Communication of Soft Information to Lenders: Credibility and Reputation*

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Abstract

Borrowers’ reputation concerns makes communication of soft or non-verifiable information credible. We find that some misreporting of short-term information has costs as well as benefits. The costs are due to inefficient management of investments, while the benefits are due to the fact that some short-term misreporting facilitates signaling of a firm’s long-term prospects. We discuss how monitoring of an ongoing project may deprive a firm of using its communication strategy to signal long-term prospects.
1 Introduction

We examine the credibility of nonverifiable or soft financial information such as sales forecasts or preliminary information about the progress of an investment project. We investigate the pros and cons of reporting such information.

Consider for instance a pharmaceutical firm’s investment in a drug development program. Even after the outcome of the R&D project becomes known it might be difficult to assess whether the information provided in an early phase of the project was truthful or manipulated. In this paper we examine how reputation concerns may improve the credibility of nonverifiable reporting. We also show how monitoring and verification of soft information by outsiders may influence reputation building. By demonstrating how reputation building depends on discretion in reporting, our results shed light on the ongoing discussion of the appropriate level of discretion in financial reporting.

To capture the fact that soft information is nonverifiable and that firms are concerned about their reputations, we consider a two-period cheap-talk model with the following main features. At the beginning of each period, an entrepreneur with an investment opportunity approaches potential lenders for financing.\textsuperscript{1} Some entrepreneurs are of higher quality or have higher talent than others. We assume that better entrepreneurs are more likely to find investment projects with a high probability of success than are poorer entrepreneurs. Only entrepreneurs know their own talent levels. After a project is financed and initiated, the entrepreneur privately observes whether the

\textsuperscript{1}We abstract from incentive problems between owners and managers and consider an entrepreneurial firm. See Bergstrasser and Philippon (2006) and Goldman and Slezak (2006) for discussions of how compensation of managers influences managers’ reporting of information.
project has a high or low probability of success. A project with a high probability of success is worth continuing, but one with low probability of success has lower expected present value than liquidation value. The entrepreneur reports the probability of success to the lender, but because the success probability is nonverifiable, nothing prevents the entrepreneur from misreporting it. The outcome of a project, on the other hand, is verifiable. Lenders may compare the outcome of a project with the reported probability of success in order to update their beliefs about the entrepreneur.\(^2\)

If the entrepreneur privately observes that the project has a low probability of success, she faces a temptation to misreport. On the other hand, if she reports truthfully the project is liquidated, and she builds a reputation for being honest.

In equilibrium, high-quality entrepreneurs signal their quality by making truthful reports on current projects. Since low-quality entrepreneurs are less likely to have good projects in the future, they place a relatively low value on their reputations and, consequently, are more inclined to manipulate reports on current projects. This implies that reports on current projects signal information about the entrepreneurs’ long-term prospects (her quality).

We derive the following results: i) Reputation concerns induce high-quality entrepreneurs to report \textit{truthfully}. ii) An entrepreneur’s reporting strategy reveals explicit information about her current projects and implicit information about her future prospects. We find that more correct information about current projects (a larger set of entrepreneur types report truthfully)

\(^2\)Our setup resembles Kanodia et al. (1989), where managers abstain from making profitable changes in an investment project (an honest report), since this may harm their reputation in the labor market. In contrast, we focus on the link between a firm’s reporting strategies and reputation concerns in a financial market.
may reveal less precise information about an entrepreneur’s future prospects and thereby increase future financing costs. iii) In markets where entrepreneurs have large investment opportunities and large future financing needs, lenders react more swiftly to current reports of soft information and prices of financial claims react more to new soft information than in other markets. iv) Monitoring improves information about current projects but prevents an entrepreneur from using its reporting strategy to reveal long-term information about future prospects. We show that even in the extreme case where monitoring is costless and provides a perfect signal of the success probability of the current project, monitoring may reduce total surplus when the long-term consequences of monitoring are taken into account.

Our results carry over to a model of staged financing, where the entrepreneur obtains the next round of financing unless negative information is reported. In the R&D example above, a negative report would imply that the project is stopped and the financing of the second round is saved (the saved second round of financing represents the liquidation value). See for instance Cornelli and Yosha (2003) for a discussion of staged financing and reporting incentives.

Our paper is closely related to the literature on reputation building in debt markets. As in Diamond (1989), we take the view that reputation arises from learning about exogenous characteristics of the borrower. While Diamond (1989) shows that reputation concerns can discipline firms in their choice of investment projects, we show how reputation concerns can discipline firms’ reporting choice. By issuing truthful reports about projects that turn

\[3\] On the other hand, firms in financial distress and with high bankruptcy probabilities put low value on long-term reputation and, consequently, misreport frequently (see Frost (1997) for empirical evidence).

\[4\] Our analytical approach builds on Choi et al. (2005) which examines the credibility
out to be less promising than expected, a good firm can insure itself against obtaining a bad reputation if a project later fails.

Nagar (1999) and Trueman (1986) analyze the impact of managers’ reputation concerns on their reporting strategy. While Trueman (1986) shows that early release of information may improve reputation, Nagar (1999) shows that a risk-averse manager without private information about her quality may prefer not to release information in order to prevent investors from updating their beliefs about her quality. In contrast to Nagar (1999), we study a manager who knows her quality when she reports.

The idea that reports about ongoing projects may reveal long-term information is not new to the economics of accounting literature. Most closely related to our paper is Sankar and Subramanyam (2001), who demonstrate that a manager with limited discretion to manipulate earnings, can communicate value-relevant information that cannot be reflected in fundamental earnings. In their model, a risk-averse manager manipulates information in order to avoid consumption shocks and smooth consumption over two periods. In our approach, a risk-neutral manager’s communication of soft information is disciplined by reputation concerns.

Stocken (2000) examines an infinitely-repeated cheap-talk game, where homogenous firms report soft information and later issue a verifiable accounting report. He shows that, with sufficiently patient investors and sufficiently precise accounting reports, firms truthfully report soft information. In contrast, we examine reputation building in a game where firms are heterogeneous and signal their types by choosing different reporting strategies.\footnote{Gigler (1994) and Newman and Sansing (1993) discuss announcements in a cheap-talk setting with two recipients (investors and competitors). They show that the existence of a product pre-announcements in a reputational cheap-talk model.}

\footnotetext[5]{Gigler (1994) and Newman and Sansing (1993) discuss announcements in a cheap-talk setting with two recipients (investors and competitors). They show that the existence of a product pre-announcements in a reputational cheap-talk model.}
The rest of the paper proceeds as follows. Section 2 introduces the two-period cheap-talk model. Section 3 examines the partially informative equilibrium. Section 4 discusses how monitoring may interfere with firms’ reputation building. Section 5 draws conclusions. All proofs are relegated to the Appendix.

2 A model

In this section, we construct a two-period cheap-talk model. Consider a game played by risk-neutral lenders and an entrepreneur with two sequential investment projects. In each period, the entrepreneur has a project that requires investment $I$ if it is to be implemented. A lender offers a loan contract to the entrepreneur. The contract describes how much the entrepreneur must pay back in order to borrow $I$ and includes covenants stating that the project may be stopped and liquidated if new information reveals that the project has a negative NPV.

Each project has two potential outcomes. A successful project ($S$) is worth $V$, whereas a failure ($F$) is worth 0. After the investment is made, but before the project is completed, a project can be stopped and liquidated. In this case, the lenders get the liquidation value, denoted by $L$, which is less than the borrowed amount, $I$. Projects differ in their probabilities of success. A good project ($G$) succeeds with probability $p_G$, whereas a bad project ($B$) succeeds with probability $p_B$ ($< p_G$). We assume that a bad project should be liquidated, as the expected continuation value is less than the liquidation value, $p_B V < L$, whereas good projects should be continued, $p_G V > I > L$.\footnote{second receiver of information may improve the information communicated in equilibrium.\footnote{Allowing for risky liquidation value would not change our qualitative results, given that the entrepreneur is expected to get less in case of liquidation instead of continuation.}}
Stage 0
Lenders decide whether to finance a project.

Nature chooses the project’s success probability (conditional on entrepreneur’s talent)

Stage 1
After observing the success probability of the project, the entrepreneur issues a report to investors.

Lenders choose to liquidate or continue the project, depending on the entrepreneur’s report.

Stage 2
The outcome of the project is revealed.

Figure 1: The time-line of a project

For simplicity, we assume that there is no discounting of future cash flows.

After the project is started, the entrepreneur obtains private soft information about its probability of success. The entrepreneur chooses whether to report this information truthfully to the lender. Depending on the reported information, the lender decides whether to continue or liquidate the current project. The time-line of each project is summarized in Figure 1.

There is uncertainty about the outcome of a project even after the report is made. Consequently, it is not feasible to distinguish bad luck from deliberate misreporting by comparing the reported information with the project outcome.

The ex ante probability that an entrepreneur has a good project is denoted by $\theta \in [0, 1]$, which can be considered as the entrepreneur’s type. The entrepreneur’s type is invariant across projects and represents her qualities or skills in finding good investment projects. However, the realization of project quality is independent for the two investment projects. The entre-
preneur knows her own type, $\theta$, but lenders know only the distribution of $\theta$. We assume that $\theta$ has cumulative distribution function $F(\cdot)$, which is common knowledge.

Since there are many competing risk-neutral lenders, they will invest in projects as long as the projects yield non-negative expected returns. Lenders make two decisions. First, they decide whether to offer a loan contract at the market interest rate. Second, after receiving the report from the entrepreneur, they decide whether to continue or liquidate the project.

To focus on the interaction of borrower reputation and soft financial information, the model abstracts from long-term contracting. We also assume that the potential profit from the first project is consumed before the entrepreneur starts the second project. The only intertemporal linkage is the information about the report and outcome of the first project.

3 Analysis

We are searching for a perfect Bayesian equilibrium (PBE) where all players’ strategies are sequentially optimal and lenders’ beliefs about the entrepreneur type are derived by Bayes’ rule whenever possible. As in any model of cheap talk, we always have a babbling equilibrium in which the cheap talk has no meaning and is rationally ignored by the receiver. We are interested in whether we have an informative equilibrium in which the entrepreneur, by making an announcement, can convey credible information to lenders on the probability of success of her current project. We analyze how reputation is formed in equilibrium and how the concern over reputation affects cheap talk. As usual, we proceed by using backward induction to derive the informative equilibrium.
3.1 Second investment project

The second investment project constitutes the last interaction with lenders. As a result, the entrepreneur does not have any reputational concerns and will simply seek to maximize her current profit. By terminating the project the lender captures the liquidation value ($L$), and the entrepreneur gets zero. If the project is continued and succeeds, the entrepreneur repays the loan and keeps the residual. Consequently, all entrepreneur types benefit from continuing the investment project, and the entrepreneur’s report on the second project has no credibility. Consequently, lenders will not update their beliefs about the second project’s probability of success based on the entrepreneur’s second-period report.

Thus, the relevant history for lenders in the second project is $h_2 = (m_1, r_1)$, where $m_1 \in \{G, B\}$ and $r_1 \in \{S, F\}$ are the reported quality and the realized outcome of the first project, respectively, and $h_2 \in \{(G, S), (G, F), (B)\}$. Note that if the entrepreneur reports $B$ in the first period, the project is liquidated and no outcome is realized. In this case, the relevant history for lenders in the second project is $h_2 = (B)$. This implies that, at the beginning of the second period, there will be history-dependent beliefs $\mu_2(h_2)$ about the second project’s success probability.

As the entrepreneur never reports negative information about the second project, the second project is never liquidated given that it is financed. Given that lenders give funding $I$ to the second project and that the expected success probability is $\mu_2(h_2)$, in order to break even lenders must obtain

$$D_2(\mu_2) \equiv \frac{I}{\mu_2(h_2)}$$

in returns if the project succeeds. If the project fails, lenders get nothing. The
interest rate depends on lenders’ beliefs ($\mu_2$). This implies that the lender’s claim on a successful project, $D_2(\mu_2)$, is decreasing in the entrepreneur’s reputation.

Given the lenders’ beliefs $\mu_2$, the expected profit for an entrepreneur of type $\theta$ is given by:

$$\pi_2(\theta) = [p_B + \theta (p_G - p_B)] (V - D_2(\mu_2)).$$

The value of reputation is higher for entrepreneurs with high $\theta$; that is, $\frac{\partial^2 \pi_2(\theta)}{\partial \theta^2} = -(p_G - p_B) \frac{\partial D_2(\mu_2)}{\partial \mu_2} > 0$. Entrepreneurs with high $\theta$ are more likely to have a successful project and are therefore more likely to pay $D_2(\mu_2)$ to their financiers. Thus, high-$\theta$ entrepreneurs benefit most from improving reputation $\mu_2$, and thereby reducing $D_2(\mu_2)$. It follows that the Spence–Mirlees single-crossing property holds making the report on the quality of the first project informative.\(^7\)

### 3.2 First investment project

Let $m_1(v_1; \theta)$ denote the message of a type $\theta$ entrepreneur when she knows that the first project is of quality $v_1 \in \{G, B\}$.

As the entrepreneur with a higher $\theta$ has stronger incentives to build a good reputation, we are looking for an informative equilibrium with the following cut-off property:

- For $\theta \geq \theta^*$, $m_1(v_1; \theta) = v_1$
- For $\theta < \theta^*$, $m_1(v_1; \theta) = G$.

In other words, all managers with $G$ projects report truthfully. If an entrepreneur has a $B$ project, then there is cut-off such that types $\theta > \theta^*$

\(^7\)There are alternative modeling approaches where the single-crossing property holds. For instance, the best firms may have higher probabilities of discovering a second project.
truthfully report \( B \), whereas types \( \theta < \theta^* \) report \( G \) regardless of the value \( v_1 \).

Lenders update their belief about a project’s probability of success according to the entrepreneur’s report. We denote lenders’ beliefs by \( \mu_1 (m_1; \theta^*) \) when the entrepreneur is expected to adopt the cut-off rule of \( \theta^* \), where \( m_1 \in \{ G, B \} \) is the report about the first project. By applying Bayes’ rule, we can derive lenders’ beliefs based on the report:

\[
\mu_1(B; \theta^*) = p_B \\
\mu_1(G; \theta^*) = \frac{\Pr(\text{success in first project and report G})}{\Pr(\text{report G})} = \frac{\int_{\theta^*}^{\theta^*} [p_B + \theta (p_G - p_B)] dF(\theta) + \int_{\theta^*}^{1} p_G \theta dF(\theta)}{F(\theta^*) + \int_{\theta^*}^{1} \theta dF(\theta)}.
\]

Notice that if all entrepreneur types misreport if they have a \( B \) project, then there is no information associated with reporting \( G \) and \( \mu_1(G; \theta^* = 1) = p_1 \), where \( p_1 \) is the success probability in the absence of informative cheap talk.

Since a project is continued only when the entrepreneur reports \( G \), the probability of continuing the first project is given by

\[
\Pr(G; \theta^*) = 1 - \int_{\theta^*}^{1} (1 - \theta) dF(\theta).
\]

Consequently, the face value of the first loan, \( D_1 (\mu_1 (G; \theta^*)) \), is given by:

\[
D_1 (\mu_1 (G; \theta^*)) \mu_1 (G; \theta^*) \Pr(G; \theta^*) + [1 - \Pr(G; \theta^*)] L = I,
\]

or, alternatively, by

\[
D_1 (\mu_1 (G; \theta^*)) = \frac{I - [1 - \Pr(G; \theta^*)] L}{\mu_1 (G; \theta^*) \Pr(G; \theta^*)}, \quad (1)
\]

which makes the lenders break even.
We now turn to how lenders update their beliefs based on $h_2$. The beliefs depend on the reported probability of success ($m_1$) and the realized outcome of the first project ($r_1$), $\mu_2(h_2; \theta^*) = \mu_2(m_1, r_1; \theta^*)$. Lenders’ beliefs, if the first project is stopped and liquidated (i.e., $B$ is reported), are as follows:

$$\mu_2((B); \theta^*) = \frac{\Pr(\text{report B in first project and success in second project})}{\Pr(\text{report B in first project})}$$

$$= \frac{\int_{\theta^*}^{1} (p_B + \theta(p_G - p_B))(1 - \theta) dF(\theta)}{\int_{\theta^*}^{1} (1 - \theta) dF(\theta)}.$$  

If the first project is reported to be $G$ and the project is a success, beliefs are as follows:

$$\mu_2((G, S); \theta^*) = \frac{\Pr(\text{success in first project and success in second project})}{\Pr(\text{success in first project})}$$

$$= \frac{\int_{0}^{\theta^*} [p_B + \theta(p_G - p_B)]^2 dF(\theta) + \int_{0}^{1} \theta p_G [p_B + \theta(p_G - p_B)] dF(\theta)}{\int_{0}^{\theta^*} [p_B + \theta(p_G - p_B)] dF(\theta) + \int_{\theta^*}^{1} \theta p_G dF(\theta)}.$$  

On the other hand if the first project is reported to be $G$ and the project is a failure, beliefs are as follows:

$$\mu_2((G, F); \theta^*) = \frac{\Pr(\text{failure in first project and success in second project})}{\Pr(\text{failure in first project})}$$

$$= \left\{ \frac{\int_{0}^{\theta^*} [\theta(1 - p_G) + (1 - \theta)(1 - p_B)] [p_B + \theta(p_G - p_B)] dF(\theta)}{\int_{0}^{\theta^*} [\theta(1 - p_G) + (1 - \theta)(1 - p_B)] dF(\theta) + \int_{\theta^*}^{1} \theta(1 - p_G) dF(\theta)} \right\}$$

For later use, let $\mu_2((G, F); \theta^* = 1) = \mu_2(F)$ and $\mu_2((G, S); \theta^* = 1) = \mu_2(S)$ denote the probabilities of success in the absence of informative cheap talk (i.e., all entrepreneur types report $G$ when they have a $B$ project).
So far, we have constructed the lender’s beliefs and $D_1$ and $D_2$, given the entrepreneur’s communication strategy. Now, we examine whether the entrepreneur has any incentive to deviate from the prescribed strategy given the lender’s loan terms. For this purpose, let $\Pi(m_1; (\theta, v_1); \theta^*)$ denote the entrepreneur’s overall expected profit if she announces project quality $m_1 \in \{G, B\}$ when her type is $\theta$, the actual project quality in the first period is $v_1 \in \{G, B\}$, and when the entrepreneur adopts the cut-off $\theta^*$.

$$\Pi(G; (\theta, G); \theta^*) = p_G [(V - D_1(\mu_1(G; \theta^*))) + p_G \pi_2(\theta, \mu_2(G, S; \theta^*)) + (1 - p_G) \pi_2(\theta, \mu_2(G, F; \theta^*))]$$

$$\Pi(G; (\theta, B); \theta^*) = p_B [(V - D_1(\mu_1(G; \theta^*))) + p_B \pi_2(\theta, \mu_2(G, S; \theta^*)) + (1 - p_B) \pi_2(\theta, \mu_2(G, F; \theta^*))]$$

$$\Pi(B; (\theta, B); \theta^*) = \pi_2(\theta, \mu_2(B; \theta^*))$$

$$\Pi(B; (\theta, G); \theta^*) = \pi_2(\theta, \mu_2(B; \theta^*)) .$$

The first and second lines in the first two expressions represent the expected profit from the first and second projects, respectively. Notice that the last two expressions only include profit from the second project (reporting $B$ implies that the first project is liquidated).

Now, we will consider the entrepreneur’s incentives to report the quality of the first project truthfully. First, consider an entrepreneur with a $G$ project. All entrepreneur types will truthfully report $G$ if and only if:

$$\Pi(G; (\theta, G); \theta^*) - \Pi(B; (\theta, G); \theta^*) \geq 0 \text{ for all } \theta \in [0, 1].$$

Lemma 1 shows that it is optimal for the entrepreneur to truthfully report the quality of a $G$ project if her potential profit from the first project is sufficiently large.
Lemma 1 If:

\[ V - I_{\frac{1}{\mu_1}} \geq \left[ p_G \frac{I}{\mu_2(S)} + (1 - p_G) \frac{I}{\mu_2(F)} \right] - I_{\frac{1}{p_G}} \]  \tag{5}

then all entrepreneur types issue truthful reports about G projects.

The reputation benefits from reporting B depend on the cut-off rule \( \theta^* \). As the reputation benefits from reporting B increase in \( \theta^* \) (consider \( \mu_2(B; \theta^*) \)), an entrepreneur is most inclined to report B when having a G project if \( \theta^* = 1 \). If the condition in Lemma 1 is satisfied, all entrepreneur types will report truthfully even if \( \theta^* = 1 \).

Consider an entrepreneur with a B project. She has incentive to tell the truth (report B) if and only if:

\[ \Delta (\theta, \theta^*) = \Pi(B; (\theta, B); \theta^*) - \Pi(G; (\theta, B); \theta^*) \geq 0. \]

We can define an implicit function \( \Psi(\theta^*) \) that satisfies \( \Delta (\Psi(\theta^*), \theta^*) = 0 \). Notice that \( \frac{\partial \Delta(\theta, \theta^*)}{\partial \theta} > 0 \); i.e., high-\( \theta \) entrepreneurs benefit more from reducing the face value of debt in the second period than do low-\( \theta \) entrepreneurs. Consequently, high-\( \theta \) entrepreneurs have stronger incentives to build good reputations by being truthful. This implies that the cut-off point that satisfies \( \Psi(\theta^*) = \theta^* \) characterizes an informative equilibrium.

For the equilibrium to be informative, the fixed point \( \theta^* \) needs to be in the interval of \([0, 1)\), with a lower fixed point \( \theta^* \) corresponding to a more informative equilibrium (i.e., more entrepreneur types with a B project report truthfully in the first period). A sufficient condition for \( \theta^* < 1 \) is that \( \Psi(1) < 1 \), or, alternatively, \( \Delta(1, 1) > 0 \). The intuition is that, lenders believe that only the best type of entrepreneur (\( \theta = 1 \)) tells the truth, then
other types are willing to report a B project truthfully to imitate the best type.

**Lemma 2** \( \Psi(1) < 1 \), if:

\[
p_G V - I > p_B \left( V - \frac{I}{\mu_1} \right) + p_G \left( V - p_B \frac{I}{\mu_2(S)} - (1 - p_B) \frac{I}{\mu_2(F)} \right). \quad (6)
\]

Lemma 3 shows that, if lenders believe that all entrepreneurs report truthfully, then the lowest entrepreneur type (\( \theta = 0 \)) has an incentive to lie when she has a B project in the first period.

**Lemma 3** \( \Psi(0) > 0 \).

If all entrepreneur types are expected to tell the truth (\( \theta^* = 0 \)), the outcome of the project (success or failure) does not affect the entrepreneur’s reputation. In this case, the entrepreneur would be tempted to misreport the quality of a B project. Consequently, there is no equilibrium where all entrepreneurs report truthfully.

The following lemma establishes that \( \theta^* \) is the unique fixed point on \([0, 1)\).

**Lemma 4** \( \Psi(\theta^*) \) is a strictly decreasing function of \( \theta^* \).

We can now summarize our findings so far:

**Proposition 1** If conditions (5) and (6) hold, then there exists a unique informative equilibrium with cut-off \( \theta^* \in (0, 1) \) and the following properties:

(a) In the first period, an entrepreneur whose type exceeds the cut-off point \( \theta^* \) reports truthfully.

(b) In the first period, an entrepreneur whose type is below the cut-off point \( \theta^* \) always reports that the project is good.

(c) Reporting in the second period does not convey any meaning.
Figure 2 illustrates the equilibrium outcome:

\[ \theta = 0 \quad \text{Always report } G \quad \theta^* \quad \text{Truthful report} \quad \theta = 1 \]

Figure 2: Reporting strategies

3.3 Investment opportunities and soft information

So far, we have considered only the case where the first and the second projects are ex ante identical (before it is revealed whether the project is of type $G$ or $B$). In this subsection, we examine how the credibility of soft financial information may change if the entrepreneur’s investment opportunities vary over time. In particular, we will focus on how the informative cheap-talk equilibrium will change if the entrepreneur is expected to have different investment opportunities in the two periods.

Entrepreneurs with promising growth opportunities can benefit in two ways. In addition to the obvious gain from having better investment opportunities in the second period, there is a beneficial effect on the financing cost in the first period.

Let the second project be described by $I_2 = \lambda I_1$, $V_2 = \lambda V_1$, and $L_2 = \lambda L_1$, where $\lambda > 0$ and the subscript refers to the project being considered. Thus, all project characteristics of the second project are equal to those in the first project multiplied by $\lambda$. The higher the value of $\lambda$, the more the entrepreneur is concerned about her financing terms in period two compared to period one.

**Proposition 2** Suppose we have an informative equilibrium with $\theta^* \in (0, 1)$.  


The cut-off $\theta^*$ is decreasing in $\lambda$.

Proposition 2 shows that more entrepreneur types report truthfully and that soft information is more credible in growth industries (large $\lambda$) than in mature industries with smaller investment opportunities (low $\lambda$). Figure 3 illustrates the impact of increased investment opportunities on the equilibrium outcome:

![Figure 3: Increased investment opportunities and the impact on a firm’s reporting strategy.](image)

The following corollary shows that financing costs decrease in the level of the entrepreneur’s reputation concerns.

**Corollary 1** All entrepreneur types face lower borrowing costs initially (i.e., $D_1$ decreases) if the investment opportunities in the industry are growing (i.e., $I_2$ increases).

After an entrepreneur has revealed soft information, lenders update their beliefs about the expected value of their claims. The claim is either worth $L_1$, which is the value of a liquidated or downsized project, or $D_1 (\mu_1 (G; \theta^*)) \mu_1 (G; \theta^*)$, which is the expected cash flow from continuing the project. We consider the difference between these two values as the volatility of the value of debt claims, $\Delta P$:

$$\Delta P = D_1 (\mu_1 (G; \theta^*)) \mu_1 (G; \theta^*) - L_1.$$
The following corollary shows that in growth industries, the increased credibility of soft information makes the pricing of debt claims more volatile.

**Corollary 2** \( \Delta P \) is higher in growth industries (high \( \lambda \)) than in mature industries (low \( \lambda \)).

We now investigate the comparative statics of a decrease in \( \theta^* \) (a shift to more truthful reporting). According to Corollary 1, more truthful reporting makes all entrepreneur types better off when they finance their first project. The impact of more truthful reporting on the financing of the second project depends on the quality of the first project. All entrepreneurs with a \( G \) project in the first period benefit in the second period from more truthful reporting of the first project. This follows from the observation that the reputation of those who report a good project improves if \( \theta^* \) decreases (i.e., \( \mu_2(G,S;\theta^*) \) and \( \mu_2(G,F;\theta^*) \) increases with a decrease in \( \theta^* \) (see equations (3) and (4)). On the other hand, an entrepreneur who truthfully reports a \( B \) project experiences more expensive financing in the second period if a larger share of entrepreneurs truthfully reports \( B \) projects (i.e., \( \mu_2(B;\theta^*) \) decreases with a decrease in \( \theta^* \)). This follows from observing that if \( \theta^* \) decreases, then the interval \([\theta^*, 1]\) increases and the average entrepreneur on the interval has a smaller probability of success. Figure 4 illustrates how a lender’s beliefs about the probability of success of the second project depend on the outcome of the first project, the report of the first project, and the cut-off rule \( \theta^* \).\(^8\)

\(^8\)Notice that, in equilibrium, \( \theta^* \) must satisfy \( \mu_2(G,F;\theta^*) < \mu_2(B;\theta^*) \).
4 Monitoring of current projects

The analysis so far omits the possibility of the lender monitoring projects directly. To assess how monitoring may influence borrowers’ reputation building, we introduce monitoring in the previously analyzed cheap-talk game. We compare an entrepreneur’s reputation with and without monitoring of her first project.

Assume lenders have access to a costless monitoring technology that perfectly reveals the probability of success of an entrepreneur’s first project. We do not consider monitoring of the second project. This is justified on the

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9 Even if we were to have an imperfect monitoring technology, the qualitative results of the paper would not change.
grounds that monitoring of the second project could be infeasible owing, for
instance, to the more opaque nature of the second project.

The lender starts monitoring at stage 0 and reveals whether the project
is good or bad.\textsuperscript{10} If the project is bad, the lender liquidates it and recovers
$L_1$ of his loan (recall that the liquidation value $L_1$ is less than the investment
$I_1$). Outsiders observe whether the first project is liquidated or continued.
Based on this observation, all potential lenders update their beliefs about
the success probability of the second project.

As monitoring is perfect, the situation with monitoring is equivalent to
one where all entrepreneur types truthfully announce their project qualities,
that is, $\theta^* = 0$ in the cheap-talk game. Thus, reputation in the
monitoring game depends only on whether the entrepreneur has a good
or bad project. The reputation of an entrepreneur with a good project is
$\mu_2(G) = \mu_2((G, S); \theta^* = 0) = \mu_2((G, F); \theta^* = 0)$, whereas the reputation of
an entrepreneur with a bad project is: $\mu_2(B) = \mu_2(B; \theta^* = 0)$. Figure 5 illus-
trates the entrepreneur’s reputation with and without monitoring and shows
how the difference depends on the cut-off point in the cheap-talk game, $\theta^*$.

\textsuperscript{10}We assume that efficient monitoring requires that monitoring starts at stage 0. We
do not look at the case where the lender waits until he or she observes the report from the
entrepreneur before deciding whether to monitor, which has been analyzed in the costly
state verification literature (see Townsend (1979)).
Monitoring reveals that the project is of type G
\[ \mu_2 = \frac{2}{S^2} \mu_2(F) \]

Proposition 3
In the monitoring game, a high type entrepreneur with a bad project cannot distinguish herself from a low type entrepreneur with a bad project.

Notice that when misreporting occurs in the cheap-talk game without
monitoring, a high-quality entrepreneur with a bad project can protect her reputation by making a truthful announcement. In fact, the reputation of a high-quality but unfortunate entrepreneur who reports truthfully improves as $\theta^*$ increases.

**Does costless monitoring improve welfare?**

Above, we have seen that monitoring of the first project can blur information about the entrepreneur’s type. In this subsection, we examine whether costless monitoring increases the expected social surplus compared with the previous cheap-talk game.

Monitoring improves lenders’ liquidation decisions in period one. However, in period two, monitoring makes it difficult for a lender to distinguish between high type and low type entrepreneurs with bad first-period projects. We combine the two effects in order to evaluate the total effect on social welfare.

We make the following restrictions on parameter values $(V_i, p_G, p_B, I_i, L_i)$ where $i = 1, 2$:

1. $\mu_2(B) < \underline{\mu}$ where $\underline{\mu}$ is defined by $\underline{\mu}V_2 - I_2 = 0$.\(^{11}\) Note that $\underline{\mu}$ is defined as the lowest reputation an entrepreneur may have and still obtain a loan in the second period.$^{12}$

2. $\mu_2(B; \theta^*) > \underline{\mu}$ where $\theta^*$ is defined by the equilibrium conditions of the cheap-talk game.

\(^{11}\)Recall that $\mu_2(B) = \mu_2(B; \theta^* = 0)$ where $\mu_2(B; \theta^* = 0)$ is defined by equation (2).

\(^{12}\)The case where bad-outcome firms are denied further financing is considered in Diamond (1989) as well. Diamond shows that the threat of not obtaining further financing prevents borrowers from choosing excessively risky projects.
Assumption (1) implies that an entrepreneur with a bad project in the first period is credit rationed in the second period. Assumption (2) implies that an entrepreneur who truthfully reports a bad project in the first period is able to finance her second project. Our next step is to compare the surplus generated in the above described equilibrium with a cheap-talk equilibrium with a cut-off rule $\theta^*$. 

The expected first-period gain from monitoring, $\Phi_1$, follows from more efficient liquidation decisions:

$$\Phi_1 = \int_0^{\theta^*} (1 - \theta) (L_1 - P_B V_1) dF(\theta) \geq 0.$$ 

Now consider the second-period gain from monitoring. As $\mu_2(B) < \mu$, monitoring prevents a low-quality entrepreneur with bad projects in both periods from financing her last bad project. In addition, monitoring prevents a high type entrepreneur who has a bad project in the first period from financing her second project, even though she has a high probability of success in the second period. The monitoring of the first project changes the second-period surplus by:

$$\Phi_2 = \int_0^1 (1 - \theta)(1 - \theta)(I_2 - P_B V_2) dF(\theta) - \int_0^1 (1 - \theta) \theta (P_G V_2 - I_2) dF(\theta)$$

$$= \int_0^1 (1 - \theta) [I_2 - V_2 (P_B + \theta (P_G - P_B))] dF(\theta).$$

If $\Phi_2 < 0$, the loss from preventing high-quality entrepreneurs with bad first projects from financing their second project exceeds the gain from preventing low-quality entrepreneurs with bad first projects from obtaining finance for their second projects. There are examples where the negative effect on surplus in the second period exceeds the positive effect in the first period, $\Phi_1 + \Phi_2 < 0$.\(^{13}\)

\(^{13}\)To see that $\Phi_1 + \Phi_2 < 0$ can be satisfied for some project characteristics, consider
Proposition 4  Costless monitoring can reduce the social surplus.

If a costless and perfect monitoring technology becomes available in the first period, it becomes impossible for entrepreneurs to cheat and, consequently, the link between truthful reporting and the quality of the entrepreneur disappears. Monitoring prevents the entrepreneur from using her reporting strategy to improve her reputation. We have seen that monitoring of the first project can provide an undeserved poor reputation to unfortunate but high-quality entrepreneurs (Proposition 3). This may result in the entrepreneur being credit rationed when she wants to finance a second project. This loss may exceed the benefit from the improved liquidation decision regarding the first project (Proposition 4). Hence, monitoring can improve the quality of short-term information about entrepreneurs’ projects but harm the revelation of long-term information about entrepreneur type.

This analysis can be related to our R&D example in the introduction. SFAS no. 2 requires that R&D costs to be charged at expense when incurred. This implies that a firm cannot report the expected value of their R&D investments in their financial statements. Our analysis shows that although information about R&D projects often is soft information which may be misrepresented, firms’ choice of reporting strategies can reveal long-term information about the firm’s R&D prospects. SFAS no. 2 does not allow for discretionary reporting and makes communicating long-term prospects impossible. More generally, our analysis indicates that tight accounting standards might make it difficult to communicate long-term information.

the following example. Assume that \( \theta \) is uniformly distributed on \([0, 1]\). Furthermore, assume that \( L_1 \) approaches \( P_B V_1 \) so that \( \Phi_2 \) represents the net gain from monitoring. As \( \theta \) is uniformly distributed, we have \( \Phi_2 = -\frac{1}{6} (2p_B + p_G) V_2 + \frac{1}{2} I_2 \), which is negative if \( V_2 > \frac{3}{p_G + 2p_B} I_2 \).
Another example is banks reporting of loan loss provisions. The loan loss account is perceived to be subject to discretionary behavior owing to the manner in which allowance for loan losses is defined under GAAP and the uncertainty surrounding the estimation of losses. Studies of banks’ loan losses find evidence of positive stock price reaction to unexpected additions to loan loss allowances (bad news).\textsuperscript{14} Wahlen (1994) explores the conjecture that managers reveal long-term good news with unexpected increases in the loan loss provision account.\textsuperscript{15} In addition to finding a positive stock price reaction, Whalen found that the unexpected portion of the provision is positively related to changes in future earnings, which is consistent with our idea that short-term bad news may reveal long-term good news about a firm. Less discretion in reporting (more restrictive accounting rules) would make it more difficult for banks to reveal long-term information.

5 Concluding remarks

It is common practice for firms to report some information that cannot be verified ex post. We develop a simple model capturing the fact that firms report soft financial information and examine the credibility of such information when firms need to approach a credit market repeatedly for financing of new projects. We show that a firm’s reporting strategy reveals information about current projects as well as information about the quality of the entrepreneur. A good entrepreneur with a bad project can insure herself against acquiring a bad reputation by truthfully reporting.

\textsuperscript{14}See Griffin and Wallach (1991), Elliot et al. (1991), and Beaver and Engel (1996).
\textsuperscript{15}Beaver and Engel (1996) decompose the allowance for loan losses into discretionary and nondiscretionary components. They find that the capital market assigns significantly different prices to each component. The discretionary component is less negatively priced than the nondiscretionary component.
We extend the discussion to a setting where there is monitoring of the first project. The benefit of monitoring is that it ensures short-term gains in the form of more efficient management of the first project (efficient liquidation of bad projects). The downside is that monitoring removes the entrepreneur’s ability to signal her quality by truthfully reporting bad news. Consequently, monitoring improves the information about current projects, but may reveal less information about entrepreneur quality than would have been revealed in a setting with discretionary reporting (cheap talk).

The analysis can be extended in different directions. The analysis can take into account that misreporting can be discovered and the firm might be sued with some probability. In the same way as increased reputation concerns induce more firm types to report truthfully (see Section 3.3), a litigation threat will induce more firms to make truthful reports. A more challenging and interesting extension would be to analyze how a firm’s capital structure influences its reporting strategy and derive results on optimal capital structure (e.g. leverage and debt maturity). We have already shown that a negative report about a current project may reveal positive long-term information. Hence, prices on short-term debt and long-term claims (e.g. equity or long-term debt) may move in different directions. We would like to address these issues in further work.
Appendix

**Proof of Lemma 1:** It suffices to consider the \((\theta = 1, \theta^* = 1)\)-case. This is the case associated with the largest reputation gain (reduced financing costs for the second project) from reporting \(B\) while having a \(G\) project:

\[
\Pi(G; (\theta = 1, G); \theta^* = 1) - \Pi(B; (\theta = 1, G); \theta^* = 1) > 0.
\]

Note that:

\[
\Pi(G; (\theta = 1, G); \theta^* = 1) - \Pi(B; (\theta = 1, G); \theta^* = 1) = p_G [V - D_1(\mu_1(G; \theta^* = 1))] + p_G \pi_2(\theta, \mu_2(G, S; \theta^* = 1)) + (1 - p_G) \pi_2(\theta = 1, \mu_2(B; \theta^* = 1)) - \pi_2(\theta = 1, \mu_2(F)) - [p_G V - I].
\]

Q.E.D.

**Proof of Lemma 2:** From:

\[
\Delta(\theta = 1, \theta^* = 1) = \Pi(B; (\theta = 1, B); \theta^* = 1) - \Pi(G; (\theta = 1, B); \theta^* = 1) > 0,
\]

we obtain:

\[
[p_G V - I] - \left[ p_B \left( V - \frac{I}{\mu_1} \right) + p_G \left( V - p_B \frac{I}{\mu_2(S)} - (1 - p_B) \frac{I}{\mu_2(F)} \right) \right] > 0,
\]

which holds for a sufficiently small \(p_B\). Q.E.D.

**Proof of Lemma 3:** If all entrepreneur types are expected to tell the truth,
i.e., $\theta^* = 0$, then type $\theta = 0$ optimally chooses to lie:

$$
\Delta (\theta = 0, \theta^* = 0) = \Pi (B; (\theta = 0, B); \theta^* = 0) - \Pi (G; (\theta = 0, B); \theta^* = 0)
$$

$$
= \left[ p_B \left( V - \frac{I}{\mu_2(B; \theta^* = 0)} \right) \right] - \left[ p_B \left( V - \frac{I - (1 - E[\theta]) L}{p_G E[\theta]} \right) + p_B \left( V - \frac{I}{\mu_2(G)} \right) \right]
$$

$$
< 0,
$$

where $\mu_2 (G) \equiv \mu_2 (G, S; \theta^* = 0) = \mu_2 (G, F; \theta^* = 0) > \mu_2 (B; \theta^* = 0)$ and $E[\theta] = \int_0^1 \theta dF(\theta)$. Q.E.D.

**Proof of Lemma 4:** From the implicit function theorem, we need to prove that:

$$
\Psi'(\theta^*) = -\frac{\partial \Delta}{\partial \theta} < 0.
$$

We have:

$$
\frac{\partial \Delta (\theta, \theta^*)}{\partial \theta} = \frac{\partial \Pi (B; (\theta, B); \theta^*)}{\partial \theta} - \frac{\partial \Pi (G; (\theta, B); \theta^*)}{\partial \theta}
$$

$$
= \frac{\partial \pi_2 (\theta, \mu_2 (B; \theta^*))}{\partial \theta} - \frac{\partial [p_B \pi_2 (\theta, \mu_2 (G, S; \theta^*)) + (1 - p_B) \pi_2 (\theta, \mu_2 (G, F; \theta^*))]}{\partial \theta}
$$

$$
= (p_G - p_B) (V - D_2 (\mu_2 (B; \theta^*))
$$

$$
- p_B (p_G - p_B) (V - D_2 (\mu_2 (G, S; \theta^*))) - (1 - p_B) (p_G - p_B) (V - D_2 (\mu_2 (G, F; \theta^*)))
$$

$$
= (p_G - p_B) \left\{ p_B D_2 (\mu_2 (G, S; \theta^*)) + (1 - p_B) D_2 (\mu_2 (G, F; \theta^*)) - D_2 (\mu_2 (B; \theta^*)) \right\}
$$

$$
= (p_G - p_B) \left\{ p_B \frac{I}{\mu_2 (G, S; \theta^*)} + (1 - p_B) \frac{I}{\mu_2 (G, F; \theta^*)} - \frac{I}{\mu_2 (B; \theta^*)} \right\}.
$$

Note that in an informative equilibrium there must exist a second-period gain associated with a truthful report of a $B$ project in the first period (otherwise all firms will report $G$ in the first period). Consequently, the expected face
value of debt in period two must decrease if $B$ is reported. In equilibrium, $\theta^*$ must satisfy $p_B \frac{I}{\mu_2(G,S;\theta^*)} + (1 - p_B) \frac{I}{\mu_2(G,F;\theta^*)} > \frac{I}{\mu_2(B;\theta^*)}$. It follows that $\frac{\partial \Delta(\theta,\theta^*)}{\partial \theta} > 0$.

Furthermore, we have:

$$
\frac{\partial \Delta(\theta,\theta^*)}{\partial \theta^*} = \frac{\partial \Pi(B ; \theta, B ; \theta^*)}{\partial \theta^*} - \frac{\partial \Pi(G ; \theta, B ; \theta^*)}{\partial \theta^*}
$$

$$= \frac{\partial}{\partial \theta^*} \left[ \frac{p_B + \theta(p_G - p_B)}{\mu_2(B;\theta^*)} \right] \left( V - D_2(\mu_2(B;\theta^*)) \right)
$$

$$+ \frac{\partial}{\partial \theta^*} \left[ \frac{p_B}{\mu_1(G;\theta^*)} \right] \left[ V - D_1(\mu_1(G;\theta^*)) \right] + p_B \frac{\partial D_2(\mu_2(G,S;\theta^*))}{\partial \theta^*} + (1 - p_B) \frac{\partial D_2(\mu_2(G,F;\theta^*))}{\partial \theta^*}.
$$

Note that $\frac{\partial D_2(\mu_2(B;\theta^*))}{\partial \theta^*} < 0$ because the average quality of firms reporting a $B$ project increases when $\theta^*$ increases, which will reduce financing costs, $D_2(\mu_2(B;\theta^*))$, in the second period. Furthermore, note that $\frac{\partial D_1(\mu_1(G;\theta^*))}{\partial \theta^*} > 0$, $\frac{\partial D_2(\mu_2(G,S;\theta^*))}{\partial \theta^*} > 0$ and $\frac{\partial D_2(\mu_2(G,F;\theta^*))}{\partial \theta^*} > 0$ because an increase in $\theta^*$ implies that the average quality of firms reporting $G$ project declines and, consequently, financing costs increase. Therefore, $\frac{\partial \Delta(\theta,\theta^*)}{\partial \theta} > 0$, which implies $\Psi'(\theta^*) = -\frac{\partial \Delta(\theta,\theta^*)}{\partial \theta^*} < 0$. Q.E.D.

Proof of Proposition 2: Consider the truth-telling condition (the entrepreneur has a $B$ project in the first period) when the second project is scaled up by a factor $\lambda$ compared with the first project:
\[
\left\{ (p_B + \theta (p_G - p_B)) \left( \lambda V_1 - \frac{\lambda I_1}{\mu_2(B; \theta^*)} \right) \right\} \\
- p_B \left( V_1 - \frac{I_1 - [1 - \Pr(G; \theta^*)] L_1}{\mu_1(G; \theta^*) \Pr(G; \theta^*)} \right) \\
- (p_B + \theta (p_G - p_B)) \left( \lambda V_1 - p_B \frac{\lambda I_1}{\mu_2(G, S; \theta^*)} - (1 - p_B) \frac{\lambda I_1}{\mu_2(G, F; \theta^*)} \right).
\]

The expression is positive (negative) if \( \lambda > 1 \) (\( \lambda < 1 \)).

The first line in the expression corresponds to the expected profit associated with reporting \( B \), while the next two lines correspond to the expected profit associated with reporting \( G \). Entrepreneur \( \theta = \theta^* \) (who is indifferent about issuing a \( G \) or a \( B \) report) will strictly favor a truthful \( B \) report if \( \lambda \) increases. This follows from \( p_B \frac{1}{\mu_2(G, S; \theta^*)} + (1 - p_B) \frac{1}{\mu_2(G, F; \theta^*)} > \frac{1}{\mu_2(B; \theta^*)} \); the average reputation associated with reporting \( G \) is lower than the reputation acquired by reporting \( B \). Q.E.D.

**Proof of Corollary 1:** Recall that \( D_1(\mu_1(G; \theta^*)) \) is defined by:

\[
D_1(\mu_1(G; \theta^*)) \mu_1(G; \theta^*) \Pr(G; \theta^*) + [1 - \Pr(G; \theta^*)] L_1 = I_1.
\]

From Proposition 2, \( \theta^* \) is decreasing in \( I_2 \). As a reduction in \( \theta^* \) implies that more \( B \) projects are liquidated, the face value of debt decreases with a reduction in \( \theta^* \). Q.E.D.

**Proof of Corollary 2:** Observe that an increase in \( I_2 \) implies a decrease in \( \theta^* \). Also,

\[
D_1(\mu_1(G; \theta^*)) \mu_1(G; \theta^*) = \frac{I_1 - L_1}{\Pr(G; \theta^*)} + L_1,
\]

and \( \Pr(G; \theta^*) \) is increasing in \( \theta^* \). Q.E.D.
Proof of Proposition 3: The result follows from observing

\[ \mu_2((B); \theta^*) = \frac{\int_{\theta^*}^{1} [1 - \theta] [p_B + \theta (p_G - p_B)] dF(\theta)}{\int_{\theta^*}^{1} (1 - \theta) dF(\theta)} \geq \frac{\int_{0}^{1} [1 - \theta] [p_B + \theta (p_G - p_B)] dF(\theta)}{\int_{0}^{1} [1 - \theta] dF(\theta)} = \mu_2(B). \]

Q.E.D.
References


