\]

This constraint is further referred to as the financing condition and is denoted by \((IR_f)\).
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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 condition are satisfied.\(^{12}\)

\[
\max_{e_a, e_m, H_e, L_e} (q + e_a \tau) H_e + e_m (1 - q - e_a \tau) L_e + (1 - e_m) B - C - \omega
\]

subject to

\[
(I C_e), \ (I C_f^A), \ (I C_f^M), \ (I R_f),
\]

\[
L_e \geq 0, \quad (13)
\]

\[
H = H_f + H_e, \quad (14)
\]

\[
L = L_f + L_e, \quad (15)
\]

\[
I = I_f + \omega. \quad (16)
\]

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

**Proposition 1 (Equilibrium with multi-tasking)** For given parameters \((H, L, K, C, q, p, \tau, I)\), there exist critical wealth levels \(\omega_1^M > 0\) and \(\omega_2^M > \omega_1^M\) such that

i) if \(\omega < \omega_1^M\), the entrepreneur will not receive financing.

ii) if \(\omega_1^M \leq \omega < \omega_2^M\), the venture is funded and the contract offered by the entrepreneur resembles a convertible security. Equilibrium advising and monitoring are positive. The entrepreneur allocates control to the financier.

iii) if \(\omega \geq \omega_2^M\), 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.

\(^{12}\)Conditions (13)-(16) include the entrepreneur's limited liability condition and the three feasibility constraints.
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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 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 \((L_f \approx L, L_e \approx 0)\) 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,\(^{13}\) 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 effort on advice.

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

\(^{13}\)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.
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 effort levels of the financier, but not the Nash equilibrium outcome of the game. The reason for this is that although the size of private benefits determines the entrepreneur's preferences over the two projects, it plays no role in the provision of effort incentives for either of the two parties.

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 in the form of equity.\(^\text{14}\) This implication is similar to the one arising from the analysis in Cestone (2001), despite the two models are built on 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 effects of interference on the entrepreneur's initiative. In that model, 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 has, however, a negative impact on advising by the financier and thus on entrepreneurial utility.

\(^{14}\)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.
2.4. OPTIMAL CONTRACTS AND FUNDING

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 returns and, as a result, facilitate financing.

Corollary 1 (Multitask financing for poor entrepreneurs) If $\omega \in [\omega^M, \omega^P]$, i) the venture is funded by a multitask financier, ii) financing by a passive investor is not feasible.

2.4.2 Separation of Tasks: Two Financiers

Here, I consider the involvement of two financiers, each investing funds in the venture.\(^{15}\) 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, respectively. Let $L_a$ and $L_m$ represent the proceeds from the mundane project, to be transferred to the advisor and the monitor when no success occurs, and $I_a$ and $I_m$ refer to the capital contributions of the two financiers to the investment.

I assume that payoffs are non-decreasing in project outcome. 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.\(^{16}\)

$$H_a > L_a \geq 0, \quad (A.8)$$

$$H_m \geq L_m \geq 0. \quad (A.9)$$

Equilibrium levels of advising and monitoring are determined by the incentive com-

\(^{15}\)The involvement of two (or more) financiers in a venture is a highly realistic assumption: venture capitalists often form syndicates and finance joint projects (see Lerner (1994) or Schwienbacher (2002)).

\(^{16}\)The less intuitive case, where condition (A.9) does not hold, is discussed in Section 2.5.1.
Chapter 2. Venture Financing with Multiple Tasks

Patibility conditions of the advisor and the monitor, further denoted by \((IC_a)\) and \((IC_m)\):

\[
e_a \in \arg \max_{0<e_a<1} \left\{ (q + e_a \tau) H_a + e_m (1 - q - e_a \tau) L_a - \frac{e_a^2}{2K} - I_a \right\}. \tag{17}
\]

\[
e_m \in \arg \max_{0\leq e_m \leq 1} \left\{ (q + e_m \tau) H_m + e_m (1 - q - e_m \tau) L_m - \frac{e_m^2}{2K} - I_m \right\}. \tag{18}
\]

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

\[
\{ \hat{e}_a(H_a, L_a) = K \tau H_a, \hat{e}_m(H_m, L_m) = K \left( 1 - q - K \tau^2 H_a \right) L_m \}. \tag{19}
\]

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

**Lemma 3 (Different financial claims)** Assume conditions (A.8) and (A.9) hold. The entrepreneur offers the advisor an equity claim \((H_a > 0, L_a = 0)\). If a monitor is hired, he is given 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 across the positive outcome states. Monitoring has however no impact on the chance for success. Therefore, when anticipating high returns, the monitor will exert less effort. 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:

\[
I_a \leq (q + \hat{e}_a \tau) H_a + \hat{e}_m (1 - q - \hat{e}_a \tau) L_a - \frac{\hat{e}_a^2}{2K}. \tag{20}
\]
2.4. OPTIMAL CONTRACTS AND FUNDING

\[ I_m \leq (q + \hat{e}_a \tau) H_m + \hat{e}_m (1 - q - \hat{e}_a \tau) L_m - \frac{\hat{e}_m^2}{2K}, \quad (21) \]

where \( I_o + I_m = I - \omega \). Inequalities (20) and (21) imply the aggregate condition for financing. Obviously, it is equivalent to the financing condition in the multitask case (IRf):

\[ \omega \geq I - (q + \hat{e}_a \tau)(H - H_e) - \hat{e}_m (1 - q - \hat{e}_a \tau)(L - L_e) + \frac{\hat{e}_a^2 + \hat{e}_m^2}{2K}. \quad (22) \]

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:

\[ \max_{e_a, e_m, H_e, L_e} (q + e_a \tau) H_e + e_m (1 - q - e_a \tau) L_e + (1 - e_m) B - C - \omega \quad (23) \]

subject to

\[ (IC_e), (IC_a), (IC_m), (IR_f). \quad (24) \]

\[ L_e \geq 0, \quad (25) \]

\[ H = H_a + H_m + H_e. \quad (26) \]

\[ L = L_a + L_m + L_e. \quad (27) \]

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

**Proposition 2 (Equilibrium when tasks are separated)** For given parameters \((H, L, K, C, q, p, \tau, I)\), there exist critical wealth levels \(\omega^S_1 > 0\) and \(\omega^S_2 > \omega^S_1\) such that

i) if \(\omega < \omega^S_1\), the entrepreneur will not receive financing.

ii) if \(\omega^S_1 \leq \omega < \omega^S_2\), 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 \(\omega \geq \omega^S_2\), 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 reasons other than in the multitask case. It is the assumption that the monitor's payoffs are non-decreasing in the project's outcome that creates the conflict of incentives. Although he is hired to ensure positive liquidation returns, the monitor receives equal cash-flows across the positive outcome states. This reduces the advisor's share in profits and the incentives for advice. Consequently, although in an indirect way, monitoring still decreases incentives for advice. Therefore, an entrepreneur with sufficient self-financing uses only one financier: an advisor. In this case there is no incentive conflict, hence equilibrium advising will be high. A capital-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 the possibility for obtaining funding:

**Corollary 2 (Joint financing for poor entrepreneurs)** If \( \omega \in [\omega^A, \omega^P] \), i) the venture is funded either jointly by an advisor and a monitor or solely by an advisor, ii) financing by a passive investor is not feasible.

The findings in Corollaries 1 and 2 originate from the assumption that advising and monitoring are accomplished by the financiers of the entrepreneur's project. Value adding activities ease the condition for financing if and only if they are performed by parties providing investment capital. This is because the participation of outside financiers constrains insiders' incentives to exert effort in order to increase expected project returns. 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
2.5. CHOICE BETWEEN THE COMBINATION AND SEPARATION OF TASKS

to meet the condition for financing.\(^{17}\)

2.5 Choice between the Combination and Separation of Tasks

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

Entrepreneurs with substantial self-financing are indifferent between the possibilities of entering into a contract with a multitask financier or engaging two one-task financiers. This is because \(\omega_2^M = \omega_2^S\) and the results in Proposition 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 approach 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 enter into a contract with a single 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 \(\omega\), 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), under these conditions, it is more difficult to enhance the support task: whenever positive monitoring is needed, the 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 on the parameters of the model.

\(^{17}\)Casamatta (2003) provides a thorough analysis of this question.
Proposition 3 (Multitask vs separation of tasks) Assume condition (A.9) holds.

i) If $\omega \in [\omega^M_1, \omega^S_1)$, the venture may be funded by a multitask financier but joint financing by an advisor and a monitor is not feasible.

ii) If $\omega \in [\omega^S_1, \omega^S_2]$, then both multitask financing and joint financing by an advisor and a monitor are feasible. The entrepreneur prefers funding from a multitask financier to joint financing by an advisor and a monitor.

Proposition 3 suggests 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 funding possibilities. The next figure provides an overview of the results.

**Figure 2.1:** Possibilities for Funding, Non-decreasing Payoffs

<table>
<thead>
<tr>
<th>$0$</th>
<th>$\omega^M_1$</th>
<th>$\omega^S_1$</th>
<th>$\omega^M_2 = \omega^S_2$</th>
<th>$\omega$</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Funding is not feasible.</td>
<td>• Only multitask financing is feasible.</td>
<td>• Multitask financing is preferred to joint funding by advisor and monitor.</td>
<td>• Advising but no monitoring is provided by multitask financier or one-task advisor.</td>
<td></td>
</tr>
</tbody>
</table>

The results in Proposition 3 stem from the assumption that the monitor’s cashflows are non-decreasing in the project’s outcome. Given this assumption, the separation of tasks exacerbates rather than mitigates the incentive conflict between advising and monitoring. Sophisticated financial contracts may allow for payoffs to be decreasing in the outcome. Therefore, in what follows, I consider how relaxing assumption (A.9) affects the results of the analysis. I show that allowing for the monitor’s payoff to be decreasing in the outcome creates a preference for the separation of tasks by entrepreneurs with low levels
of self-financing, but it does not change the conclusion that the poorest entrepreneurs can be funded only by multitask financiers. The assumption of non-decreasing payoffs does not therefore undermine the result that entrepreneurial wealth-constraints give rise to a need for financing with multiple tasks.

2.5.1 Robustness: Payoffs Decrease in Outcome

Assume (A.9) does not hold. It follows from the incentive compatibility condition in (18) that the entrepreneur offers the monitor no share in the project’s success state returns. Similarly to the case of non-decreasing payoffs, the advisor receives an equity claim.

\[ H_m = 0, \quad L_m > 0 \]  
\[ H_a > 0, \quad L_a = 0 \]  

Equilibrium efforts on advising and monitoring will satisfy (19). The equilibrium cash-flow and control allocation maximizes the entrepreneur’s expected returns and satisfies all parties’ incentive compatibility constraints, the financing condition, and the feasibility conditions. The entrepreneur’s problem can be summarized as follows.

\[
\max_{e_a, e_m, H_a, L_a} (q + e_a \tau) H_e + e_m (1 - q - e_a \tau) L_e + (1 - e_m) B - C - \omega
\]  

subject to

\[ (IC_e), \ (IC_a), \ (IC_m), \ (IR_f), \]
\[ L_e \geq 0, \]  
\[ H = H_a + H_e, \]  
\[ L = L_m + L_e, \]  
\[ I = I_a + I_m + \omega, \]

where (IC_a) and (IC_m) are defined in (17) and (18), and (IR_f) is given in (22). The following proposition summarizes the results concerning the possibilities for funding.
Proposition 4 (Multitask vs separation, payoffs decrease in outcome) Assume condition (A.9) does not hold. For given parameters $(H, L, K, C, q, p, r, I)$, there exist financial contracts for the advisor $\{H_a > 0, L_a = 0\}$ and the monitor $\{H_m = 0, L_m > 0\}$, and a critical wealth level $\omega^S_1$, such that $\omega^M_1 < \omega^S_1 < \omega^S_1$ and

i) if $\omega \in [\omega^M_1, \omega^S_1]$, the venture is funded by a multitask financier, but joint financing by an advisor and a monitor is not feasible.

ii) if $\omega \in [\omega^S_1, \omega^S_2]$, then both multitask financing and joint financing by an advisor and a monitor are feasible. The entrepreneur prefers joint financing by an advisor and a monitor to obtaining funding from a multitask financier.

When contracts with decreasing payoffs can be designed, the monitor is rewarded only in the no-success state in equilibrium. Success state rewards will be shared by two parties: the entrepreneur and the advisor. Equilibrium advising will be higher than in the multitask case or the case of the separation of tasks with payoffs non-decreasing in the project’s outcome (section 2.4.2). For, although in an indirect way, incentives for the two tasks are related, intense advising will mitigate monitoring. Consequently, effort on monitoring will be lower and the entrepreneur's expected welfare will be higher than under multitask financing or under the separation of tasks when payoffs are constrained to be non-decreasing in the outcome. Therefore, whenever contracts with decreasing payoffs can be designed, the entrepreneur will prefer joint financing by an advisor and a monitor to funding by a multitask financier. Below a specific level of entrepreneurial self-financing, however, joint financing by an advisor and a monitor is not feasible. Nevertheless, some entrepreneurs with a capital endowment below the threshold may be funded by multitask financiers. The joint provision of efforts on advice and monitoring expand funding possibilities more than the simultaneous involvement of an advisor and a monitor, even if payoffs are allowed to be decreasing in the project's outcome. This is because the participation of a multitask financier provides higher equilibrium value added than the joint involvement of an advisor and a monitor. Figure 2.2 summarizes these results.
2.5. **CHOICE BETWEEN THE COMBINATION AND SEPARATION OF TASKS**

**Figure 2.2:** Possibilities for Funding, Payoffs Decrease in Outcome

- **Funding is not feasible.**
- **Only multitask financing is feasible.**
- **Joint funding by advisor and monitor is preferred to multitask financing.**
- **Advising but no monitoring is provided by multitask financier or one-task advisor.**

Proposition 4 and Figure 2.2 suggest that, whenever sophisticated contracts with decreasing payoffs can be designed, joint financing by an advisor and a monitor will expand funding possibilities more than in the case when the monitor's payoffs are constrained to be non-decreasing in the project's outcome \( \omega_1^S < \omega_1^S \). The increase in welfare arising from the advising and monitoring activities is however less than the equilibrium value added by a multitask financier. Multitask financing turns out to have an important function even if the assumption that the financiers' payoffs must be non-decreasing in the outcome is relaxed. Synergies arising from the combination of the two tasks allow for the funding of poor entrepreneurs whose projects could not be realized if advising and monitoring were to be performed by two different financiers.\(^{18}\)

---

\(^{18}\)The possibility for collusion has been ruled out in the analysis. If collusion is possible, the entrepreneur renegotiates the contract with the monitor to ensure that no monitoring occurs and the creative project prevails. From his final state private rewards \( B \), he offers a payment of the size \( S < B \) to the monitor. Assuming there are no transaction costs of collusion, the monitor will agree to collude with the entrepreneur if \( S \) exceeds his returns from monitoring. Note that assumption (A.9) does not affect the outcome of this renegotiation and thus the possibility for collusion between the two parties.
2.6 Multitask Funding and State-Contingent Control

In previous sections, the cash-flow and control allocation are assumed to be 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 2003, page 14). In general, under good performance the entrepreneur regains control over the firm.\(^{19}\) 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 the joint effort of the entrepreneur and the financier. If the entrepreneur works and the financier exerts advising effort \( e_a \), a high (low) signal arrives with probability \( q + e_a \tau \) (with probability \( 1 - q - e_a \tau \)). When the entrepreneur avoids incurring the cost of effort \( C \), the probability of high and low signals will be \( p + e_a \tau \) and \( 1 - p - e_a \tau \).

\(^{19}\)This may occur at an IPO for example, when the venture capitalist (partially) exits the investment and the entrepreneur continues managing the firm.
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 2.4.1). As a consequence, funding possibilities contract: the entrepreneur needs to contribute more to the investment outlay to ensure external financing. As \( \gamma \) 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 raises the chance for first period success and thereby decreases the probability of a low interim signal. \( \gamma > 0 \) implies that the marginal return to advising is lower than in the case with simultaneous effort exertion on the two tasks. As a result, the equilibrium level of advising will also be less than in the scenario with multiple tasks.

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 with the Nash outcome of the simultaneous tasks case (Proposition 1).
2.7 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 only 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:

$$H_e \geq \frac{C}{q-p} + e_m L_e. \quad (35)$$

If the financier has control, he chooses the level of monitoring that maximizes his expected returns:

$$e_m \in \arg \max_{0 \leq e_m \leq 1} \left( qH_f + e_m (1 - q) L_f - \frac{e_m^2}{2K} - I_f \right). \quad (36)$$

It follows from (36) that, similarly to the multitask case, the higher the financier’s share in liquidation returns, the more intense his monitoring effort:

$$\hat{e}_m(L_f) = K (1 - q) L_f. \quad (37)$$

The condition for financing is

$$I_f \leq qH_f + \hat{e}_m (1 - q) L_f - \frac{e_m^2}{2K}, \quad (38)$$

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

Proposition 5 (Equilibrium with bank financing) For given parameters $(H, L, K, C, q, p, \tau, I)$, there exists a critical wealth level $\omega^B > 0$ such that
2.7. VENTURE CAPITAL VS BANK FINANCING

\[ i. \text{ if } \omega < \omega^B, \text{ the entrepreneur will not receive financing.} \]

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

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

Obviously, the positive aspect of monitoring is that it eases the possibility for financing, compared to the passive investor's case: \( \omega^B < \omega^P \). 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 success state returns, by reducing the opportunity cost of working for the entrepreneur. Here, the monitoring activity directly increases the expected value of the venture by increasing the return in the no-success state. 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 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 welfare.

**Proposition 6 (Multitask vs bank financing)** If \( \omega \in [\omega^M, \omega^B) \), i) the venture may be funded by a multitask financier, ii) bank financing is not feasible.

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 funding from a venture capitalist than from a bank. Obviously, an entrepreneur with more self-financing may also prefer funding from a venture capitalist since advising increases while monitoring decreases his expected welfare.
2.8 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 contracting. Proposition 1 and Proposition 2 imply the following hypotheses.

**Implication 1** Highly capital constrained entrepreneurs are financed either with a convertible security or a mixture of debt and equity claims. They relinquish control to their financiers.

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

Furthermore, the results in Proposition 3 have predictions concerning the likely source of funding for entrepreneurs with different amounts of self-financing.

**Implication 3** Poor entrepreneurs are more likely to obtain funding from a venture capitalist than to hire a consultant and use a bank simultaneously.

**Implication 4** Entrepreneurs with more self-financing are likely to enter into a contract with a venture capitalist or use a consultant that provides capital, but are unlikely to get funding from a bank. The venture capitalist will act as an advisor rather than a monitor in this case.

Implications 1 and 2 describe a relation between the venture capitalist's financial participation and the contract offered by the entrepreneur: venture capitalists investing large amounts of capital hold convertible debt (or convertible preferred equity) and have control rights. In turn, venture capitalists investing smaller amounts have common equity but no control rights. These implications predict an unusual pattern of the joint allocation
2.8. EMPIRICAL IMPLICATIONS

of cash-flow and control rights in venture capital contracts: the holders of less risky, convertible securities are allocated control, while riskier claims are attached no control rights. Overall, these implications complement those arising from Casamatta (2003) by attaching a control allocation to the cash-flow claims identified as optimal by her analysis.²⁰

To the extent that start-up ventures are associated with capital poor entrepreneurs, Implication 1 is in line with the evidence: in entrepreneurial start-ups, financiers hold convertible preferred equity and have a variety of control rights (Kaplan and Strömberg (2003)). As Implication 3 suggests, these poor entrepreneurs are more likely to obtain funding from venture capitalists than from other intermediaries that can not perform multiple tasks. This is consistent with the notion that venture capital-backed companies have remarkably low collateral. It is in line with Ueda (2004) suggesting that an entrepreneur with low collateral is more likely to receive external financing from a venture capitalist than from a bank. In her model, however, intermediaries are not told apart on the basis of their value adding roles. Therefore, the possibility of the entrepreneur's hiring both a bank and a consultant can not be taken into account.

Implications 2 and 4 are consistent with at least two methods of entrepreneurial financing, different from venture capital. First, both implications can be associated with business angel financing. Fenn, Liang, and Prowse (1998) report that business angels invest smaller amounts of money than venture capitalists and take equity positions. They give advice but refrain from interfering in the management of firms. Second, although no common definition of the corporate venturing process exists, the implications of the model suit certain forms of corporate venturing, as the following quotation reflects: "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

²⁰Although the two models are based on different assumptions, Casamatta (2003) also predicts a relation between the contract and the venture capitalist's financial participation. Her model can not however account for the allocation of control between entrepreneurs and venture capitalists.
a minority shareholding allowing the smaller business to retain its independence."\textsuperscript{21} The implications of the analysis thus point to a relation between financial contracting and the value enhancing role of the financier and account for the simultaneous existence of various value-adding investors. To this extent, the model provides one possible explanation for the observed variety of venture capital and private equity funds.

\textbf{2.9 Conclusion}

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, in order to ensure funding, the poorest entrepreneurs will enter into a contract with a multitask financier rather than obtain funding from two financiers, an advisor and a monitor at the same time. 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.

The implications of the theory coincide, to a great extent, with observed features of venture financing firms and contracts. In particular, they account for the simultaneous participation of various value enhancing financiers in the capital market, including start-up financiers, angel investors, and corporate venturers. Moreover, they justify the prevalent use of the combination of convertible securities and 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 the separation of them.

\textsuperscript{21}The Corporate Venturing factsheet, www.is4profit.com.
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. The available evidence, although not abundant, confirms this view.
2A Appendix

Proof of Lemma 1: Under multitask financing the total value of the venture $V$ is

$$V = (q + e_a \tau) H + e_m (1 - q - e_a \tau) L + (1 - e_m) B - C - \frac{e_a^2 + e_m^2}{2K} - I. \quad (39)$$

First best advising and monitoring can be derived by maximizing (39) w.r.t. $e_a$ and $e_m$:

$$e_a = K \tau (H - e_m L), \quad (40)$$

$$e_m = K (1 - q - e_a \tau) L - KB. \quad (41)$$

Therefore $e_a^{FB}$ and $e_m^{FB}$ can be expressed as

$$e_a^{FB} = K \tau \frac{H - KL^2 (1 - q) + KLB}{1 - K^2 \tau^2 L^2}, \quad (42)$$

$$e_m^{FB} = K \frac{L (1 - q - K \tau^2 H) - B}{1 - K^2 \tau^2 L^2}. \quad (43)$$

Since $e_m \in [0, 1]$, (43) suggests that a critical level of private benefits $B^*$ can be defined such that for any $B \geq B^* = L (1 - q - K \tau^2 H)$, $e_m^{FB} = 0$ and for any $B < B^*$, $e_m^{FB} > 0$. Obviously, first best advising will be positive for any $B > 0$ (since $H > KL^2 (1 - q)$ by assumption (A.1)).

Proof of Lemma 2: Under multitask financing, the entrepreneur considers the following maximization problem:

$$\max_{e_a, e_m, H_r, L_r} (q + e_a \tau) H_r + e_m (1 - q - e_a \tau) L_r + (1 - e_m) B - C - \omega \quad (44)$$

subject to

$$H_r \geq \frac{C}{q - p} + e_m L_r, \quad (45)$$

$$L_r \geq 0, \quad (46)$$

$$e_a \in \arg \max_{e_a \leq 1} \left\{ (q + e_a \tau) H_f + e_m (1 - q - e_a \tau) L_f - \frac{e_a^2 + e_m^2}{2K} - I_f \right\}, \quad (47)$$

$$e_m \in \arg \max_{0, e_m \leq 1} \left\{ (q + e_a \tau) H_f + e_m (1 - q - e_a \tau) L_f - \frac{e_m^2 + e_a^2}{2K} - I_f \right\}. \quad (48)$$
\[ I_f \leq (q + e_a \tau) H_f + e_m (1 - q - e_a \tau) L_f - \frac{e_m^2 + e_a^2}{2K}. \] (49)

\[ H = H_f + H_e. \] (50)

\[ L = L_f + L_e. \] (51)

\[ I = I_f + \omega. \] (52)

The first two expressions represent the incentive compatibility and limited liability constraints of the entrepreneur. (47) and (48) express the financier's incentive compatible effort choices. The financier's participation condition is given in (49). Constraints (50)-(52) ensure the feasibility of the solution.

Equilibrium efforts on advising \( \hat{e}_a \) and monitoring \( \hat{e}_m \) can be expressed from (47) and (48):

\[ \hat{e}_a(H_f, L_f) = K \tau (H_f - \hat{e}_m L_f), \] (53)

\[ \hat{e}_m(H_f, L_f) = KL_f (1 - q - \hat{e}_a \tau). \] (54)

The unique solutions are:

\[ \hat{e}_a(H_f, L_f) = K \tau \frac{H_f - KL_f^2 (1 - q)}{1 - K^2 \tau^2 L_f^2}, \] (55)

\[ \hat{e}_m(H_f, L_f) = KL_f \frac{1 - q - K \tau^2 H_f}{1 - K^2 \tau^2 L_f^2}. \] (56)

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 equilibrium is defined by (55)-(56).

The result in Lemma 2 is obtained by taking partial derivatives of the expressions in (55) and (56) w.r.t. \( H_f \) and \( L_f \):

\[ \frac{\partial \hat{e}_a}{\partial H_f} = \frac{\tau K}{1 - K^2 \tau^2 L_f^2} > 0, \] (57)

\[ \frac{\partial \hat{e}_m}{\partial H_f} = -\frac{K^2 \tau^2 L_f}{1 - K^2 \tau^2 L_f^2} < 0. \] (58)
CHAPTER 2. VENTURE FINANCING WITH MULTIPLE TASKS

\[
\frac{\partial \hat{e}_a}{\partial L_f} = - \frac{2K^2 \tau L_f [1 - q - K \tau^2 H_f]}\left[1 - K^2 \tau^2 L_f^2\right]^2 < 0. \tag{59}
\]

\[
\frac{\partial \hat{e}_m}{\partial L_f} = \frac{K \left(1 + L_f^2 K^2 \tau^2\right) [1 - q - K \tau^2 H_f]}\left[1 - K^2 \tau^2 L_f^2\right]^2 > 0. \tag{60}
\]

The inequalities in (57)-(60) hold given assumptions (A.1)-(A.2). ◦

**Proof of Proposition 1:** Under multitask financing, the optimal contract \(\{H_e, H_f, L_e, L_f, I_f\}\) is given by the solution to the problem defined in (44)-(52). The condition for financing can be expressed from (49):

\[
\omega \geq I - (q + e_a \tau) H_f - e_m (1 - q - e_a \tau) L_f - \frac{e_m^2 + e_a^2}{2K}. \tag{61}
\]

Therefore, in equilibrium, the following condition must hold:

\[
\omega \geq I - (q + \hat{e}_a \tau) H_f - \frac{\hat{e}_m^2 + \hat{e}_a^2}{2K}, \tag{62}
\]

where \(\hat{e}_a, \hat{e}_m\) depend on the contracted cash-flow allocation \(\{H_e, H_f, L_e, L_f\}\) and satisfy (55) and (56). In what follows, I consider the condition for financing under different cash-flow allocations.

a. When the cash-flow allocation satisfies the conditions \((L_f = 0, H > H_f > 0)\), equilibrium monitoring is zero, while effort on advising is positive: \(\{\hat{e}_a = K \tau H_f, \hat{e}_m = 0\}\). The financing condition in this scenario is:

\[
\omega \geq I - q H_f - \frac{1}{2} K \tau^2 H_f^2. \tag{63}
\]

Given the entrepreneur’s incentive compatibility condition in (45), the financier’s maximum returns are \(H_f^{\text{max}} = H - \frac{C}{q-p}\). Thus a critical level of the entrepreneur’s wealth \(\omega^M_2\) can be derived, such that the condition for financing is satisfied and the entrepreneur obtains funding with zero monitoring and positive advising:

\[
\omega \geq \omega^M_2 = \omega^P - \frac{1}{2} K \tau^2 \left(H - \frac{C}{q-p}\right)^2. \tag{64}
\]

where \(\omega^P = I - q \left(H - \frac{C}{q-p}\right)\) is the minimum capital the entrepreneur needs to provide to be able to sign a contract with a passive financier.
When 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:

\[
\left\{ \hat{e}_a = K\tau \frac{H_f - K\tau L_f^2 (1 - q)}{1 - K^2 \tau^2 L_f^2}, \hat{e}_m = KL_1 \frac{1 - q - K\tau^2 H_f}{1 - K^2 \tau^2 L_f^2} \right\}. \tag{65}
\]

Maximum returns for the investor are \(L_f^{\text{max}} = L, H_f^{\text{max}} = H - \frac{C}{q - p}\) in the high and low states, respectively. The condition for financing in (61) is satisfied if the entrepreneur's wealth exceeds a critical level, \(\omega_1^M\):

\[
\omega \geq \omega_1^M = \omega^P - \hat{e}_a \tau \left( H - \frac{C}{q - p} \right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K}, \tag{66}
\]

where \(\left\{ \hat{e}_a = K\tau \frac{H_f^{\text{max}} - KL^2 (1 - q)}{1 - K^2 \tau^2 L^2}, \hat{e}_m = KL_1 \frac{1 - q - K\tau^2 H_f^{\text{max}}}{1 - K^2 \tau^2 L_f^2}, H_f^{\text{max}} = H - \frac{C}{q - p} \right\}\).

It remains to be shown that

\[
\omega_1^M < \omega_2^M. \tag{67}
\]

To prove this, I rewrite the above inequality using the results in (64) and (66):

\[
-\hat{e}_a \tau \left( H_f^{\text{max}} \right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K} < -\frac{1}{2} K\tau^2 \left( H_f^{\text{max}} \right)^2, \tag{68}
\]

where \(\left\{ \hat{e}_a = K\tau \frac{H_f^{\text{max}} - KL^2 (1 - q)}{1 - K^2 \tau^2 L^2}, \hat{e}_m = KL_1 \frac{1 - q - K\tau^2 H_f^{\text{max}}}{1 - K^2 \tau^2 L_f^2}, H_f^{\text{max}} = H - \frac{C}{q - p} \right\}\).

Using (53), it can be shown that (68) is equivalent to the following condition:

\[
1 > \tau^2 K^2 L^2. \tag{69}
\]

Condition (69) holds for all parameter values given assumption (A.1). ◦

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

**Proof of Lemma 3:** First I specify the entrepreneur's maximization problem, assuming he obtains funding from two financiers, an advisor and a monitor. I refer to the advisor and the monitor with subscripts 'a' and 'm':

\[
\max_{e_a, e_m, H_e, L_e} (q + e_a \tau) H_e + e_m (1 - q - e_a \tau) L_e + (1 - e_m) B - C - \omega \tag{70}
\]
subject to

\[ H_a \geq \frac{C}{q - p} + e_m L_e, \]  
\[ L_e \geq 0, \]  
\[ e_a = \arg \max_{0 \leq e_a \leq 1} \left\{ (q + e_a \tau) H_a + e_m (1 - q - e_a \tau) L_a - \frac{e_a^2}{2K} - I_a \right\}, \]  
\[ e_m = \arg \max_{0 \leq e_m \leq 1} \left\{ (q + e_a \tau) H_m + e_m (1 - q - e_a \tau) L_m - \frac{e_m^2}{2K} - I_m \right\}, \]  
\[ I_a \leq (q + e_a \tau) H_a + e_m (1 - q - e_a \tau) L_a - \frac{e_a^2}{2K}, \]  
\[ I_m \leq (q + e_a \tau) H_m + e_m (1 - q - e_a \tau) L_m - \frac{e_m^2}{2K}, \]  
\[ H = H_a + H_m + H_e, \]  
\[ L = L_a + L_m + L_e, \]  
\[ I = I_a + I_m + \omega. \]

Constraints (71) and (72) represent the incentive compatibility and limited liability conditions for the entrepreneur. (73) and (74) express the incentive compatible effort choices of the financier with the advising and the financier with the monitoring task, respectively. The financiers’ participation conditions are given in (75) and (76). Constraints (77)-(79) ensure the feasibility of the solution.

To prove the result in Lemma 3, I express efforts on advising and monitoring from (73) and (74):

\[ \hat{e}_a(H_a, L_a) = K (\tau H_a - \hat{e}_m \tau L_a), \]  
\[ \hat{e}_m(H_m, L_m) = K (1 - q - \hat{e}_a \tau) L_m. \]

Providing the advisor a financial claim such that \( L_a > 0 \) 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: \( H_m = L_m = L - L_e \). \( \diamond \)
Proof of Proposition 2: When the entrepreneur uses two financiers, the maximization problem is defined by equations (70)-(79). Given the results in Lemma (3) and conditions (77)-(79), equilibrium efforts on the two tasks can be expressed as follows:

\[
\begin{align*}
\hat{e}_a(H_a, L_a) &= K\tau H_a \\
\hat{e}_m(H_m, L_m) &= K\left(1 - q - K\tau^2 H_a\right)L_m
\end{align*}
\]

Adding up the two participation constraints (75) and (76) and using equations (77)-(79), the condition for financing can be written as

\[
\omega \geq I - (q + e_a\tau)(H - H_e) - e_m(1 - q - e_m\tau)(L - L_e) + \frac{e_a^2 + e_m^2}{2K}.
\]

Using (81) and (80), and the results in Lemma (3), I rewrite this condition to the following form:

\[
\omega \geq I - (q + \hat{e}_a\tau)(H - H_e) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K},
\]

where \(\hat{e}_a, \hat{e}_m\) depend on the financiers’ cash-flows \(\{H_a, L_a, H_m, L_m\}\) and satisfy equations (82), (83). Last, I consider the condition for financing under different allocations of the cash-flow rights.

\(a\), If cash-flow rights are such that \((H_a > 0, L_a = 0, H_m = L_m = 0)\), equilibrium monitoring is zero while effort on 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 (71) implies that \(H_a^{\text{max}} = H - \frac{C}{q - p}\). Thus a critical wealth level \(\omega_2^S\) can be derived such that the entrepreneur receives external funding with zero monitoring and positive advising:

\[
\omega \geq \omega_2^S = \omega^P - \frac{1}{2}K\tau^2 \left(H - \frac{C}{q - p}\right)^2,
\]

where \(\omega^P\) is the minimum capital the entrepreneur needs to provide to be able to sign a contract with a passive financier. Note that this condition is identical to (64).

\(b\), if cash-flow rights are allocated such that \((H_a > 0, L_a = 0, H_m = L_m > 0)\), equilibrium efforts on both advising and monitoring will be positive:

\[
\{\hat{e}_a(H_a, L_a) = K\tau H_a; \hat{e}_m(H_m, L_m) = K\left(1 - q - K\tau^2 H_a\right)L_m\}.
\]
Conditions (71) and (72) suggest that \( H_r^{\min} = \frac{C}{q-p} \) and \( L_r^{\min} = 0 \). Therefore, maximum returns to the financiers are: \( H_m^{\max} = L_m^{\max} = L \) and \( H_a^{\max} = H - \frac{C}{q-p} \). With maximum monitoring (\( H_m^{\max} = L_m^{\max} = L \)), the advisor’s maximum returns are \( H_a = H - L - \frac{C}{q-p} \). Under this scenario, the entrepreneur receives funding if his capital endowment exceeds the critical level \( \omega_1^S \):

\[
\omega \geq \omega_1^S = \omega^P - \hat{e}_r \tau \left( H - \frac{C}{q-p} \right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K},
\]

where \( \{ \hat{e}_u = K \tau H_u; \hat{e}_m = K (1 - q - K \tau^2 H_u) L; H_a = H - L - \frac{C}{q-p} \} \).

It remains to be shown that

\[
\omega_1^S < \omega_2^S. \tag{89}
\]

I rewrite (89) using the results in (86) and (88):

\[
-\hat{e}_a \tau \left( H - \frac{C}{q-p} \right) - \frac{\hat{e}_m^2}{2K} + \frac{\hat{e}_a^2}{2K} < -\frac{1}{2} K \tau^2 \left( H - \frac{C}{q-p} \right)^2 . \tag{90}
\]

Using (80) and (81), it can be shown that (90) is equivalent to the following condition:

\[
1 - q - K \tau^2 H_a > \tau. \tag{91}
\]

The condition holds for all parameter values of the model given assumption (A.2).

**Proof of Corollary 2:** Corollary 2 follows from Proposition 2.
Proof of Proposition 3:

i) To show that

$$\omega_1^M < \omega_1^S.$$  \hspace{1cm} (92)

I substitute \( \{ \hat{e}_a = K \tau^2 H_{a}^\text{max} - K L^2 (1 - q), \hat{e}_m = KL \frac{1 - q - K \tau^2 H_{a}^\text{max}}{1 - K \tau^2 L^2}; H_{a}^\text{max} = H - \frac{C}{q - p} \} \) to (66) and \( \{ \hat{e}_a = K \tau H_{a}; \hat{e}_m = K (1 - q - K \tau^2 H_{a}) L; H_{a} = H - L - \frac{C}{q - p} \} \) to (88).

After simplification, (92) can be written in the following form:

$$\frac{1}{1 - K^2 \tau^2 L^2} \left( \tau^2 \alpha^2 + (1 - q)^2 L^2 - 2K \tau^2 L^2 \left( 1 - q \right) \alpha \right)$$  \hspace{1cm} (93)

$$\gamma > \tau^2 \alpha^2 + (1 - q)^2 L^2 - 2K \tau^2 L^2 \left( 1 - q \right) \left( \alpha - L \right) - \tau^2 L^2 \left( 1 - K^2 \tau^2 \left( \alpha - L \right)^2 \right).$$  \hspace{1cm} (94)

(93)-(94) is equivalent to the condition in (95):

$$\gamma > (1 - K^2 \tau^2 L^2) \left( \gamma - \tau^2 L^2 \left[ 1 - 2K L (1 - q) - K^2 \tau^2 (\alpha - L)^2 \right] \right)$$  \hspace{1cm} (95)

where \( \alpha = \left( H - \frac{C}{q - p} \right) \) and \( \gamma = \tau^2 \alpha^2 + (1 - q)^2 L^2 - 2K \tau^2 L^2 \left( 1 - q \right) \alpha \). (95) holds for all parameter values of the model given assumption (A.1).

ii) The result in Proposition 3.ii) follows from the fact that, whenever condition (A.9) holds, advising is more while monitoring is less intense under multitask financing than under the separation of the two tasks. Whenever positive monitoring is required for funding to be worthwhile, the entrepreneur will use a multitask financier since advising increases while monitoring decreases his expected returns.  \( \diamond \)

Proof of Proposition 4: Assume condition (A.9) does not hold. The entrepreneur's problem is defined in (30)-(34). Equilibrium efforts will satisfy (96)-(97).

$$\hat{e}_a(H_{a}, L_{a}) = K \tau H_{a}$$  \hspace{1cm} (96)

$$\hat{e}_m(H_{m}, L_{m}) = K \left( 1 - q - K \tau^2 H_{a} \right) L_{m}$$  \hspace{1cm} (97)
Moreover, the equilibrium contract will be such that $H_a > 0$, $L_a = 0$, $H_m = 0$, $L_m > 0$. The project is funded if the entrepreneur’s capital exceeds the critical level $\omega^S_1$, that is if

$$\omega \geq \omega^S_1 = \omega^P - \tilde{e}_a \tau \left( H - \frac{C}{q - p} \right) - \frac{\tilde{e}_m^2}{2K} + \frac{\tilde{e}_a^2}{2K},$$

(98)

where $\{\tilde{e}_a = K\tau H_a; \tilde{e}_m = K(1 - q - K\tau^2 H_a) L; H_a = H - \frac{C}{q - p}\}$.

i) To show that

$$\omega^M_1 < \omega^S_1$$

(99)

I substitute $\{\tilde{e}_a = K\tau H_a; \tilde{e}_m = K(1 - q - K\tau^2 H_a) L; H_a = H - \frac{C}{q - p}\}$ to (66) and $\{\tilde{e}_a = K\tau H_a; \tilde{e}_m = K(1 - q - K\tau^2 H_a) L; H_a = H - \frac{C}{q - p}\}$ to (98). After simplification, (99) can be written as

$$\left(1 - K^2 \tau^2 L^2\right) \left(\gamma + K^2 \tau^4 L^2 \alpha^2\right) < \gamma,$$

(100)

where $\alpha = H - \frac{C}{q - p}$ and $\gamma = \tau^2 \alpha^2 + L^2 (1 - q)(1 - q - 2K\tau^2 \alpha)$. Simple algebra shows that (100) is equivalent to the condition

$$(1 - q - K\tau^2 \alpha)^2 > 0.$$ 

(101)

(101) holds for all parameter values of the model. To show that

$$\omega^S_1 \leq \omega^M_1$$

(102)

I substitute $\{\tilde{e}_a = K\tau H_a; \tilde{e}_m = K(1 - q - K\tau^2 H_a) L; H_a = H - \frac{C}{q - p}\}$ to (98) and $\{\tilde{e}_a = K\tau H_a; \tilde{e}_m = K(1 - q - K\tau^2 H_a) L; H_a = H - L - \frac{C}{q - p}\}$ to (88). After simplification, (102) can be written in the following form:

$$(2\alpha + L^3)(\alpha - L) + \alpha L (L^2 - 2) + L^2 (3 - 2KL(1 - q)) > 0,$$

(103)

where $\alpha = H - \frac{C}{q - p}$. Each component in the sum on the l.h.s. of (103) is positive. Consequently, (103) holds for all parameter values of the model.
ii) The result in Proposition 4.ii) follows from the fact that, given condition (A.9) does not hold, advising is more while monitoring is less intense under the separation of tasks than under multitask financing. For advising increases while monitoring decreases his expected welfare, the entrepreneur will prefer joint financing by an advisor and a monitor to obtaining funding from a multitask financier, whenever positive monitoring is required for funding to be worthwhile. \(\diamond\)

**Proof of Proposition 5:** When the entrepreneur obtains funding from a one-task monitor, his problem can be specified as follows:

\[
\max_{e_m,H_e,L_e} (qH_e + (1 - q) e_m L_e + (1 - e_m) B - C - \omega) \tag{104}
\]

subject to

\[
H_e \geq \frac{C}{q - p} + e_m L_e, \tag{105}
\]

\[
L_e \geq 0, \tag{106}
\]

\[
e_m \in \arg\max_{0 < e_m \leq 1} \left\{ qH_f + e_m (1 - q) L_f - \frac{e_m^2}{2K} - I_f \right\}, \tag{107}
\]

\[
I_f \leq qH_f + e_m (1 - q) L_f - \frac{e_m^2}{2K}, \tag{108}
\]

\[
H = H_f + H_e, \tag{109}
\]

\[
L = L_f + L_e, \tag{110}
\]

\[
I = I_f + \omega. \tag{111}
\]

The first two inequalities are the incentive compatibility and limited liability constraints of the entrepreneur. (107) and (108) represent the financier’s incentive compatibility and participation conditions. The last three equations ensure the feasibility of the solution. The financier’s monitoring effort in equilibrium is given by condition (107):

\[
\hat{e}_m(L_f) = K (1 - q) L_f. \tag{112}
\]
The condition for financing is derived from (108):

$$\omega \geq \omega^B = \omega^P - \frac{1}{2} K (1 - q)^2 L^2.$$  \hspace{1cm} (113)

where $\omega^P = I - q \left( H - \frac{C}{q-p} \right)$. If condition (113) is not satisfied, the entrepreneur will not receive financing.

When $\omega^B < \omega < \omega^P$, the entrepreneur receives financing and the financier exerts positive monitoring effort: $\hat{e}_m = K (1 - q) (L - L_e)$. The entrepreneur relinquishes control and offers a debt contract: $\{H_f = L_f, L_f = L - L_e\}$.

If $\omega \geq \omega^P$, the entrepreneur retains control together with all liquidation returns: $\{L_f = 0, L_e = L\}$. This implies that the monitor is rewarded only in the good outcome state. He is therefore offered an equity contract. $\diamond$

**Proof of Proposition 6:** To show that

$$\omega^M < \omega^B$$  \hspace{1cm} (114)

I substitute $\{\hat{e}_a = K \tau \frac{H_{\text{max}} - K L^2 (1 - q)}{1 - K^2 \tau^2 L^2}, \hat{e}_m = KL \frac{1 - q - K \tau^2 H_{\text{max}}}{1 - K^2 \tau^2 L^2}, H_f^{\text{max}} = H - \frac{C}{q-p}\}$ to (66) and compare the resulting expression to (113). (114) turns out to be equivalent to:

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

where $\alpha = H - \frac{C}{q-p}$. This expression can be rewritten as:

$$\left( \alpha - KL^2 (1 - q) \right)^2 > 0.$$  \hspace{1cm} (116)

(116) holds for all parameter values of the model. $\diamond$