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Protective interests and creative destruction ☆

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Abstract

We study mechanisms by which the provision of incentives to new entrants is influenced by lenders' financial interests in incumbents. When a financier has a strong interest in protecting incumbent rents, he stifles the entrant's internal efficiency with a highly dilutive claim, and bribes her for not accessing more aggressive finance elsewhere. By contrast, when the financier's protective interest in the incumbent is less strong, then it can spur the *destruction* of incumbent rents. This is because it strengthens the financier's commitment to penalize the entrant for managerial slack by forcing her into market exit, which sharpens her internal efficiency and competitiveness. While the corresponding decrease in incumbent firm value is partially internalized by the financier, he is more than compensated by the incremental firm value of the entrant, part or all of which accrues to him. The model has implications for the competitive effects of industry-focused lending styles.

JEL classification: G2; G3; L1

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1. Introduction

Since Schumpeter (1912), economists have been interested in the role of active financiers, such as banks and venture capitalists, in promoting innovation and in facilitat-

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ing product market entry of wealth-constrained new ventures.[1] In this paper, we explore mechanisms by which the financing of—and the provision of incentives to—entering entrepreneurs is influenced by lenders' financial interests in product market incumbents.

The issues of interest to us can be illustrated with the following example from the market for business performance measurement software. In 1995, Kleiner Perkins Caufield & Byers ("lender"), a US venture capital firm, started to invest in Brio Technology, a maker of business analytics software. The company went public in May 1998. Shortly before the company's IPO, the lender made a start-up investment in Epiphany, an alleged rival of Brio Technology,[2] while still holding a significant equity stake in Brio Technology.[3] In such a context, would the lender have an incentive to stifle the entrant's competitiveness in order to protect the value of its stake in the incumbent, thereby suppressing competition? How does the *degree* to which the lender internalizes the competitive threat posed to the incumbent shape the provision of incentives to the entrant? Why did the lender finance the entrant in the first place?

This paper offers a framework that provides answers to these questions. Our main result is that while there are natural circumstances in which a lender's protective interest in an incumbent indeed facilitates the protection of incumbent rents, there can be equally natural circumstances in which the effect goes precisely in the opposite direction. That is, the lender's interest in protecting the incumbent may ultimately spur the *destruction* of incumbent rents. The intuition behind this result stems from the observation that once having financed a new entrant, the lender's financial interest in the incumbent strengthens its commitment to penalize the entrant for managerial slack by forcing her into product market exit. This sharpens the entrant's internal efficiency and competitiveness, which in turn harms the incumbent. While the corresponding decrease in incumbent firm value is partially internalized by the lender, it is more than compensated by the incremental firm value of the entrant, part or all of which accrues to the lender.

The model has the following broad features. A lender who is financially affiliated with a product market incumbent has the opportunity to extend finance to a new entrant, the financing relationship with whom will be subject to moral hazard. The entrant derives bargaining power vis-à-vis the lender from the threat to undertake her project with another, independent lender. By exerting non-contractible managerial effort the entrant can enhance the competitiveness of her venture. This entails a negative externality on the competitive stance of the incumbent's business, which is partially internalized by the lender via its claim in the incumbent.

In this setup, an increase in the degree to which the lender internalizes the competitive threat posed to the incumbent can have two effects on financial contracting with the entrant. It can make it less worthwhile for the lender to elicit aggressive effort from the entrant, but it also strengthens the lender's commitment to penalize the entrant for man-

[1] See Bhattacharya and Thakor (1993) and Gorton and Winton (2002) for surveys of the banking literature. Sahlman (1990), Gompers and Lerner (1999), and Kaplan and Strömberg (2003), among others, provide insights into venture capital finance. Levine (1997) has an excellent survey on the literature on finance and growth.

[2] See Epiphany's IPO filing (Form S-1 Registration Statement, July 14, 1999).

[3] In 1998, 1999, and 2000, Kleiner Perkins held stakes of 21, 15, and 6 percent, respectively; see Brio Technology's proxy statements.

agerial slack by forcing her into exit, which facilitates the provision of efficient incentives. While the former effect goes in the direction of suppressing competition, the latter can be competition-enhancing. Which of the two effects dominates depends, among other things, on the size and nature of the lender's claim in the incumbent and the magnitude of the competitive threats involved.

If the lender has a strong interest in protecting incumbent rents—e.g., the lender holds a large equity stake in the incumbent and the competitive threat is severe—then the first effect dominates. In this case, the lender finances the entrant with a highly dilutive claim. This stifles the entrant's eagerness to exert aggressive effort in the marketplace (cf. Jensen and Meckling, 1976), and thereby suppresses competition.[4] In essence, the lender establishes a financing relationship with the entrant to prevent her from accessing *more aggressive* finance elsewhere. This puts the lender in a position to manipulate the entrant's internal efficiency with an appropriate financial claim, and to de facto bribe her to take a softer stance against the incumbent.

Conversely, if the lender's protective interest in the incumbent is neither too strong nor too weak, then the disciplining effect comes into play.[5] In this circumstance, the lender's enhanced toughness vis-à-vis the entrant provides it with a competitive advantage in strengthening the entrant's competitiveness. While the corresponding decrease in incumbent firm value is partially internalized by the lender, it is more than compensated by the enhanced value of its stake in the entrant. In this context, the lender's interest in *protecting* incumbent product market rents ultimately spurs their *destruction*. At the same time, however, it promotes the *creation* of new value, for it facilitates the provision of efficient incentives to the entrant.

Our approach has implications for the competitive effects of *industry-focused* lending styles.[6] While the literature on common lenders of rivals has gone a long way in highlighting the competition-suppressing effects of lender industry focus (see, e.g., Poitevin, 1989; Bhattacharya and Chiesa, 1995; Spagnolo, 2002; and Cestone and White, 2003), it has been mute on its potential *pro-competitive* effects. Our analysis shows that industry focus can be pro-competitive even when cost efficiency effects due to economies of scale in industry or technological expertise are negligible. Rather, we emphasize the disciplining effect that stems from lenders' enhanced toughness when holding financial claims in competing projects. The model also sheds light on the competitive effects of diversification-promoting regulatory measures, such as a tightening of regulatory capital constraints. To the extent that these regulatory moves stifle financiers' "appetite" for industry focus, we argue that they can have important effects on competition.

We also show that in contexts in which financiers internalize competitive externalities, the credit market can have *multiple equilibria*, with varying intensities of competition. This multiplicity of equilibria stems from the externality that a lender exerts on other incumbent-affiliated lenders when it agrees to finance a new entrant. Given that the entrant can access

[4] If the lender has a very strong interest in protecting the incumbent, there can even be a situation in which the entrant does not enter in the first place. In this case, she is bought out by the lender.

[5] If the lender has very little interest in protecting the incumbent, then the financial claim in the incumbent has no effect on the provision of incentives to the entrant.

[6] For example, venture capital organizations typically exhibit strong degrees of industry-specialization.

an alternative source of finance, other lenders find it less worthwhile to turn down the entrant's financing request, which in turn has profound implications for their willingness to not only finance the entrant but also to provide her with aggressive incentives.

Related literature. This article complements several strands of the literature. A number of papers have argued that competition can be jeopardized when lenders internalize competitive externalities via their financial claims in rival firms. For example, Poitevin (1989) shows that a common lender of rivals can mitigate the Brander and Lewis (1986) limited-liability effect of debt finance, thereby softening competition. Bhattacharya and Chiesa (1995) find that common lenders can limit the number of active firms in an industry. Spagnolo (2002) shows that a concentrated or collusive banking sector can facilitate collusion in the product market. Hellmann (2002) focuses on the effects of strategic externalities on lenders' support incentives, and finds that negative externalities can be harmful. Cestone and White (2003) have a model in which a lender may finance a firm with an equity-like claim in order to commit to not finance a prospective rival of this firm. Unlike these papers, we show that financing of rivals by a common lender can have both anti- and pro-competitive effects.[7]

This paper is also related to the literature on product market competition and managerial incentives. Notably, Schmidt (1997) has a setting in which product market competition can have ambiguous effects on managerial incentives: it inflicts survival pressure on managers, which reduces managerial slack, but it can also make it less worthwhile for the firm's owners to induce high effort. The tension between the effectiveness of termination threats and the attractiveness of inducing effort is also at the heart of our paper. Yet, in our setting, it is not competition per se that gives rise to ambiguous incentive effects but the degree to which lenders internalize competitive externalities via their claims in rivals.[8]

Lastly, our paper relates to the corporate finance literature on multiple investors (see, among others, Berglöf and von Thadden, 1994; Dewatripont and Tirole, 1994; Bolton and Scharfstein, 1996, and, closest related to our setting, Repullo and Suarez, 1998). These papers show how multiple investor financing hardens firms' budget constraints, which in turn relieves ex ante financial and incentive constraints. Our paper suggests that lenders' financial interests in rivals can effectively serve as a substitute for multiple investor financing. Yet, in our model, the lender may have *multiple faces*, for the direction of the incentive effect depends on the size and riskiness of the claim in the rival.

The remainder of this paper is organized as follows. The next section develops our main argument in the context of a simple model of start-up financing. Section 3 provides extensions and robustness checks. Section 4 concludes. Proofs are relegated to Appendix A.

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[7] The literature on common lenders of rivals forms part of a wider literature on the interplay between corporate financing decisions and product market considerations. See, among others, Titman (1984), Brander and Lewis (1986), Maksimovic (1988), Bolton and Scharfstein (1990), Maksimovic and Titman (1991), Fauré-Grimaud (2000), and Chemla and Fauré-Grimaud (2001). Empirical studies include, among others, Chevalier (1995), Kovenock and Phillips (1997), and Zingales (1998).

[8] The yardstick competition literature would suggest that the information contained in rivals' cash flows can enhance the efficiency of managerial incentive contracts as it allows to filter out extraneous noise (Holmström, 1979; Mookherjee, 1984). Accordingly, firms can benefit from the presence of rivals (Nalebuff and Stiglitz, 1983). A similar conclusion emerges from our analysis, albeit for different reasons.

2. Protective interests and creative destruction

This section outlines the framework and contains the paper's main analysis.

2.1. Setup

There are three (types of) agents: a wealthless entrepreneur with a project, an incumbent, and relationship financiers ("lenders"). The entrepreneur needs outside funding to finance entry into a product market where she would compete against the incumbent. Lenders all have deep pockets and are identical, except that one of them is financially affiliated with the incumbent, as specified below.[9] We refer to this lender as the *affiliated* lender. The entrepreneur derives bargaining power vis-à-vis the affiliated lender from the threat to undertake her project with one of many *independent* lenders.[10] All parties are risk-neutral and there is no discounting.

Project. The entrepreneur's project evolves over three stages, $t = 0, 1, 2$. At date 0, there is a fixed investment outlay $I > 0$. Having no internal funds, the entrepreneur needs to raise the entire investment outlay from a lender. At date 1, the entrepreneur can add value by exerting effort $e \in [0, 1]$ (e.g., R & D, customer acquisition and other marketing efforts, cost cutting, etc.) at private cost $\psi(e)$. The effort cost function $\psi(e)$ is smooth, increasing and strictly convex, and satisfies the following standard regularity conditions: $\psi'''(e) \geqslant 0$, $\psi(0) = \psi'(0) = 0$, and $\lim_{e \to 1} \psi'(e) = \infty$.

Once the entrepreneur made her effort choice, the project is either continued or terminated.[11] Project termination would involve liquidation of the firm's assets and irreversible exit of the entrepreneur from the product market. Assets in place have a salvage value $S \in (0, I)$ at date 1 and zero salvage value at date 2. If continued, the project generates final and verifiable output (i.e., cash flows) at date 2. Cash flows are given by $\Pi > 0$ with probability e and zero with probability $1 - e$. Figure 1 illustrates the timing.

Let e^{FB} denote the present value maximizing effort level (when the project is undertaken and continued), i.e., $e^{FB} = \arg\max_e e\Pi - \psi(e)$. To make the analysis interesting, we assume that the net present value of the project is strictly positive at e^{FB},

$$e^{FB}\Pi - I - \psi\left(e^{FB}\right) > 0.$$

It is assumed that effort is non-contractible but privately observable to the lender by virtue of its relationship with the entrepreneur. Non-contractibility of effort in conjunction

[9] For example, the lender could have provided the incumbent with debt or equity funding in the past, or it could have bought shares or bonds in the secondary market for speculative or diversification reasons, etc. The assumption that there is only one affiliated lender simplifies the analysis, but is not crucial. Section 3.5 extends the setting towards multiple affiliated lenders.

[10] The case of a monopolistic lender will be briefly discussed in Section 3.2. We abstract from multiple investor financing. See, among others, Berglöf and von Thadden (1994), Bolton and Scharfstein (1996) and, closest related to our setting, Repullo and Suarez (1998) for models with multiple investors.

[11] The allocation of liquidation control rights (who has the right to decide whether the project is continued or terminated) and income rights (who receives what in the event of liquidation) will be derived endogenously. For simplicity, we exclude partial or random liquidation mechanisms.

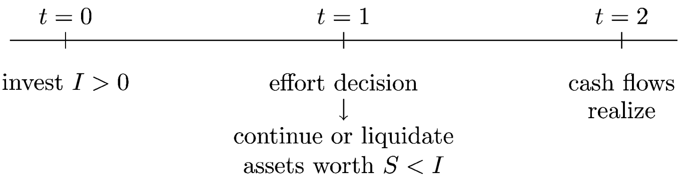

Fig. 1. Project structure.

with limited liability on the side of the entrepreneur gives rise to a standard moral hazard problem between the entrepreneur and her lender. Observability of effort will have the key advantage that the lender can potentially improve the entrepreneur's managerial incentives by imposing a threat on her to terminate the project should she fail to behave diligently.

Incumbent. For simplicity, the incumbent is modelled as a passive product market player who has no investment opportunities and who does not exit. Most naturally, aggressive behavior by the entrepreneur tends to erode the competitive stance of the incumbent's business. This is modelled as follows. If the entrepreneur is not in the market at date 2, either because she did not enter in the first place or her project has been terminated, then the incumbent derives product market income $V_h > 0$ at date 2. Conversely, if the entrepreneur is in the market at date 2, the incumbent's income is given by

$$\widetilde{V} = \begin{cases} V_l \in [0, V_h) & \text{with probability } e, \\ V_h & \text{with probability } 1 - e. \end{cases}$$

Thus, the incumbent's expected income, $eV_l + (1-e)V_h$, is strictly decreasing in e. The term $V_h - V_l > 0$ measures the *magnitude of the competitive threat* that the entrepreneur poses to the incumbent.

This modelling approach accommodates a variety of interesting strategic scenarios (for surveys, see Tirole, 1989; Besanko et al., 2000; Vives, 2000). For example, $V_l = 0$ may be interpreted as the entrant's innovation being "drastic". $V_h - V_l$ small could mean that the entrant's product offering is highly differentiated from that of the incumbent. In this case, the competitive threat posed to the incumbent should be relatively mild. $V_h - V_l > \Pi$ (say, "monopoly profits" are larger than "total duopoly profits") would imply that entry is inefficient for industry profits. Conversely, if $V_h - V_l < \Pi$, then the net present value brought in by the entrant's project may well outweigh the industry welfare cost from the business stealing effect. In this case, entry would be efficient for industry profits.

Financial affiliations. As mentioned earlier, the affiliated lender holds a financial claim in the incumbent. Independent lenders do not hold financial claims in the incumbent. For simplicity, we take the distribution of claims across lender as exogenously given and fixed.[12] The affiliated lender's claim generates interest rate or dividend income at date 2. Let R_l^{inc}

[12] See Arping (2002) for an endogenization of investors' financial interests in the incumbent. There we consider a game in which investors can strategically acquire claims in the incumbent. An important practical consideration is that the acquisition process is subject to frictions, which could stem from, e.g., capital adequacy regulation that penalizes investors for taking overly large and risky stakes, or dispersion among the incumbent's share- or bond-

and R_h^{inc} denote the payments from the incumbent to the affiliated lender when the incumbent derives income V_l and V_h, respectively.[13] We restrict attention to claims with the following natural properties: $R_l^{\text{inc}} \geqslant 0$, $R_h^{\text{inc}} \geqslant R_l^{\text{inc}}$ (monotonicity), and $R_s^{\text{inc}} \leqslant V_s$, $s \in \{l, h\}$ (limited liability). Examples for claims we have in mind are risk-free debt ($R_l^{\text{inc}} = R_h^{\text{inc}} \leqslant V_l$), risky debt ($R_l^{\text{inc}} = V_l$ and $R_h^{\text{inc}} > V_l$), and equity stakes ($R_l^{\text{inc}} = \tau V_l$ and $R_h^{\text{inc}} = \tau V_h$, where $\tau \in [0, 1]$). "No claim" can be formally treated as $R_l^{\text{inc}} = R_h^{\text{inc}} = 0$.

The term $\Delta \equiv R_h^{\text{inc}} - R_l^{\text{inc}}$ measures the degree to which the affiliated lender internalizes the competitive threat posed to the incumbent. We will frequently refer to this term as the *value-sensitivity* of the affiliated lender's claim in the incumbent, or, alternatively, as the affiliated lender's *protective interest* in the incumbent. For example, the value-sensitivity of an equity stake of size τ is given by $\Delta = \tau(V_h - V_l)$. The value-sensitivity of risky debt with face value $D \in (V_l, V_h]$ is given by $\Delta = D - V_l$. The value-sensitivity of risk-free debt and "no claim" are given by zero.

Contracting. It is assumed that the product market rivals cannot enter binding contracts (e.g., because of antitrust restrictions), and that the class of permissible contracts between lenders and the incumbent is given by the set of financial claims specified above. Thus, to the extent that lenders' financial claims in the incumbent are exogenously given and fixed, there is no need to consider contracting possibilities between lenders and the incumbent. Furthermore, we do not allow for side contracts between lenders, such as a contract between the affiliated and an independent lender that prohibits the independent lender from financing the entrepreneur. These assumptions enable us to focus on the contracting game between the entrepreneur and lenders, which is modelled as follows:

At date 0, the affiliated lender first makes a take-it-or-leave-it contract offer to the entrepreneur. If the entrepreneur accepts, the contract is put in force. If the entrepreneur rejects, she makes a contract offer to the competitive fringe of independent lenders and undertakes her project with one of them.

The outcome under independent lender financing determines the entrepreneur's *reservation payoff* when deciding whether to accept the affiliated lender's contract offer. Competition among independent lenders drives their profits down to zero. The entrepreneur's reservation payoff is thus given by the equilibrium net present value of her project,

$$e^{\text{out}}\Pi - I - \psi\left(e^{\text{out}}\right)$$

where e^{out} denotes the equilibrium effort level under independent lender financing. In the following, we refer to this effort level as the *outside option* effort level.

holders giving rise to a free-rider problem à la Grossman and Hart (1980). The qualitative insights that emerge from this analysis are similar to the ones presented here.

[13] Notice that the lender's claim does not affect the incumbent's cash flows V_l and V_h. We thus deliberately abstract from standard conflicts of interests between outside investors and firm insiders, such as risk-shifting incentives, effort moral hazard, etc. (likewise, we abstract from taxes). This approach enables us to focus on the key question addressed in this paper, namely how the lender's claim in the incumbent affects the entrepreneur's financing and incentives. It will be this channel through which the lender's claim in the incumbent may affect incumbent firm value $eV_l + (1 - e)V_h$.

For expositional convenience, we assume at this stage (and verify later) that the equilibrium allocation under independent lender financing is *as if* the project were automatically continued. In the low cash flow state the entrepreneur derives zero income, for which reason she can repay the lender only in the high cash flow state (as is standard, the entrepreneur is protected by limited liability). The optimal financial contract under independent lender financing is then a debt contract specifying a repayment I/e^{out} due at date 2. The outside option effort level is given by the (largest) solution of the reduced form incentive constraint,

$$\Pi - I/e^{\text{out}} = \psi'\left(e^{\text{out}}\right). \tag{1}$$

The left-hand side is the marginal benefit of exerting effort, and the right-hand side is the marginal cost. Independent lender financing is feasible if and only if (1) has a solution, which we assume. Notice that because of the underlying moral hazard problem the outside option effort level is distorted, $e^{\text{out}} < e^{FB}$.

We allow for contract renegotiation between the entrepreneur and her lender.[14] It is inessential which party has the bargaining power in renegotiation; we assume for convenience that the entrepreneur makes take-it-or-leave-it renegotiation offers to the lender. We restrict w.l.o.g. attention to contracts that are renegotiation-proof in equilibrium.

In what follows, we explore the financial contracting problem between the affiliated lender and the entrepreneur, assuming that in equilibrium a contracting relationship is established, which we verify later. Our aim is to show how the provision of incentives to the entrepreneur is influenced by the degree to which the lender internalizes the competitive threat posed to the incumbent.

2.2. Preliminaries

We start by deriving the investment and effort decisions that maximize the joint surplus of the entrepreneur and the affiliated lender (henceforth, "the lender"). Suppose the project is undertaken and continued in equilibrium. Let $e^{FB}(\Delta)$ denote the surplus maximizing effort level, i.e.,

$$e^{FB}(\Delta) = \arg\max_{e\in[0,1]} e\left(\Pi + R_l^{\text{inc}}\right) + (1-e)R_h^{\text{inc}} - \psi(e).$$

If interior, $e^{FB}(\Delta)$ is given by the solution of the first-order condition

$$\Pi - \Delta = \psi'(e)$$

where $\Delta \equiv R_h^{\text{inc}} - R_l^{\text{inc}}$ is the value-sensitivity of the lender's claim in the incumbent. Notice that $e^{FB}(\Delta)$ is strictly decreasing in Δ (for $\Delta < \Pi$), and satisfies $e^{FB}(0) = e^{FB} > 0$ and $e^{FB}(\Pi) = 0$. There thus is a threshold $\Delta^{\text{out}} \in (0, \Pi)$ such that $e^{FB}(\Delta) = e^{\text{out}}$ if and only if $\Delta = \Delta^{\text{out}}$. By inspection, this threshold is given by the outside funding burden under independent lender financing, $\Delta^{\text{out}} = I/e^{\text{out}}$. In other words, the efficient effort level

[14] Notice that the incumbent has no interest in joining the bargaining table. This is because the incumbent cannot successfully bribe the entrepreneur and her lender to implement the industry-efficient outcome, for they cannot contractually commit to do so.

$e^{FB}(\Delta)$ is inferior to the outside option effort level e^{out} if and only if the value-sensitivity of the lender's claim in the incumbent is sufficiently large, namely $\Delta > I/e^{\text{out}}$.

Next, let $\mathcal{W}(\Delta)$ denote the surplus *gain* from investing, relative to not investing, conditional on the entrepreneur exerting efficient effort when the project is undertaken, i.e.,

$$\begin{aligned}\mathcal{W}(\Delta) &= e^{FB}(\Delta)\bigl(\Pi + R_l^{\text{inc}}\bigr) + \bigl(1 - e^{FB}(\Delta)\bigr)R_h^{\text{inc}} - \psi\bigl(e^{FB}(\Delta)\bigr) - I - R_h^{\text{inc}} \\ &= e^{FB}(\Delta)(\Pi - \Delta) - \psi\bigl(e^{FB}(\Delta)\bigr) - I.\end{aligned}$$

Notice that $\mathcal{W}(\Delta)$ is strictly decreasing in Δ (for $\Delta < \Pi$), and satisfies $\mathcal{W}(0) > 0$ and $\mathcal{W}(\Pi) < 0$. There thus is a threshold $\bar{\Delta} \in (0, \Pi)$ such that $\mathcal{W}(\Delta) \geqslant 0$ if and only if $\Delta \leqslant \bar{\Delta}$. By implication, if $\Delta > \bar{\Delta}$, then investment cannot be efficient for the lender and the entrepreneur. In this case, the optimal financial contract is trivially a *buy-out* contract under which the entrepreneur commits to not enter the market. An initial transfer

$$T = \underbrace{e^{\text{out}}\Pi - I - \psi\bigl(e^{\text{out}}\bigr)}_{\text{reservation payoff}}$$

compensates the entrepreneur for her lost product market income. In the remainder of the paper, we abstract from this rather uninteresting case, and restrict attention to $\Delta \leqslant \bar{\Delta}$. To reduce the number of cases under consideration, we assume $I/e^{\text{out}} < \bar{\Delta}$. Intuitively, this means that the entrepreneur's outside option is not "too bad", i.e., Π is not too small relative to I, and hence e^{out} is not too small either. We discuss below how the qualitative results would be altered if this assumption were not satisfied.

2.3. *Incumbent rent protection*

Let us show in a first step that if the lender has a relatively strong interest in protecting the incumbent, $\Delta \in [I/e^{\text{out}}, \bar{\Delta}]$, then the first best—i.e., efficient effort and full rent extraction—can be implemented with a very simple financial contract.

Consider the following type of contract: an initial transfer $T \geqslant I$, out of which the initial investment outlay must be expended, repayments $R_H = \Delta$ and $R_L = 0$ conditional on project continuation and the realization of the high and low cash flow states, respectively, and the following clause: "The project is continued". To see the mechanism behind this contract, suppose the entrepreneur exerts effort e and consider the parties' joint continuation incentive at date 1. Since the status quo contract stipulates continuation, the project is continued without renegotiation whenever continuation is efficient, i.e.,

$$\underbrace{e\bigl(\Pi + R_l^{\text{inc}}\bigr) + (1-e)R_h^{\text{inc}}}_{\text{continuation surplus}} \quad \geqslant \quad \underbrace{S + R_h^{\text{inc}}}_{\text{termination surplus}}$$

or $e \geqslant \tilde{e} \equiv S/(\Pi - \Delta)$. Conversely, if $e < \tilde{e}$, then continuation is inefficient. In this case, the parties have an incentive to renegotiate the status quo contract and to terminate the project. Since the entrepreneur has the bargaining power in renegotiation, the surplus gain from termination is reaped by her. The entrepreneur's payoff from exerting effort e thus reads

$$\mathcal{U}(e) = \begin{cases} S + T - I - \psi(e) & \text{for } e < \tilde{e} \equiv S/(\Pi - \Delta), \\ e(\Pi - \Delta) + T - I - \psi(e) & \text{for } e \geqslant \tilde{e}. \end{cases}$$

This is maximized at $e^{FB}(\Delta) > \tilde{e}$.[15] Intuitively, the contract is designed such that the lender's payoff depends neither on the entrepreneur's choice of effort nor on the continuation decision. Thus, the entrepreneur is full residual claimant on the surplus, and hence she cannot possibly have an incentive to deviate from the efficient course of action.

Under the first best the lender also fully extracts the entrepreneur's rent. The entrepreneur is indifferent between accepting and rejecting the contract if and only if her payoff from accepting the contract equals her reservation payoff,

$$e^{FB}(\Delta)(\Pi - \Delta) + T - I - \psi\left(e^{FB}(\Delta)\right) = e^{\text{out}}\Pi - I - \psi\left(e^{\text{out}}\right)$$

or, rearranging terms,

$$T = e^{FB}(\Delta)\Delta + \underbrace{\int_{e^{FB}(\Delta)}^{e^{\text{out}}} \Pi - \psi'(e)\,\mathrm{d}e}_{\text{NPV destruction}} \equiv T(\Delta). \tag{2}$$

Notice that $T(\Delta) \geqslant I$ by $\Delta \geqslant I/e^{\text{out}}$. In sum,

Proposition 1. *Suppose the affiliated lender has a relatively strong interest in protecting the incumbent, $\Delta \in [I/e^{\text{out}}, \bar{\Delta}]$. Then*:

(i) *The entrepreneur is financed by the affiliated lender* (*rather than by an independent lender*) *and the project is undertaken.*
(ii) *Relative to independent lender financing, the entrepreneur's competitiveness is stifled. Specifically, the entrepreneur exerts efficient effort $e^{FB}(\Delta)$, which is weakly inferior to the outside option effort level e^{out}.*

In essence, the affiliated lender finances the entrepreneur to prevent her from accessing *more aggressive* finance elsewhere. This puts the lender in a position to stifle the entrepreneur's internal efficiency and competitiveness with an excessively dilutive financial claim, and to de facto bribe her to take a softer stance against the incumbent.

2.4. Incumbent rent destruction

Next, suppose the affiliated lender's protective interest in the incumbent is not too strong, $\Delta < I/e^{\text{out}}$. In this case, the contract considered in the previous subsection no longer implements the first best. This is because the initial transfer payment (2) would be insufficient to cover the initial investment outlay, and hence the contract would violate the entrepreneur's wealth constraint. We now demonstrate that, in some cases, the lender can still implement the first best by imposing a threat of termination on the entrepreneur. The credibility of this threat will be ensured by the lender's protective interest in the incumbent.

[15] Formally, we have $\Pi - \Delta = \psi'(e^{FB}(\Delta))$, and, by $S < I$ and $\Delta \leqslant \bar{\Delta}$, $e^{FB}(\Delta)(\Pi - \Delta) - \psi(e^{FB}(\Delta)) > S$.

To allow for the possibility of termination threats, we consider that the lender is pledged the control right to terminate the project at date 1.[16] As above, a financial contract specifies an initial transfer $T \geqslant I$ and repayments R_L and R_H, conditional on project continuation and the realization of the low and high cash flow states, respectively. We normalize without loss of generality the excess cash transfer and the low cash flow state repayment to zero, $T - I = 0$ and $R_L = 0$. The contract also governs the sharing of the liquidation proceeds in the event of project termination. Let $R_0 \leqslant S$ denote the share that accrues to the lender; the residual $S - R_0$ is captured by the entrepreneur.

To understand how the threat of termination affects the entrepreneur's incentive to exert effort, we need to know how the lender's continuation incentive under the status quo contract is altered by the entrepreneur's choice of effort. Suppose the entrepreneur exerts effort e, and consider the lender's incentive to continue the project. Under the status quo contract the lender prefers to continue if and only if

$$\underbrace{e\left(R_H - R_l^{\text{inc}}\right) + (1-e)R_h^{\text{inc}}}_{\text{continuation payoff}} \quad \geqslant \quad \underbrace{R_0 + R_h^{\text{inc}}}_{\text{termination payoff}}$$

or $e(R_H - \Delta) \geqslant R_0$. It will become immediate below that we must have $R_H > \Delta$ under an optimal contract. There thus is a threshold $\hat{e} \equiv R_0/(R_H - \Delta)$ such that under the status quo contract the lender prefers to continue if and only if $e \geqslant \hat{e}$. By inspection, an increase in Δ makes it less worthwhile for the lender to continue the entrepreneur's project, ceteris paribus. Intuitively, when the lender has a strong interest in protecting the incumbent, the lender finds it relatively attractive to remove the entrepreneur from the product market in order to improve incumbent firm value. This suggests that an increase in Δ may entice the entrepreneur to work harder in order to enhance the continuation value of the lender's stake in her project, thereby making it less worthwhile for the lender to terminate her project. This observation is central to the intuition behind the following analysis.

Let $\Phi(\Delta)$ denote the lender's profit from financing the entrepreneur. Given our assumption that the lender makes the initial contract offer, an optimal contract solves

$$\begin{aligned}\max_{R_0, R_H, e^*} \Phi(\Delta) &= e^*\left(R_H + R_l^{\text{inc}}\right) + (1-e^*)R_h^{\text{inc}} - I - \left(e^{\text{out}} R_l^{\text{inc}} + \left(1 - e^{\text{out}}\right) R_h^{\text{inc}}\right) \\ &= e^*(R_H - \Delta) - I + e^{\text{out}}\Delta\end{aligned}$$

s.t.

$$e^*(\Pi - R_H) - \psi(e^*) \geqslant e^{\text{out}}\Pi - I - \psi\left(e^{\text{out}}\right), \tag{IR}$$

$$R_0 \leqslant S, \tag{LL}$$

[16] It will become immediate below that it is indeed optimal to pledge the lender this right. The role of termination/intervention control rights in corporate finance contexts is of course central to a large literature (e.g., Bolton and Scharfstein, 1990, 1996; Aghion and Bolton, 1992; Rajan, 1992; Berglöf and von Thadden, 1994; Dewatripont and Tirole, 1994; von Thadden, 1995; Hart and Moore, 1998; Repullo and Suarez, 1998). For example, banks frequently retain the right to accelerate debt or to terminate credit lines. These contractual features can give banks significant power in forcing liquidation. Likewise, explicit or implicit termination control rights play an important role in venture capital finance (Kaplan and Strömberg, 2003).

$$e^*(R_H - \Delta) \geqslant R_0, \tag{CO}$$

$$e^* \text{ is incentive-compatible,} \tag{IC}$$

where e^* denotes the candidate equilibrium effort level, (IR) is the entrepreneur's participation constraint, (LL) is the limited liability constraint in the event of project termination, (CO) says that the lender has no incentive to terminate the project in equilibrium,[17] and (IC) is the managerial incentive constraint.

To solve this problem, we adopt the following two-step procedure. We first show what can be implemented when the continuation incentive constraint (CO) holds with equality and strict inequality, respectively. We then explore whether it is optimal for the affiliated lender to design the contract such that (CO) holds with equality.

Lemma 1. *Suppose the affiliated lender's protective interest in the incumbent is not too strong, $\Delta < I/e^{\text{out}}$. Then*:

(i) *If in equilibrium the affiliated lender is indifferent between project termination and continuation, i.e., $e^*(R_H - \Delta) = R_0$, then it elicits efficient effort $e^{FB}(\Delta)$ from the entrepreneur, and derives a profit of*

$$\Phi(\Delta) = \begin{cases} S - I + e^{\text{out}}\Delta & \text{for } \Delta \leqslant \hat{\Delta}, \\ \mathcal{G}(e^{FB}(\Delta)) \equiv \int_{e^{\text{out}}}^{e^{FB}(\Delta)} \Pi - \Delta - \psi'(e)\,\mathrm{d}e > 0 & \text{for } \Delta > \hat{\Delta}, \end{cases} \tag{3}$$

where $\hat{\Delta} \in ((I - S)/e^{\text{out}}, I/e^{\text{out}})$ solves $\mathcal{G}(e^{FB}(\Delta)) = S - I + e^{\text{out}}\Delta$.

(ii) *Conversely, if in equilibrium the affiliated lender strictly prefers to continue the project, i.e., $e^*(R_H - \Delta) > R_0$, then it elicits the outside option effort level e^{out} and makes zero profits.*

The intuition behind part (i) of the lemma is the following. If in equilibrium the lender is indifferent between project termination and continuation, then the lender can always reap its equilibrium continuation payoff by terminating the project.[18] In this situation, the lender is fully protected against moral hazard: if the entrepreneur shirked and did not fully compensate the lender for the cost, then the lender would simply terminate her project. Faced with this penalty threat, the entrepreneur fully internalizes the "social" cost of shirking. Thus, the managerial incentive constraint is slack and the lender elicits efficient effort. To see the shape of the lender's profit function, observe that if (CO) holds with equality the lender's profit reads $R_0 - I + e^{\text{out}}\Delta$. Thus, by limited liability (i.e., $R_0 \leqslant S$), the lender's profit cannot be larger than $S - I + e^{\text{out}}\Delta$. Obviously, the lender's profit cannot possibly exceed the gains from trade either; otherwise, the entrepreneur would not have accepted the contract. Yet, the gains from trade, conditional on the entrepreneur exerting efficient

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[17] To see the meaning of this constraint, note that if the project is undertaken, then it must be continued in equilibrium. Thus, restricting w.l.o.g. attention to contracts that are renegotiation-proof in equilibrium, the lender must have no incentive to terminate the project in equilibrium.

[18] Notice that the lender's termination payoff does not depend on effort.

effort, are given by $\mathcal{G}(e^{FB}(\Delta))$.[19] Thus, the lender's profit is given by the minimum of $S - I + e^{\text{out}}\Delta$ and $\mathcal{G}(e^{FB}(\Delta))$.

Part (ii) can be explained as follows. If in equilibrium the lender strictly prefers project continuation, then it still prefers continuation when the entrepreneur's actual effort level is slightly below the equilibrium effort level. This, together with the fact that in equilibrium project continuation is strictly efficient, implies that following any $e \geqslant e^* - \epsilon$, where $\epsilon > 0$ but small, the project is continued without renegotiation. In other words, the lender is willing to "tolerate" some shirking on the side of the entrepreneur: *the threat of termination lacks credibility*. Formally, this means that the desired effort level e^* is incentive-compatible only if the standard "arm's length" financing incentive constraint is satisfied, i.e.,

$$\Pi - R_H = \psi'(e^*).$$

In other words, the managerial incentive constraint is no longer slack. In this context, the best what the lender can do is to simply replicate the independent lender financing allocation, that is, demand a repayment $R_H = I/e^{\text{out}}$ and elicit effort e^{out}. To see this, notice that more aggressive effort (i.e., $e^* > e^{\text{out}}$) can be made incentive-compatible only if $R_H < I/e^{\text{out}}$. This is too costly for the lender; it would leave the entrepreneur an excessively high rent. Providing less aggressive incentives is not optimal either. This is because, given that $e^{FB}(\Delta) > e^{\text{out}}$, the gains from trade are non-negative if and only if $e^* \geqslant e^{\text{out}}$. In sum, if the termination threat lacks credibility, then the affiliated lender does not provide any value-added, and hence its profit is zero.

Observe that, by $S < I$, the lender's profit from imposing a credible threat of termination on the entrepreneur, (3), is positive if and only if Δ is not too small. This leads to our main result.

Proposition 2. *There is a threshold* $\underline{\Delta} \equiv (I - S)/e^{\text{out}} > 0$ *such that*:

(i) *If the affiliated lender's protective interest in the incumbent is neither too weak nor too strong, i.e.,* $\Delta \in [\underline{\Delta}, I/e^{\text{out}})$*, then it spurs the destruction of incumbent rents. Specifically, in equilibrium, the entrepreneur exerts efficient effort* $e^{FB}(\Delta)$*, which strictly exceeds the outside option effort level* e^{out}*. The affiliated lender's profit is given by* (3).

(ii) *Conversely, if* $\Delta < \underline{\Delta}$*, the entrepreneur exerts effort* e^{out}*, regardless of who finances her. Consequently, the source of financing is irrelevant.*

This demonstrates the pro-competitive effect of affiliated lender financing.[20] When the lender's interest in protecting the incumbent is neither too weak nor too strong, the lender effectively gives up protecting the incumbent. Instead, the lender takes advantage of its

[19] To see this more formally, note that if the lender and the entrepreneur establish a contracting relationship, then their joint surplus is given by $e^*(\Pi + R_l^{\text{inc}}) + (1 - e^*)R_h^{\text{inc}} - \psi(e^*) - I$. Conversely, if the parties did not establish a contracting relationship, then the surplus would read $e^{\text{out}}(\Pi + R_l^{\text{inc}}) + (1 - e^{\text{out}})R_h^{\text{inc}} - \psi(e^{\text{out}}) - I$. The *gains from trade* are then given by the surplus increase from establishing a contracting relationship, i.e., $\mathcal{G}(e^*) = \int_{e^{\text{out}}}^{e^*} \Pi - \Delta - \psi'(e)\,\mathrm{d}e$, where $\Delta = R_h^{\text{inc}} - R_l^{\text{inc}}$.

[20] We say that affiliated lender financing is pro-competitive if $e^* > e^{\text{out}}$ and anti-competitive if $e^* < e^{\text{out}}$.

enhanced toughness vis-à-vis the entrant and elicits strictly more aggressive effort than under independent lender financing. While the corresponding decrease in incumbent firm value is partially internalized by the lender, it is more than compensated by the incremental firm value of the entrant, part or all of which accrues to the lender. In this context, the lender's bias towards protecting incumbent rents spurs their *destruction*. At the same time, however, it promotes the *creation* of new value, for it facilitates the provision of efficient managerial incentives to the entrant.

Figure 2 illustrates the non-monotonic relation between the lender's protective interest in the incumbent and the entrepreneur's competitiveness. At $\Delta = 0$ the affiliated lender is no different from an independent lender. The threat of termination lacks credibility. Consequently, the entrepreneur's competitiveness is stifled by her external funding burden. Consider then the effects of an increase in Δ. By inspection, as Δ increases the efficient effort level $e^{FB}(\Delta)$ decreases. Yet, as long as $\Delta < I/e^{\text{out}}$ the efficient effort level still exceeds the outside option effort level e^{out}, i.e., the effort level that the entrepreneur would exert if she undertook her project with an independent lender. At the same time, the increase in Δ makes it less costly for the affiliated lender to provide the entrepreneur with efficient incentives by imposing a credible threat of termination on her. Intuitively, while an independent lender's termination payoff is bound by the asset salvage value, the affiliated lender also internalizes part of the increase in incumbent firm value when removing the entrepreneur from the product market. This strengthens the affiliated lender's commitment to penalize the entrepreneur for managerial slack. As soon as Δ is sufficiently large, i.e., $\Delta \geqslant \underline{\Delta}$, the affiliated lender finds it worthwhile to elicit efficient effort. The equilibrium effort level jumps to the efficient effort level $e^{FB}(\Delta)$. Equilibrium incentives are then gradually decreasing in Δ until it is no longer worthwhile for the parties to invest.[21]

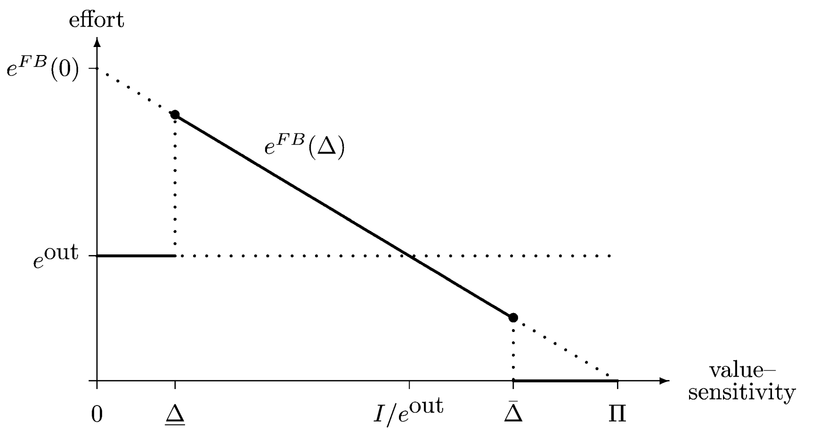

Fig. 2. Equilibrium incentives. The figure depicts the entrepreneur's equilibrium effort level as a function of the value-sensitivity Δ of the affiliated lender's claim in the incumbent. Effort is maximized at $\underline{\Delta} > 0$, and strictly superior to e^{out} if and only if $\Delta \in [\underline{\Delta}, I/e^{\text{out}})$.

[21] It is noteworthy that this pattern (and the various thresholds) would stay the same if the entrepreneur rather than the affiliated lender made the initial contract offer. What would change is how the gains from trade are shared

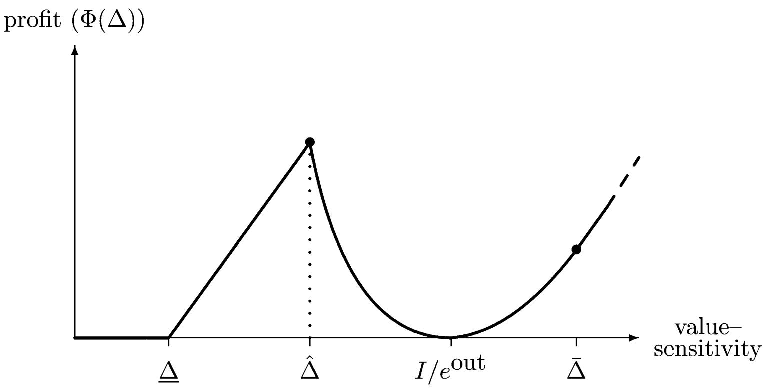

Fig. 3. Affiliated lender's profit. The figure relates the affiliated lender's profit to its protective interest in the incumbent. The lender's profit entails a local maximum at $\hat{\Delta}$. For $\Delta \geqslant \hat{\Delta}$, the profit is given by the gains from trade $\mathcal{G}(e^{FB}(\Delta))$. At $\Delta = I/e^{\text{out}}$, the gains from trade are zero.

Figure 3 depicts the affiliated lender's profit from financing the entrepreneur. For $\Delta < \underline{\Delta}$, the affiliated lender provides no value-added, and hence its profit is zero. For $\Delta \in [\underline{\Delta}, \hat{\Delta})$, the lender's profit is increasing in Δ. Within this range the entrepreneur's participation constraint is slack. The intuition is that the gains from trade are substantial when Δ is small. The lender cannot extract all of these gains from trade, for if it did the threat of termination would lose its credibility. As soon as Δ exceeds the threshold $\hat{\Delta}$ the lender fully extracts the gains from trade: the entrepreneur's participation constraint is binding. At $\Delta = I/e^{\text{out}}$ the gains from trade are zero, and hence the lender's profit must be zero too. For $\Delta > I/e^{\text{out}}$, the value-added of the affiliated lender stems from the competition-stifling effect: the gains from trade are again positive.

3. Discussion

This section provides robustness checks and extensions. We start by highlighting the effects of the magnitude of the competitive threat on the industry financing equilibrium. We then elaborate in some detail on two key ingredients of our model, namely, (i) the entrepreneur having a viable outside option to take finance elsewhere, and (ii) the presence of binding financial constraints. Lastly, we consider two extensions. Section 3.4 introduces diversification-promoting economic and/or regulatory capital constraints at the lender level. Section 3.5 highlights the multiplicity of credit market equilibria when there are several affiliated lenders.

between the lender and the entrepreneur: if the entrepreneur had the initial bargaining power she would capture the gains from trade, rather than the lender. Figure 2 also illustrates how the results would change if $I/e^{\text{out}} > \bar{\Delta}$. In this case, we would have three scenarios, $\Delta < \underline{\Delta}$ (no effect), $\Delta \in [\underline{\Delta}, \bar{\Delta}]$ (pro-competitive effect), and $\Delta > \bar{\Delta}$ (buy out).

3.1. The effects of the magnitude of the competitive threat

An important determinant of the value-sensitivity of the lender's claim in the incumbent is the *magnitude* of the competitive threat that the entrepreneur poses to the incumbent. For example, if the lender held an equity stake of size τ in the incumbent the value-sensitivity of its claim would be proportional to the magnitude of the competitive threat, $\Delta = \tau(V_h - V_l)$. The value-sensitivity of risky debt with face value $D > V_l$ is given by $\Delta = D - V_l$. Thus, to the extent that V_l decreases as the competitive threat posed to the incumbent becomes more severe, the value-sensitivity of debt is also increasing in the magnitude of the competitive threat. To fix ideas, suppose the lender holds an equity stake of size τ. From the preceding analysis we know that affiliated lender financing is pro-competitive if and only if[22]

$$\tau \in \left[\underline{\tau}, \tau^{\text{out}}\right) \equiv \left[\frac{I - S}{e^{\text{out}}(V_h - V_l)}, \frac{I}{e^{\text{out}}(V_h - V_l)}\right).$$

Relatively small stakes ($\tau < \underline{\tau}$) have no effect on the entrepreneur's competitiveness, while relatively large stakes ($\tau > \tau^{\text{out}}$) give rise to an anti-competitive effect.

This is illustrated in Fig. 4 (a similar figure could be drawn for debt). The solid line depicts $\underline{\tau}$ and the dashed line τ^{out}. Interestingly, the competitive effect of affiliated lender financing is non-monotonic in the magnitude of the competitive threat. When the competitive threat is very mild (e.g., products are highly differentiated), the threat of termination is unlikely to be credible. Conversely, when the magnitude of the competitive threat is neither too small nor too large, the pro-competitive effect is likely to prevail. Lastly, if the

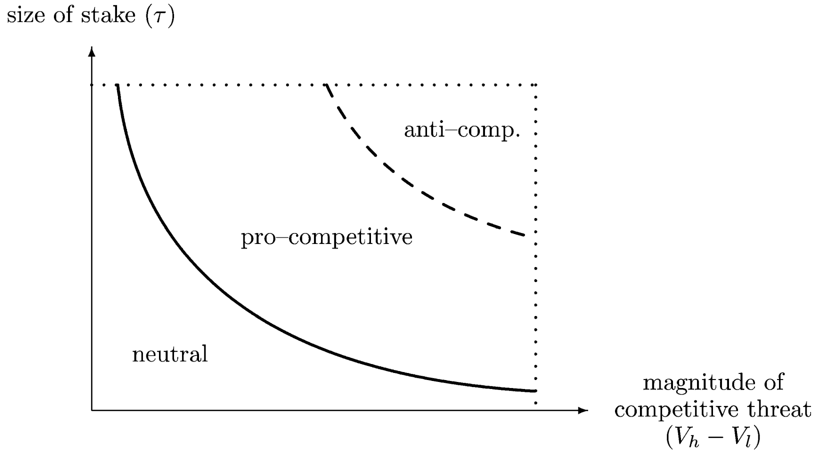

Fig. 4. Competitive effects of affiliated lender financing. The figure illustrates the competitive effects of affiliated lender financing when the lender holds an equity stake of size τ in the incumbent. The x-axis represents the magnitude of the competitive threat $(V_h - V_l)$, the solid line depicts the lower bound of the pro-competitive range, and the dashed line represents the upper bound.

[22] Recall that affiliated lender financing is referred to as pro-competitive if and only if the affiliated lender elicits more aggressive effort than under independent lender financing.

entrepreneur poses a very strong competitive threat to the incumbent (e.g., her product offering is "drastic"), and moreover the lender's stake in the incumbent is not too small, then affiliated lender financing is likely to be anti-competitive.

3.2. Credit market structure

We have assumed above that the entrepreneur has a viable outside option to undertake her project with an independent lender, which is a natural assumption. However, for an understanding of the importance of this model ingredient, it is useful to briefly elaborate on the case where the entrepreneur relies on the affiliated lender.

Thus, consider an economy with only one financier, namely, the affiliated lender. In this context, not financing the entrepreneur allows the lender to keep the entrepreneur out of the product market. Therefore, as for the value of the lender's claim in the incumbent there is no difference between *not financing* the entrepreneur at date 0 and *liquidating* her at date 1. This implies that the threat of termination cannot be credible. To see this, notice that the break-even constraint of a monopoly financier reads $e^*(R_H - \Delta) \geqslant I$. The threat of termination can be made credible only if $e^*(R_H - \Delta) \leqslant S$. By $I > S$, these two conditions cannot hold simultaneously. By contrast, if the entrepreneur has a viable outside option to access finance elsewhere, then the affiliated lender's break-even constraint reads $e^*(R_H - \Delta) \geqslant I - e^{\text{out}}\Delta$. The threat of competition thus relaxes the lender's break-even constraint. This, in turn, has positive implications for the lender's willingness to provide the entrepreneur with efficient incentives by inflicting a credible threat of termination on her.

The following proposition describes the case of a monopoly financier.

Proposition 3. *Suppose the affiliated lender has a monopoly position in the credit market. Then*:

(i) *If the project is undertaken the equilibrium effort level e^* is given by the solution of*

$$\underbrace{\Pi - \Delta - \psi'(e^*)}_{\textit{marginal value}} = \underbrace{e^*\psi''(e^*)}_{\textit{marginal rent}}.$$

Equilibrium effort is strictly decreasing in Δ and strictly inferior to the efficient effort level $e^{FB}(\Delta)$.

(ii) *The project is undertaken if and only if*

$$\underbrace{e^*(\Pi - \Delta) - I - \psi(e^*)}_{\textit{net present value}} \geqslant \underbrace{e^*\psi'(e^*) - \psi(e^*)}_{\textit{entrepreneurial rent}}.$$

Notably, there is a threshold $\tilde{\Delta} \in (0, \bar{\Delta})$ such that the project is undertaken if and only if $\Delta \leqslant \tilde{\Delta}$.

This illustrates the pivotal role of the entrepreneur's outside option to undertake her project with another financier. In a world with only one lender, the effects described in the previous section do not materialize. The lender's financial interest in the incumbent exacerbates the standard distortion from monopoly pricing.[23] The entrepreneur's competitiveness is severely stifled.[24] Thus, the monopoly lender scenario is characterized by very poor incentives and excessively soft competition. In this context, the introduction of credit market competition can have a dramatic pro-competitive spillover effect on the product market. In particular, the affiliated lender may adopt a completely different lending approach vis-à-vis the entrepreneur, and switch from a "rent protection regime" in which the entrepreneur's competitiveness is severely stifled and incumbent rents are protected to a "rent destruction regime" in which the entrepreneur is provided with aggressive incentives.

3.3. *The role of financial constraints*

So far, we have assumed that the entrepreneur has no internal funds that she could contribute to the financing of her project. In this subsection, we relax this assumption. Our aim is to demonstrate how the competitive effect of affiliated lender financing depends on the degree to which the entrepreneur's financial constraint is binding.

Suppose the entrepreneur has internal funds $A < I$. The entrepreneur's outside funding need is then given by $I - A$. The following proposition demonstrates the role of financial constraints in our setting.

Proposition 4. *Suppose the entrepreneur has internal funds $A < I$. Then*:

(i) *For $A < I - S$ (tight financial constraint), the affiliated lender's financial interest in the incumbent has a pro-competitive effect if and only if*

$$\Delta \in \big[\underline{\Delta}, \Delta^{\text{out}}\big) \equiv \big[(I - A - S)/e^{\text{out}}, (I - A)/e^{\text{out}}\big).$$

For $\Delta < \underline{\Delta}$ affiliated lender financing is neutral, while for $\Delta > \Delta^{\text{out}}$ it is anti-competitive.

(ii) *For $A \geqslant I - S$ (lax financial constraint), affiliated lender financing is unambiguously anti-competitive.*

If the entrepreneur's financial constraint is "lax", then the asset salvage value suffices to fully "secure" the continuation value of the lender's claim at the interim termination stage. This implies that the threat of termination can be made credible no matter how small Δ.[25] In this circumstance, the entrepreneur no longer faces a binding financial constraint, and hence the surplus maximizing effort level $e^{FB}(\Delta)$ is always implemented. By implication, the lender's financial interest in the incumbent has an unambiguously anti-competitive effect.

[23] Notice that if entrepreneur made a take-it-or-leave-it offer to the lender then her performance would be strictly decreasing in Δ too. This is because as Δ increases the entrepreneur must pledge an additional payment to the lender in order to compensate the lender for the value depreciation of its claim in the incumbent. This inflates her outside funding burden, which stifles incentives.

[24] Notably, her equilibrium effort level is always inferior to the efficient effort level.

[25] Formally, the threshold $\underline{\Delta}$ is no longer positive.

This illustrates the pivotal role of financial constraints in our model. When financial constraints are not binding, then the lender's protective interest in the incumbent cannot possibly have a pro-competitive effect on the entrepreneur's competitiveness.

3.4. The limits of industry focus

Our basic model predicts a strong degree of investor industry focus. This is consistent with the notion that active financiers, such as venture capitalists, often display a certain degree of industry specialization. Yet, while the preceding analysis allows us to understand the benefits of industry focus, it has been silent on the potential costs. One important practical consideration stems from the observation that lenders frequently face economic or regulatory capital constraints. These constraints should provide lenders with an incentive to diversify their investment portfolios, thereby limiting their quest for industry focus.

We formalize this aspect in the most simple fashion. Suppose that a lender who holds a stake Δ in the incumbent would incur a deadweight cost $k\Delta$ if it financed the entrepreneur. For example, lenders could be subject to risk-based capital adequacy regulation that penalizes them for industry-specialization. The following proposition shows how the industry financing equilibrium is altered by this consideration.

Proposition 5. *Suppose the affiliated lender faces a deadweight cost $k\Delta$ from financing the entrepreneur, where $k > 0$ but small. There are thresholds $(\Delta_1, \Delta_2, \Delta_3)$ with $0 < \Delta_1 < \Delta_2 < \Delta_3$ such that the affiliated lender finances the entrepreneur if*

- $\Delta \in [\Delta_1, \Delta_2]$ (*pro-competitive industry focus regime*),
- *or* $\Delta \geqslant \Delta_3$ (*anti-competitive industry focus regime*).

For $\Delta \notin [\Delta_1, \Delta_2]$ and $\Delta < \Delta_3$, the entrepreneur undertakes her project with an independent investor (*diversification regime*).

The proof of the proposition is apparent from Fig. 5. The dashed line is the deadweight cost. The solid line depicts the affiliated lender's gross profit (before the deadweight cost). The affiliated lender finances the entrepreneur if and only if the gross profit (solid line) is not inferior to the deadweight cost (dashed line). As long as Δ is very small, the entrepreneur is financed by an independent lender. In this case, affiliated lender financing has no value-added. Within the range $[\Delta_1, \Delta_2] \subset (\underline{\Delta}, I/e^{\text{out}})$ the entrepreneur is financed by the affiliated lender. Moreover, affiliated lender financing is strictly pro-competitive within this range. Here, the affiliated lender's value-added stems from the disciplining effect. As Δ becomes larger, the entrepreneur switches to independent lender finance. The intuition is that for Δ close to I/e^{out}, the effort distortion $|e^{FB}(\Delta) - e^{\text{out}}|$ is relatively small. Lastly, for Δ very large, the entrepreneur is again financed by the affiliated lender. In this case the value-added of affiliated lender financing stems from the competition-stifling effect.

Figure 5 also generates interesting comparative statics. Consider the effect of an increase in the marginal deadweight cost k on the industry financing equilibrium. By inspection, as k increases, the pro-competitive range $[\Delta_1, \Delta_2]$ becomes unambiguously smaller. The anti-competitive range becomes smaller too (Δ_3 increases). This suggests that diversification-

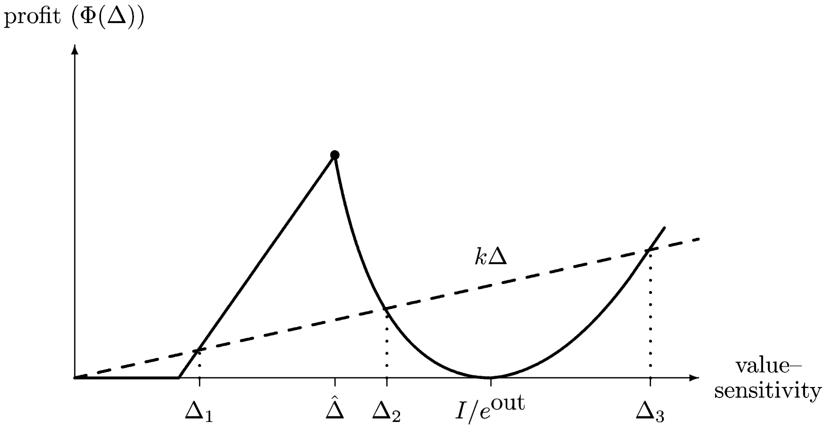

Fig. 5. The limits of industry focus. The solid line depicts the affiliated lender's gross profit (before the deadweight cost $k\Delta$). The dashed line depicts the deadweight cost. The affiliated lender finances the entrepreneur if and only if the gross profit exceeds the deadweight cost.

promoting regulatory measures, such as a tightening of regulatory capital constraints, can have important implications for product market competition. The analysis also yields insights into how industry focus and its competitive implications should vary across different types of lenders. As is well known, commercial banks are subject to stringent capital adequacy regulation measures, while venture capital firms are typically not. This suggests that venture capital firms should have a stronger appetite for industry focus than banks.

3.5. *Multiple credit market equilibria*

In this subsection, we consider a straightforward extension of the basic model towards several affiliated lenders. Our aim is to highlight the potential multiplicity of credit market equilibria that can arise in contexts in which lenders internalize competitive externalities.

To fix ideas, suppose there are two affiliated lenders, each of them holding a claim with value-sensitivity Δ in the incumbent. Let us assume that independent lender financing is *not* feasible, i.e., the reduced form incentive constraint $\Pi - I/e^{\text{out}} = \psi'(e^{\text{out}})$ does not have a solution. In other words, the moral hazard problem under independent lender financing is so severe that the entrepreneur is not able to secure funding from an independent lender. We consider the following game: The entrepreneur makes a contract offer $(T = I, R_0 \leqslant S, R_L = 0, R_H \leqslant \Pi)$. Lenders simultaneously decide whether to accept or reject this offer; if both accept, a coin is tossed.

Consider a candidate equilibrium in which both lenders accept and the threat of termination is credible, and hence the entrepreneur exerts efficient effort $e^{FB}(\Delta)$. Each lender's break-even constraint reads

$$e^{FB}(\Delta)(R_H - \Delta) \geqslant I - e^{FB}(\Delta)\Delta.$$

From the preceding analysis, we know that the threat of termination can be made credible if and only if

$$e^{FB}(\Delta)(R_H - \Delta) \leqslant S.$$

Therefore, in a candidate equilibrium in which both lenders are willing to finance the entrepreneur and the threat of termination is credible, we must have $e^{FB}(\Delta)\Delta \geqslant I - S$. Let Δ' (Δ'') denote the smallest (largest) solution of

$$e^{FB}(\Delta)\Delta = I - S. \tag{4}$$

We assume that expression (4) has a solution.[26] Observe that $\Delta' > 0$. The following proposition shows that there can be multiple equilibria in the credit market.[27]

Proposition 6. *Suppose there are two affiliated lenders with protective interests Δ, independent lender financing is not feasible, and $\Delta' < \bar{\Delta} < \Delta''$, where Δ' and Δ'' solve (4). Then, for $\Delta \in (\Delta', \bar{\Delta})$ the credit market entails multiple equilibria. In particular, there exist*

(i) *a "neutral" equilibrium in which the project is not undertaken, and lenders make zero profits, but also*
(ii) *a pro-competitive equilibrium in which the project is undertaken, the entrepreneur exerts efficient effort $e^{FB}(\Delta)$, and lenders make non-negative profits.*

For $\Delta < \Delta'$, the entrepreneur is not able to obtain financing for her venture.

This multiplicity of credit market equilibria stems from the externality that a lender exerts on the other lender when it agrees to finance the entrepreneur. Specifically, when a lender accepts the entrepreneur's offer, it reduces the other lender's reservation payoff from turning down the offer. This puts competitive pressure on the other lender, which has positive implications for the lender's willingness to provide the entrepreneur with efficient incentives. This, in turn, makes financing feasible in the first place. Somewhat paradoxically, in this context, the entrepreneur is able to obtain funding for her project *only if* lenders are sufficiently interested in protecting the incumbent.

Concretely, suppose the first lender decides to reject any financing offer. Then the second lender's best response is to reject any financing offer too. This is because, given that the first lender would not finance the entrepreneur, the second lender is a monopoly financier vis-à-vis the entrepreneur. As explained earlier, in this case, the threat of termination cannot be credible. This, in turn, implies that funding is not feasible, due to the entrepreneur's poor incentives. Thus, there is an equilibrium in which the entrepreneur is not able to secure funding: if one of the lenders is not willing to finance the entrepreneur, the other lender

[26] A sufficient condition for a solution to exist is that S is close to I. Formally, it is easy to show that $\sigma(\Delta) \equiv e^{FB}(\Delta)\Delta$ is strictly concave in Δ. Moreover, $\sigma(0) = \sigma(\Pi) = 0$. Hence, for $I - S$ sufficiently small there exist $\Delta' > 0$ and $\Delta'' > \Delta'$ such that $\sigma(\Delta) \geqslant I - S$ if and only if $\Delta \in [\Delta', \Delta'']$.

[27] As is standard, an "equilibrium" is a subgame perfect Nash equilibrium. Here, we shall adopt a second Nash refinement, namely trembling hand perfection. See the appendix for details.

would make a loss if it financed the entrepreneur. Yet, for $\Delta \in (\Delta', \bar{\Delta})$ there also exist equilibria in which the project is undertaken. Suppose the first lender accepts the offer. Then, if the second lender turned down the offer the entrepreneur would undertake her project with the first lender. That is, the second lender cannot protect the value of its claim in the incumbent by turning down the entrepreneur's financing request. The threat of competition relaxes the second lender's break-even constraint, which in turn makes the lender willing to accept a financial contract under which the entrepreneur is provided with an incentive to run her firm efficiently.[28]

The proposition states that lenders make strictly positive profits in the more competitive equilibrium, while the "neutral" no-entry equilibrium gives rise to zero profits. This does not imply that lenders have a preference for the more competitive equilibrium. To see which equilibrium is preferred by lenders, we have to compare lenders' equilibrium *payoffs* across equilibria. In the no-entry equilibrium, each lender's payoff is given by R_h^{inc}. In the pro-competitive equilibrium, lenders' payoffs cannot exceed $S - I + R_h^{\text{inc}}$, as is easily verified. This is strictly less than R_h^{inc}, which shows that lenders prefer the neutral equilibrium.[29] Thus, if lenders could coordinate on an equilibrium, they would pick the less competitive one.

To see where this preference for the "bad" equilibrium comes from, suppose the entrepreneur could contractually commit to run her firm efficiently. In this case, assuming that Δ is not too large, the project would be undertaken and the entrepreneur would exert efficient effort. This is because in the absence of moral hazard the entrepreneur can always pledge her lender a large enough claim to compensate the lender for the value depreciation of its stake in the incumbent. More specifically, pledging such a claim will not distort the entrepreneur's incentives. This shows that lenders' preference for the "bad" equilibrium ultimately stems from the moral hazard problem on the side of the entrepreneur. To resolve this moral hazard problem, lenders must impose a credible threat of termination on the entrepreneur. This limits the rent that the entrepreneur can pledge to outside financiers, which explains why lenders prefer the "bad" equilibrium.

4. Conclusion

We have examined mechanisms by which the provision of incentives to wealth-constrained new entrants is influenced by lenders' existing financial interests in incumbents. When a lender has a strong interest in protecting incumbent rents, it buys out the

[28] Interestingly, Bertrand competition does not drive lenders' profits down to zero. This is because lenders can impose a credible threat on the entrepreneur to not finance her if she deviated from a candidate contract under which lenders make strictly positive profits. In a trembling hand perfect equilibrium, lenders must make strictly positive profits in expectation, for if they did not then accepting the entrepreneur's financing offer would be weakly dominated by rejecting it.

[29] One can show that if independent lender financing were feasible there would be multiple equilibria for $\Delta \in (\Delta', \underline{\Delta})$, where $\underline{\Delta} \equiv (I - S)/e^{\text{out}}$. Notably, there exists an equilibrium in which the entrepreneur exerts effort e^{out} (as in Section 2) but also another equilibrium in which efficient effort $e^{FB}(\Delta)$ is exerted. Lenders again prefer the "neutral" to the more competitive equilibrium.

entrant or finances her with a highly dilutive claim, and bribes her for not accessing more aggressive finance elsewhere. This stifles the entrant's incentive to exert aggressive effort in the marketplace, and thereby suppresses competition. By contrast, when the lender's bias towards protecting the incumbent is neither too strong nor too weak, then it *spurs* the destruction of incumbent rents. This is because it strengthens the lender's commitment to penalize the entrant for managerial slack by forcing her into liquidation, which sharpens the entrant's competitiveness. While the corresponding decrease in incumbent firm value is partially internalized by the lender, it turns out the lender is more than compensated by the incremental firm value of the entrant, part or all of which accrues to the lender.

Empirically, to the extent that the value-sensitivity of financial claims is positively correlated with size, the model predicts a non-monotonic, U-shaped relationship between the size of financiers' claims in incumbent firms and *incumbent* firm value. This U-shaped relation is consistent with recent empirical studies about the link between bank ownership and firm value. For example, Morck et al. (2000), in a sample of Japanese firms, find that at a lower levels of bank ownership, firm value falls as bank ownership rises, while at higher levels of ownership this relationship is reversed. Likewise, Schmid (1996) documents a U-shaped relation between bank ownership and firm profitability (return on equity) in a sample of German firms. In addition, our model predicts that this U-shaped relation should be particularly pronounced in small markets. Market size may thus serve as a control variable that allows to distinguish our empirical implication from other determinants of the relation between bank ownership and firm value.

Our approach also has implications for the competitive effects of industry-focused lending styles. In particular, the analysis suggests that industry focus can be pro-competitive, even when cost efficiency gains due to economies of scale in expertise or asset complementarities are negligible. Rather, we emphasize the disciplining effect that stems from lenders' enhanced toughness when holding claims in rival firms. The sign of the competitive effect ultimately depends on a plethora of influences, notably the size and riskiness of lenders' claims in competitors, the magnitude of the competitive threats involved, and the degree to which financial constraints are binding. In financing contexts in which lenders' claims are of intermediate size, products exhibit relatively strong degrees of differentiation, and firms are subject to binding financial constraints, one would expect the disciplining effect to outweigh the competition-suppressing effect. The opposite applies when products are less differentiated, financial interests are concentrated in the hands of a few large financiers, and financial constraints are less binding.

Taking a broader perspective, the framework proposed here can be applied in any context in which a principal who is interested in protecting an agent or an asset contracts with another agent who may harm the principal's affiliate or destroy the value of the asset. Examples include policy contexts in which politicians have implicit or explicit stakes in domestic industries and bargain with foreign rivals, multi-divisional business organizations with competing divisions, collaborations between competitors, and internal labor markets. In these contexts, the quest for protecting the status quo may ultimately contribute to its "creative destruction".

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Appendix A

Proof of Proposition 1. See the discussion in the text. □

Proof of Lemma 1. Suppose $\Delta < I/e^{\text{out}}$.

Part (i): We solve for the optimal contract conditional on (CO) holding with equality ($e^*(R_H - \Delta) = R_0$).

We start by deriving the entrepreneur's payoff as a function of her effort level. Continuation at $t = 1$ is efficient if and only if $e \geqslant \tilde{e} \equiv S/(\Pi - \Delta)$. We assume (and verify later) that $R_H > \Delta$ holds at the optimum. Thus, under the status quo contract the lender prefers to continue if and only if $e \geqslant e^*$. Moreover, we must have $\tilde{e} < e^*$, otherwise the parties would not have undertaken the project. Therefore, if the entrepreneur exerts effort $e < \tilde{e}$, project termination at $t = 1$ is efficient and preferred by the lender. If the entrepreneur exerts effort $e \in [\tilde{e}, e^*)$, project continuation is efficient but the lender prefers to terminate the project. Lastly, if the entrepreneur exerts effort $e \geqslant e^*$, then project continuation is not only efficient but also preferred by the lender. In the first and third cases, the status quo contract is ex post efficient. Hence, in these cases the status quo contract is not renegotiated: in the former case the project is terminated (without renegotiation) and in the latter it is continued (without renegotiation). In the intermediate case, however, the status quo contract is inefficient. In this case, the lender would inefficiently terminate if the status quo contract were not renegotiated. Hence, the parties have an incentive to re-contract as to effectively avoid project termination. In renegotiation the entrepreneur offers the lender to convert its old claim R_H into a new claim R'_H so that the lender is just willing to continue,

$$e\big(R'_H - \Delta\big) = R_0$$

or $R'_H = \Delta + R_0/e$. The entrepreneur's payoff from exerting effort e thus reads

$$\mathcal{U}(e) = \begin{cases} S - R_0 - \psi(e) & \text{for } e < \tilde{e}, \\ e(\Pi - R'_H) - \psi(e) = e(\Pi - \Delta) - R_0 - \psi(e) & \text{for } e \in [\tilde{e}, e^*), \\ e(\Pi - R_H) - \psi(e) & \text{for } e \geqslant e^*, \end{cases}$$

where $\tilde{e} = S/(\Pi - \Delta)$. Notice that this function is continuous in e. By concavity, e^* is locally incentive compatible if and only if

$$\Pi - \Delta - \psi'(e^*) \geqslant 0, \tag{5}$$

$$\Pi - R_H - \psi'(e^*) \leqslant 0. \tag{6}$$

In addition, the entrepreneur must have no incentive to render continuation inefficient. If she had such an incentive, she would exert zero effort and derive a payoff of $S - R_0$. Hence, the entrepreneur has no incentive to render continuation inefficient if and only if

$$e^*(\Pi - R_H) - \psi(e^*) \geqslant S - R_0. \tag{7}$$

In sum, e^* is globally incentive compatible if and only if (5), (6), and (7) are satisfied.

Let us now turn to the lender's contract design problem. Suppose that none of the incentive constraints are binding. Substituting $e^*(R_H - \Delta) = R_0$ into the objective function and the entrepreneur's participation constraint, and rearranging terms, it is straightforward to show that the lender's contract design problem can be restated as follows:

$$\max_{R_0, e^*} \Phi(\Delta) = R_0 - I + e^{\text{out}}\Delta$$

s.t.

$$R_0 \leqslant I - e^{\text{out}}\Delta + \mathcal{G}(e^*), \tag{8}$$

$$R_0 \leqslant S, \tag{9}$$

where (8) is the reduced form participation constraint and $\mathcal{G}(e^*) = \int_{e^{\text{out}}}^{e^*} \Pi - \Delta - \psi'(e)\,\mathrm{d}e$ are the gains from trade. This problem has a straightforward solution. By inspection, $e^* = e^{FB}(\Delta)$ relaxes (8) as much as possible. Thus,

$$R_0 = \min\bigl[S, \underbrace{I - e^{\text{out}}\Delta + \mathcal{G}\bigl(e^{FB}(\Delta)\bigr)}_{\equiv \varphi(\Delta)}\bigr].$$

Notice that $\varphi'(\Delta) < 0$, $\varphi((I - S)/e^{\text{out}}) = S + \mathcal{G}((I - S)/e^{\text{out}}) > S$, and $\varphi(I/e^{\text{out}}) = 0$. There thus is a threshold $\hat{\Delta} \in ((I - S)/e^{\text{out}}, I/e^{\text{out}})$ such that

$$S \leqslant I - e^{\text{out}}\Delta + \mathcal{G}\bigl(e^{FB}(\Delta)\bigr)$$

if and only if $\Delta \leqslant \hat{\Delta}$. Thus, for $\Delta \leqslant \hat{\Delta}$ an optimal contract is given by $R_0 = S$ and $R_H = \Delta + S/e^{FB}(\Delta) > \Delta$. For $\Delta > \hat{\Delta}$, an optimal contract is given by

$$R_H = 1/e^{FB}(\Delta)\left[I + \int_{e^{\text{out}}}^{e^{FB}(\Delta)} \Pi - \psi'(e)\,\mathrm{d}e\right] > \Delta$$

and $R_0 = e^{FB}(\Delta)(R_H - \Delta) < S$. For completeness, notice that the limited liability constraint in the high cash flow state ($R_H \leqslant \Pi$) is of course not binding.

We now confirm that the entrepreneur's incentive constraints are not binding. Obviously, neither (5) nor (6) is binding. To prove that (7) is not binding, notice that

$$e^{FB}(\Delta)(\Pi - R_H) + R_0 - S = e^{FB}(\Delta)(\Pi - \Delta) - S > 0$$

since continuation is strictly efficient at $e^{FB}(\varDelta)$. Lastly, notice that investment is strictly efficient since $\varDelta < I/e^{\text{out}}$ and $\mathcal{W}(I/e^{\text{out}}) > 0$. The lender's profit follows immediately.

Part (ii): We solve for the optimal contract conditional on (CO) holding with strict inequality ($e^*(R_H - \varDelta) > R_0$).

Let us show in first step that if the entrepreneur's incentive constraint is given by

$$\varPi - R_H = \psi'(e^*) \tag{10}$$

then the optimal contract replicates the independent lender financing allocation. Substituting (10) into the objective function and the entrepreneur's participation constraint we can rewrite the contract design problem as follows

$$\begin{aligned}
&\max_{e^*} e^*\bigl(\varPi - \varDelta - \psi'(e^*)\bigr) - I + e^{\text{out}}\varDelta \\
&\text{s.t.} \\
&e^*\psi'(e^*) - \psi(e^*) \geqslant e^{\text{out}}\varPi - I - \psi\bigl(e^{\text{out}}\bigr) = e^{\text{out}}\psi'\bigl(e^{\text{out}}\bigr) - \psi\bigl(e^{\text{out}}\bigr)
\end{aligned} \tag{11}$$

where we have made use of the reduced form incentive constraint under independent lender financing,

$$e^{\text{out}}\varPi - I = e^{\text{out}}\psi'\bigl(e^{\text{out}}\bigr). \tag{12}$$

Note that $e\psi'(e) - \psi(e)$ is strictly increasing in e. Thus, by (11), $e^* \geqslant e^{\text{out}}$. We now show that if (i) $\varDelta > 0$ or (ii) $I/e^{\text{out}} - e^{\text{out}}\psi''(e^{\text{out}}) < 0$, then (11) must be binding, and hence $e^* = e^{\text{out}}$. Suppose (11) is not binding. Then, e^* is uniquely characterized by the first order condition

$$\chi(e^*) \equiv \varPi - \varDelta - \psi'(e^*) - e^*\psi''(e^*) = 0.$$

Notice that

$$\begin{aligned}
\chi\bigl(e^{\text{out}}\bigr) &= \varPi - \varDelta - \psi'\bigl(e^{\text{out}}\bigr) - e^{\text{out}}\psi''\bigl(e^{\text{out}}\bigr) \\
&\leqslant \varPi - \varDelta - \psi'\bigl(e^{\text{out}}\bigr) - I/e^{\text{out}} \\
&= -\varDelta \leqslant 0
\end{aligned}$$

where the first step follows from concavity ($I/e^{\text{out}} - e^{\text{out}}\psi''(e^{\text{out}}) \leqslant 0$), and the second step from (12). Thus, if either $\varDelta > 0$ or $I/e^{\text{out}} - e^{\text{out}}\psi''(e^{\text{out}}) <$ then, by concavity, $e^* < e^{\text{out}}$. That is, (11) must be binding, and hence $e^* = e^{\text{out}}$ and $R_H = I/e^{\text{out}}$. Conversely, if $\varDelta = 0$ and $I/e^{\text{out}} - e^{\text{out}}\psi''(e^{\text{out}}) = 0$, then $\chi(e^{\text{out}}) = 0$, and hence $e^* = e^{\text{out}}$ and $R_H = I/e^{\text{out}}$ too.

We now show that if $e^*(R_H - \varDelta) > R_0$, then e^* is locally incentive compatible if and only if (10) holds. In equilibrium, continuation must be strictly efficient, otherwise the parties would not have undertaken the project. Thus, following a small deviation from the equilibrium effort level, $e = e^* - \epsilon$, where $\epsilon > 0$ but small, continuation is strictly preferred by the lender and strictly efficient, and hence the project is continued without renegotiation. The entrepreneur's payoff from exerting effort $e \geqslant e^* - \epsilon$ thus reads

$$e(\varPi - R_H) - \psi(e).$$

Hence, e^* is locally incentive compatible if and only if (10) holds. Therefore, if the remaining incentive constraints are not binding, then $e^* = e^{\text{out}}$ and $R_H = I/e^{\text{out}}$.

We now show that e^{out} can be made globally incentive compatible. Let $R_0 = \min[S, I - e^{\text{out}}\Delta - \epsilon]$, where $\epsilon > 0$ but small. Then, $e^{\text{out}}(R_H - \Delta) > R_0$ for all $\Delta < I/e^{\text{out}}$, and hence the lender strictly prefers project continuation if $e^* = e^{\text{out}}$. The entrepreneur has no incentive to render continuation inefficient if and only if

$$e^{\text{out}}\Pi - I - \psi\big(e^{\text{out}}\big) \geqslant S - R_0$$

which is obviously satisfied when $R_0 = S$. For $R_0 = I - e^{\text{out}}\Delta - \epsilon$, we must have

$$e^{\text{out}}(\Pi - \Delta) - \psi\big(e^{\text{out}}\big) \geqslant S + \epsilon$$

which holds for ϵ small. Thus, the entrepreneur has no incentive to render continuation inefficient. To show that the entrepreneur has no incentive to exert effort $e \in [\tilde{e}, \hat{e})$, notice that within this range $\mathcal{U}(e) = e(\Pi - \Delta) - R_0 - \psi(e)$. However, $\mathcal{U}'(e) > 0$ for $e < \hat{e}$ (since $\hat{e} < e^{\text{out}} < e^{FB}(\Delta)$) and $\mathcal{U}(\hat{e}) = \hat{e}(\Pi - R_H) - \psi(\hat{e}) < e^{\text{out}}(\Pi - R_H) - \psi(e^{\text{out}})$. Thus, the entrepreneur strictly prefers e^{out} to any $e \in [\tilde{e}, \hat{e})$. This confirms that e^{out} is globally incentive compatible.

Lastly, notice that investment is strictly efficient since

$$e^{\text{out}}(\Pi - \Delta) - \psi\big(e^{\text{out}}\big) - I > e^{\text{out}}\big(\Pi - I/e^{\text{out}}\big) - \psi\big(e^{\text{out}}\big) - I = \mathcal{W}\big(I/e^{\text{out}}\big) > 0.$$

In sum, if $\Delta < I/e^{\text{out}}$ and (CO) holds with strict inequality at the optimum, then $e^* = e^{\text{out}}$ and $\Phi(\Delta) = 0$. □

Proof of Proposition 2. Follows immediately from Lemma 1. □

Proof of Proposition 3. We have shown in the text that if the affiliated lender is a monopoly financier the threat of termination cannot be credible. Suppose the project is undertaken. The contract design problem reads:

$$\max_{e^*} e^*(R_H - \Delta) - I$$

s.t.

$$e^*(\Pi - R_H) - \psi(e^*) \geqslant 0, \tag{13}$$

$$\Pi - R_H = \psi'(e^*). \tag{14}$$

Clearly, (13) must be slack. Thus, e^* is characterized by the first order condition

$$\Pi - \Delta - \psi'(e^*) - e^*\psi''(e^*) = 0.$$

By the implicit function theorem and concavity e^* is strictly decreasing in Δ. The lender's profit is non-negative if and only if

$$\Phi(\Delta) = e^*(R_H - \Delta) - I = e^*\big(\Pi - \Delta - \psi'(e^*)\big) - I \geqslant 0.$$

Notice that $\Phi(0) \geqslant 0$, $\Phi'(\Delta) < 0$, and $\Phi(\bar{\Delta}) < 0$. Thus, there is some $\tilde{\Delta} < \bar{\Delta}$ such that the project is undertaken if and only if $\Delta \leqslant \tilde{\Delta}$. □

Proofs of Propositions 4 and 5. Follow readily from the previous analysis and the discussion in the text. □

Proof of Proposition 6. Part (i): Suppose the first lender rejects any financing offer. It suffices to show that the second lender cannot break even if it finances the entrepreneur. We restrict without loss of generality attention to contracts with $T = I$ and $R_L = 0$. Given that the first lender rejects any contract, the second lender is willing to accept the contract if and only if

$$e^*(R_H - \Delta) - I \geqslant 0.$$

Thus, if the second lender accepts the contract it must strictly prefer project continuation in equilibrium. The entrepreneur's incentive constraint thus reads

$$\Pi - R_H = \psi'(e^*).$$

Now, notice that $R_H \geqslant \Delta + I/e^* \geqslant I/e^*$ by the lender's break-even constraint. Yet, by assumption, independent lender financing is not feasible, and hence $\Pi - I/e^* = \psi'(e^*)$ does not have a solution. Therefore, $\Pi - \Delta - I/e^* = \psi'(e^*)$ does not have a solution either, which in turn implies that the second lender cannot break even. Thus, the second lender's best response is to reject any financing offer.

Part (ii): Suppose $\Delta \in (\Delta', \bar{\Delta})$, fix an arbitrarily small $\epsilon > 0$, and consider the following strategies:

(i) the entrepreneur offers $R_H = I/e^{FB}(\Delta) + \epsilon$ and $R_0 = e^{FB}(\Delta)(R_H - \Delta)$,
(ii) lenders accept this contract and reject all other contracts (with investment).

We show that these strategies form part of a subgame and trembling hand perfect Nash equilibrium. Feasibility requires $R_0 \leqslant S$ or $\Delta \geqslant (I - S)/e^{FB}(\Delta) + \epsilon$, which holds for ϵ small since $\Delta > \Delta'$.

Suppose the entrepreneur sticks to her strategy, and the first lender plays according to its strategy and accepts. Suppose that if the second lender rejects, then the entrepreneur exerts effort $e^{FB}(\Delta)$ in equilibrium. Thus, the second lender's payoff when it rejects reads

$$e^{FB}(\Delta)R_l^{\text{inc}} + \big(1 - e^{FB}(\Delta)\big)R_h^{\text{inc}}. \tag{15}$$

Conversely, suppose the second lender accepts. Then, with probability $1/2$ the entrepreneur undertakes her project with the second lender. With probability $1/2$ the entrepreneur undertakes her project with the first lender. Suppose that if the entrepreneur undertakes her project with the second lender, then she exerts effort $e^{FB}(\Delta)$ and the contract is not renegotiated in equilibrium. Then, the second lender's payoff from accepting the contract reads:

$$\frac{1}{2}\big(e^{FB}(\Delta)\big(R_H + R_l^{\text{inc}}\big) + \big(1 - e^{FB}(\Delta)\big)R_h^{\text{inc}} - I\big) \\ + \frac{1}{2}\big(e^{FB}(\Delta)R_l^{\text{inc}} + \big(1 - e^{FB}(\Delta)\big)R_h^{\text{inc}}\big). \tag{16}$$

The second lender is willing to accept if (16) is not smaller than (15), or $e^{FB}(\Delta)R_H \geqslant I$. However, $e^{FB}(\Delta)R_H - I = \epsilon > 0$, and hence the second lender's *strictly* prefers to accept the contract if the first lender accepts it. To see that the entrepreneur has no incentive to deviate from $e^{FB}(\Delta)$ once the project is undertaken, it suffices to note that in equilibrium the lender is indifferent between project termination and continuation. By Lemma 1 the efficient effort level is implemented.

In sum, we have shown that if the entrepreneur sticks to her strategy, then the continuation subgame has a Nash equilibrium in which lenders accept the contract, the project is undertaken, and the entrepreneur exerts effort $e^{FB}(\Delta)$. To show that this Nash equilibrium (of the contract acceptance subgame) is trembling hand perfect, it suffices to note that no lender plays a weakly dominated strategy. The entrepreneur's payoff from sticking to her strategy reads

$$e^{FB}(\Delta)(\Pi - R_H) - \psi\big(e^{FB}(\Delta)\big) = e^{FB}(\Delta)(\Pi - \epsilon) - I - \psi\big(e^{FB}(\Delta)\big) > 0$$

for ϵ small since $\Delta < \bar{\Delta}$. Now, suppose the entrepreneur deviates from her strategy and offers another contract. Then, if the first lender plays according to its strategy and rejects, the second lender's strict best response is to reject, too (part (i)). Thus, if the entrepreneur deviates from her strategy then the continuation subgame has a Nash equilibrium in which lenders reject the contract, which gives the entrepreneur a payoff of zero. Consequently, the entrepreneur's best response is to stick to her strategy.

In conclusion, the proposed strategies form part of a subgame and trembling hand perfect Nash equilibrium. Each lender's expected profit is given by $1/2 \times \epsilon > 0$. Notice that the proposed strategies would form part of a subgame perfect equilibrium even if $\epsilon = 0$. However, in this case, the equilibrium would not be trembling hand perfect. This is because the first lender would strictly prefer to reject any financing offer if the second lender rejected any financing offer with arbitrarily small probability.

Lastly, to show that for $\Delta < \Delta'$ funding is not feasible it suffices to note that the entrepreneur is able to secure funding only if the threat of termination is credible. Yet, for $\Delta < \Delta'$, the threat of termination cannot be credible. Suppose, to the contrary, that the threat of termination can be made credible. In this case, the entrepreneur exerts effort $e^{FB}(\Delta)$. Lenders are willing to provide funding only if

$$e^{FB}(\Delta)(R_H - \Delta) \geqslant I - e^{FB}(\Delta)\Delta.$$

The threat of termination can be made credible only if

$$e^{FB}(\Delta)(R_H - \Delta) \leqslant S.$$

Hence, $\Delta \geqslant (I - S)/e^{FB}(\Delta)$, contradicting $\Delta < \Delta'$. □

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