Managerial Conservatism, Project Choice, and Debt

David Hirshleifer
University of California at Los Angeles

Anjan V. Thakor
Indiana University

We show that the incentive for managers to build their reputations distorts firms' investment policies in favor of relatively safe projects, thereby aligning managers' interests with those of bondholders, even though managers are hired and fired by shareholders. This effect opposes the familiar agency problem of risky debt that is imperfectly covenant-protected, wherein shareholders are tempted to favor excessively risky projects in order to expropriate bondholders. Consequently, when managerial concern for reputation results in conservatism, it can actually make shareholders better off ex ante by allowing the firm to issue more debt. We examine how the optimal choice of leverage from the shareholders' standpoint is influenced by takeover activity, and how the adoption of antitakeover measures affects a firm's investment policy and leverage choice.

In this article, we examine the real and financial decisions of a firm in which a manager may manipulate investment policy in order to develop a personal rep-

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utation for high ability. While shareholders are concerned solely with the financial payoff of the firm, the manager is also concerned with the *perceived* value of his human capital. The moral hazard introduced by this divergence leads to managerial conservatism in project choices in our model, and also has implications for the firm's optimal capital structure.

We consider a manager whose ability to identify good investment opportunities is crucial to the firm but is known only to himself. We assume that project choices themselves are unobservable, so the manager's ability must be inferred only from observed success or failure. Hence, the manager has an incentive to choose projects that promote favorable inferences, even at the expense of risk-adjusted, discounted expected cash flows.

More specifically, our focus is the problem of distortion in choices between projects with different "riskiness" in the sense of exposure to early and conspicuous failure. For many types of investment decisions, a complete failure becomes evident early. If complete failure does not occur, however, the ultimate extent of the success may not be immediately apparent. For example, a pharmaceutical firm may fail in an attempt to develop a new drug, or may simply fail to obtain regulatory approval. Even if these preliminary initiatives are successful, there still remains considerable uncertainty about the size of the market and the profitability of the new drug.

This asymmetry between early resolution of bad news and late resolution of the degree of good news frequently arises from termination options. Early arrival of sufficiently bad news leads to project termination, and a low level of profit is realized. Early arrival of good news, on the other hand, leads to continuation, and it may take years before the ultimate cash flows become apparent.[1,2]

Suppose that a good manager can select projects that have high risk-adjusted net present value (NPV) *and* are also relatively "safe" (low probability of early failure), whereas a bad manager confronted with the same technology cannot do so without error.[3] In attempting to identify a high NPV project, a bad manager occasionally ends up investing in a risky project with no higher NPV. On the other hand, a bad manager could "play it safe" and switch to an alternative tech-

[1] Of course, a manager could continue a failed project rather than terminate and thereby reveal the bad news. However, it will frequently be the case that continuing a failed project ultimately costs the manager more than owning up to failure early. Boot (1992) examines the project-termination decision of a manager who is concerned with his reputation.

[2] Acquisition is an investment choice in which a firm may select a more aggressive or conservative strategy. Failure of an acquisition may be conspicuous, if, for example, it entails divesting an acquired division, whereas success may still leave enormous uncertainty as to the ultimate cash flows that will be generated.

[3] The possibility of managers erring in the identification of projects has implications for organization structure as well, as Sah and Stiglitz (1986) have shown.

nology that permits him to invest in a safer, lower-value project which he can identify accurately, so that early failure seldom occurs. We show that, in an unlevered firm, a bad manager opts for the latter alternative in a reputational equilibrium. Hence, socially desirable risky projects are eschewed despite universal risk neutrality and costless bankruptcy.[4,5]

However, managerial reputation building does not inevitably lead to excessive conservatism in project choices. In instances where a more aggressive investment policy leads to earlier resolution of uncertainty about the manager's ability *and* the optimal wage contract is downward rigid, the manager may display excessive aggressiveness relative to the shareholders' optimum.[6] Holmstrom and Ricart i Costa (1986) show that in the absence of explicit contracting within the firm, a risk-averse manager will be reluctant to initiate projects because doing so subjects him to risk by resolving uncertainty about his ability [see also Holmstrom (1982)]. But when contracting is permitted, the second-best wage contract is downward rigid [as in the learning model of Harris and Holmstrom (1982)] and is equivalent to an option on the risk-averse manager's human capital. Thus, if the manager is sufficiently risk tolerant, he prefers the high-valued risky option associated with investing. The firm may then counteract this overinvestment propensity by rationing capital. Our analysis differs in assuming that, at an early stage of progress of a project, news about success or failure does not arrive symmetrically. Owing to this asymmetry, even a risk-neutral manager will be excessively averse to projects with a relatively high probability of failure.

This finding of ours is predicated on the assumption that the project outcome (success versus failure) can be observed early by shareholders, so that competitively determined stock prices and managerial wages depend on the information about managerial ability that is transmitted by the project outcome. On the other hand, suppose the shareholders offer the manager a contract that insulates his wage from any interim information about his ability, or, equivalently, that project

[4] The low NPV project technology could be safer for a good manager as well as a bad manager. This can potentially lead to even more severe distortions in which a good manager also switches technologies and selects the lower value project.

[5] Diamond (1989) provides a related argument for socially desirable conservatism. In his analysis, the fact of default reveals bad news about a debt-financed entrepreneur, while nondefault does not reveal the margin with which the firm is able to meet its debt obligations. While we show that the manager may be conservative for his own benefit, Rasmusen (1992) argues that conservatism can be rational and profit maximizing even in the unlevered case. In his model, more successful firms should be more conservative in adopting innovations that are evaluated with noise.

[6] Another situation in which the manager may display an aggressive investment posture is when there is symmetric but imperfect information about which task he is best equipped to handle. If the manager derives a higher utility from a more efficient match, then he will have an incentive to adopt risky investments that are likely to reveal match-relevant information faster. Ricart i Costa (1988) examines related task-assignment issues.

outcomes are unobservable to investors prior to project conclusion. We find that, in an unlevered firm, shareholder wealth in this case can be higher than when the manager's future wage at each point in time depends on information about his ability revealed by the outcome at that point. Thus, in an unlevered firm the shareholders may benefit by protecting the manager from fluctuations in assessments of his ability. An example is a golden parachute that provides interim wage insurance to the manager in case he is fired.

The observation that managerial incentive contracts should reflect the career concerns of managers has been made by Gibbons and Murphy (1992), who develop a model in which the optimal compensation contract optimizes total incentives—the combination of the implicit incentives from reputational concerns and the explicit incentives from the compensation contract. They find that explicit incentives from the optimal compensation contract should be strongest when a worker is close to retirement, and provide empirical support for the prediction.[7] Gibbons and Murphy explicitly rule out the kind of interim wage insurance discussed above. But even in the case of repeated single-period contracting (with no wage insurance), there is a key difference between their conclusion and ours. They find that agency problems *increase* as the manager approaches retirement, whereas we find the opposite. The reason for this difference is as follows. In the Gibbons–Murphy model, an effort-averse manager exerts effort to improve evolving perceptions of his ability. Thus, as he approaches retirement and his concern with these perceptions diminishes, he does not work as hard. That is, a diminution of managerial reputation-seeking is *bad* for the shareholders in the Gibbons–Murphy model. By contrast, such a dimunition is good for shareholders in the unlevered case of our model, because excessive conservatism is reduced.

The conclusion that the manager's pursuit of reputation can be deterred to benefit the shareholders, by offering the manager a long-term contract that insures him against interim shocks to perceptions of his ability, points to another advantage of explicit multiperiod contracting. Previously noted advantages include the expansion of risk-sharing opportunities [Palfrey and Spatt (1985)], the satisfaction of incentive constraints with lower welfare dissipation [Townsend (1982)], and the possibility of obtaining nondissipative separation of privately informed agents in settings in which an equilibrium either fails to exist with spot contracting or involves dissipation [Thakor

[7] Singh and Harianto (1989) provide further evidence of the importance of management tenure. They find that golden parachute contracts involve higher payment when top management is longer tenured.

(1989)]. Thus, our article can be viewed as complementing this earlier research.

Our basic result about the desirability of interim wage insurance to encourage risk taking is premised on the assumption that the firm is unlevered. In a levered firm, suppose the manager's future wages depend on perceptions about his ability, which evolve in accordance with information about managerial ability revealed by the observed outcome. This induces the manager to seek safety, thereby providing an offset to the shareholders' proclivity to favor excessively risky projects. Thus, the manager's reputational incentive draws the firm's investment choices closer to the interests of bondholders rather than shareholders. This incidental alignment of managerial and creditor interests reduces the agency costs of imperfectly covenant-protected risky debt and benefits shareholders. Therefore, given a positive optimal level of debt chosen on the shareholders' behalf by the board of directors, it may not be optimal in this context to contractually protect the manager's future wages against interim variations that result from changes in perceptions of managerial ability.[8] When there is a tax shield advantage to debt and the capital structure and the managerial wage contract are simultaneously determined, we identify conditions under which there is an interior capital structure optimum and no interim wage insurance for the manager.

This leads to an interesting interpretation of leverage choices during periods of escalated takeover activity. Suppose that, because of either imperfect ex post observability of cash flow realizations or just sluggish monitoring by the board of directors, a manager whose projects are unsuccessful does not perceive either his wage or job to be in jeopardy.[9] In such a case, managerial reputation building is not an issue and, to the extent that the manager acts in the interest of shareholders rather than bondholders, the usual agency cost of debt leads to a lower optimal debt–equity ratio.

Now suppose that the cost of takeovers declines (possibly because of financial innovations or regulatory shifts), and that the most likely takeover targets are firms whose managers are perceived to be doing

[8] Of course, reputational incentives may be too strong, leading to excessive managerial conservatism. However, if a manager of a levered firm whose wage is protected from short-term reputational effects has a greater incentive to choose excessive risk (to raise the long-run stock price) than a manager of an unlevered firm, then even an excessive reputational incentive toward conservatism is less costly to a levered firm than an unlevered one.

[9] Empirical evidence in support of such entrenchment can be found in Warner, Watts, and Wruck (1988) and Weisbach (1988).

[10] Takeover targets tend to have poor prior performance as measured by the price to book value ratio [Schwartz (1982)] and by Tobin's Q [Hasbrouck (1985) and Palepu (1986)]. Morck, Shleifer, and Vishny (1988) found that targets of hostile takeovers tend to be firms that have underperformed others in the industry. Martin and McConnell (1991) provide evidence of high top-management turnover of targets after completed tender offers, particularly if the target was underperforming other firms in its industry.

poorly.[10] Then managerial career concerns surface to bring about an increase in optimal debt–equity ratios. Thus, debt financing is predicted to increase for potential takeover targets during periods of hectic takeover activity.

There is evidence that is consistent with this prediction. In 1987, U.S. nonfinancial corporations took on $173 billion in new debt, boosting the total to $1.9 trillion. In 1962, debt as a percent of the market value of shareholders' equity for nonfinancial corporations was about 42 percent, whereas in 1987 it was almost 80 percent [Ballen (1988)].[11] Leverage ratios in book value terms (debt to book value of assets) increased substantially during the 1980s, as firms issued debt and repurchased equity.

Of course, the link between leverage and takeover activity has been noted elsewhere, notably in Harris and Raviv (1988) and Stulz (1988). However, in these articles, managers take on more debt as a defense against takeovers, a strategy similar to share repurchases [Bagwell (1991) and Bagnoli, Gordon, and Lipman (1989)] and recapitalization [Lewis (1989)]. Such strategies may be used to entrench management, and are thus frequently *not* optimal from the shareholders' standpoint. In our analysis, increased usage of debt is *not* a takeover defense; it is a way for shareholders to benefit by reducing the firm's tax burden. The increase in leverage stems from the attenuating effect of takeover threats and the consequent managerial conservatism on the shareholder–bondholder incentive conflict.

It is possible to distinguish empirically between our explanation and others of increased leverage during periods of heightened takeover activity. Our model makes four main predictions on this count. First, the amount of debt financing should increase for firms that are potential targets of takeovers. Second, this increase should be smaller for firms that adopt greater takeover protection, because in these firms managers are better insulated from reputational concerns.[12] Third, the cost of debt finance should be lower for the firms that are potential takeover targets than for those that are not; and, among potential takeover targets, the cost of debt finance should be inversely related to the strength of takeover protection. In contrast, if a higher reliance on leverage is solely a takeover defense, then a relationship between takeover activity and the cost of a given level of debt is not necessarily

[11] There are several other possible factors that may have affected leverage, such as changes in the tax code [see, e.g., Givoly et al. (1992)] and the growing use of project financing [see Shah and Thakor (1987)]. Bernanke and Campbell (1988) find that owing to the 1980s stock market boom, debt measured relative to market value of assets did not increase in the 1980s. The ratios of interest expense to cash flow and current assets, on the other hand, did increase. They also find that market measures of leverage did increase strikingly in the petroleum industry, which was subject to strong takeover threats during this period.

[12] This is, of course, holding constant the degree to which the firm is at risk for takeover.

implied.[13] Fourth, firms that have CEOs approaching retirement will, ceteris paribus, employ less new debt than other firms.[14]

The remainder of this article is organized as follows. In Section 1, we present the basic model without debt. In Section 2, debt is introduced. In Section 3, we consider the implications of our analysis for takeovers and for defensive measures designed to prevent takeovers. With Section 4, we conclude the article.

1. The Basic Model and Analysis of the Unlevered Case

1.1 The model

1.1.1 Time line and types of managers and projects. There are three dates, 0, 1, and 2, and two possible projects, each of which is available at $t = 0$ and $t = 1$. (A third, called the "terrible" project, will be introduced in Section 2.) The projects are the "good risky" (*GR*) project and the "safe mediocre" (*SM*) project. There are two types of a priori indistinguishable managers, a good manager and a bad manager. The prior probabilities for these two types of managers at $t = 0$ are λ_G for a good manager and λ_B for a bad manager, with $0 < \lambda_G < 1$ and $\lambda_G + \lambda_B = 1$. The payoff of *GR* is $R^G > 0$ with probability (w.p.) p_G and 0 w.p. $1 - p_G$ if this project is managed by a good manager. Its payoff is R^G w.p. p_B and 0 w.p. $1 - p_B$ under a bad manager. We assume $0 < p_B < p_G < 1$.[15] The *SM* project yields a payoff of R^S w.p. q and 0 w.p. $1 - q$, regardless of the type of manager in charge. We assume $0 < R^S < R^G$ and $1 > p_G > q > p_B > 0$. This is consistent with the intuition that high risk is associated with a greater number of opportunities whose exploitation would place a good manager at an advantage relative to a bad manager.[16] The projects are summarized in Figure 1. Each project requires an initial investment of \$1. For the first-period project, this investment must be made at $t = 0$, and for the second-period project, this investment must be made at $t = 1$.

[13] The above-mentioned predictions of our model also distinguish our explanation from the signaling and tax explanations alluded to in note 11. Those hypotheses do not suggest a positive relationship between the cost of debt financing and the extent of takeover protection provided to the firm's manager.

[14] We are not aware of any direct empirical test of this prediction. Broadman (1989) finds that top executives older than 65 years are less likely to resist takeovers than their younger counterparts. If debt is a takeover deterrent, then this produces an implication similar to our prediction, but for different reasons.

[15] From a descriptive standpoint, we have in mind a situation in which there is another project—call it the "error project"—which may be chosen inadvertently by a bad manager attempting to select *GR*, but has a lower probability of success, $p'_G < p_G$.

[16] We could let managerial skill affect the probability of success on *SM* as well as on *GR* without changing the nature of the results, so long as a good manager has a higher probability of success in *GR* than in *SM*; see also note 4.

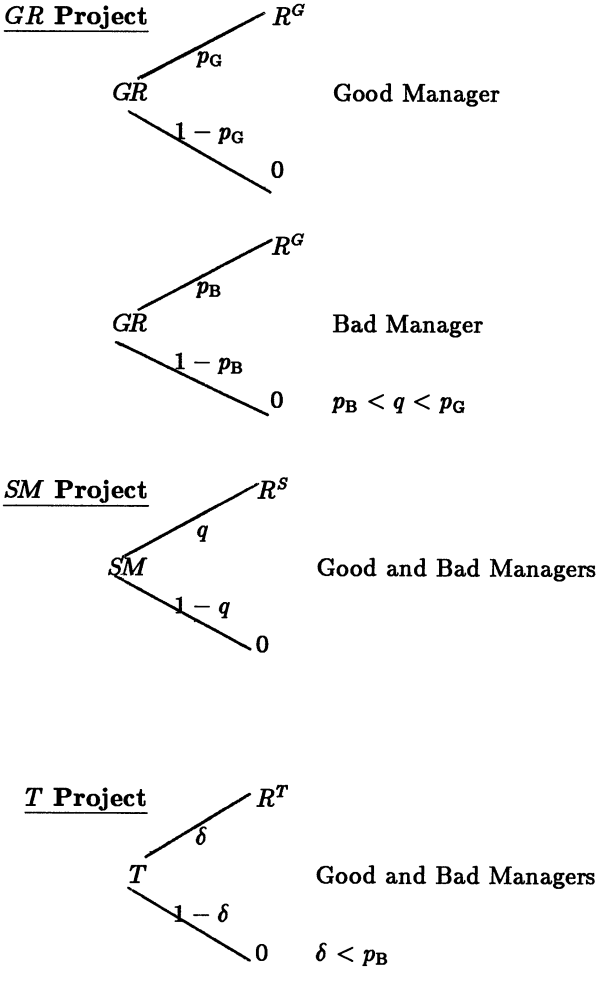

Figure 1
Alternative Investment Projects
Project T is introduced in Section 2. $R^T > R^G > R^S$, $p_B R^G > qR^S$, $p_B R^G > \delta R^T$.

1.1.2 Sequence of events and observability assumptions. A time line of the sequence of events is provided in Figure 2. At $t = 0$, the manager joins the firm and learns his type. He then chooses the first-period project for the firm and invests \$1 in it. If there is a first-period capital structure choice, then the board on behalf of shareholders approves an amount of debt that should be issued on the firm's behalf. At $t = 1$, the first-period outcome of the project is realized. The cash flow from the first-period project is not realized until $t = 2$. However, at $t = 1$, it *may* be possible for investors to observe whether the first-period project will succeed or fail. After the outcome of the first-

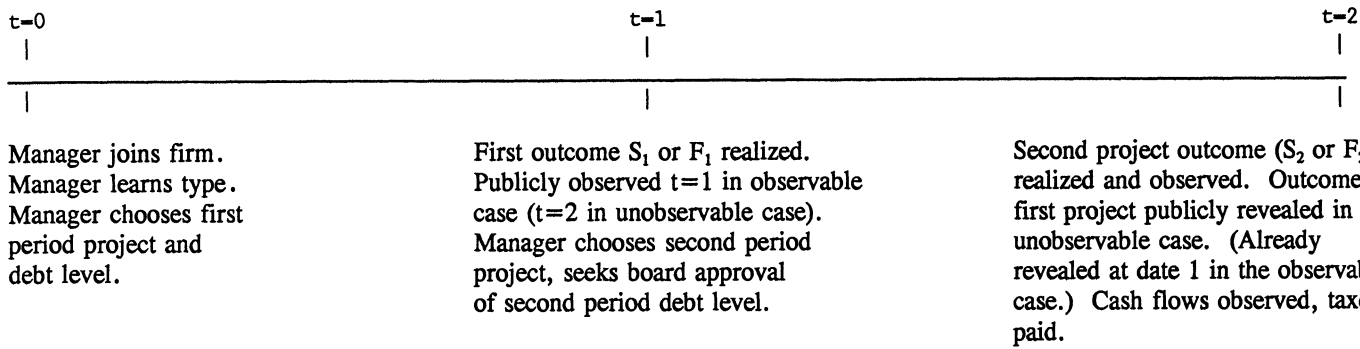

Figure 2
The time line

period project is determined ($t = 1$), the manager chooses his second-period project and invests \$1 in it. At this time, the manager also seeks board approval for the amount of second-period debt to be issued, if capital structure is a choice variable. Finally, at $t = 2$, the outcome of the second-period project is determined and cash flows from both the first- and second-period projects are realized. Note that we assume a delegation asymmetry between real and financial decisions. Since debt is an observable choice, the board of directors can, on behalf of shareholders, dictate to the manager the amount of debt to be issued. Project choice is unobservable in the sense that ex ante heterogeneity in project payoff distributions may not be as discernible to shareholders as it is to the manager. Out of necessity, this choice must then be delegated to the manager.

It is assumed that the realized project cash flows, while observable, are not contractible. This rules out forcing contracts based on punishing the manager if the final project payoff indicates he chose the "wrong" project. It also rules out any other contracts contingent on ex post outcome-based assessments of the relative likelihood of the project choice. There are two standard rationales for this kind of assumption. First, the cash flows may be in the distant future, limiting the extent to which the manager's compensation can be deferred to be contingent upon the observations of realized cash flows. Second, the effects we describe would still operate in a more complicated model with a continuous distribution of cash flows, so that the cash flow is imperfectly informative about which project was selected.

The risk-free discount rate is zero. The firm's cash flows are taxed at a proportional corporate tax rate of τ, and there are no personal taxes. Project choice is observed only by the manager. Project outcomes can also be observed by the manager. We will compare a regime in which shareholders can observe the first-period project outcome (success or failure) at $t = 1$ (before final cash flows are realized at $t = 2$) with a regime in which first-period project outcome is unobservable at $t = 1$. Outcome observability permits investors to update their beliefs about managerial quality, taking into account the fact that managers' project choices may be quality dependent. Another way of interpreting this is that we compare a regime in which the manager's wages through time are determined competitively in the labor market (so that the manager is concerned about his reputation) with one in which his interim wages are unrelated to evolving perceptions of his ability (so that reputation is of no concern to the manager).

1.1.3 Contracting environment and managerial objectives. We assume an environment of incomplete labor contracting with no pre-

commitment by either the firm or the manager. At any point in time, the manager is paid a wage that is competitively determined in the labor market and is dependent on his perceived ability. With technology fixed, the firm's stock price reflects the market's perception of managerial ability, just as does the manager's competitive wage. Thus, for the manager, maximizing expected future stock prices is essentially equivalent to maximizing expected future wages. We assume that the manager maximizes a weighted average of the firm's stock prices at $t = 1$ and $t = 2$. Let $\phi = GR_t, SM_t$ be the project selected at $t = 0,1$ and let V_t be the firm's stock price at t.[17] The manager's problem at $t = 0$ is

$$\max_{\phi_0,\phi_1} E_0[V_1 + \alpha V_2], \tag{1}$$

where $\alpha > 0$ is a constant.[18] We assume that the manager is not fired after failure. However, similar results can be obtained even if the manager can be fired. What is crucial is that when the outcome is observable at $t = 1$, the manager places value on early success so as to maintain his (or the firm's) reputation.

We compare two regimes. In the first, the project outcome at date 1 is not observable. Hence, the manager's date 1 wage is not influenced by any new information about his ability and he does not have an incentive to develop a reputation. This is equivalent to a situation in which the date 1 outcome is observable but the shareholders provide the manager a wage contract that insulates his wealth from date 1 perceptions about his ability. In this case, the manager cares only about the *terminal* (date 2) stock price. The other regime is one in which the date 1 outcome is observable and hence the manager's wage depends on how his ability is perceived at date 1. This creates a desire for the manager to develop a reputation. As in any other reputation model, there are apparently two simple ways to eliminate this pursuit of reputation. One is to design a menu of outcome-contingent wage contracts that cause the manager types to reveal themselves ex ante through self-selection by contract choice. The other is to offer a wage contract that does not necessarily result in self-selection but suppresses the manager's desire to build a reputation. An example is a fixed-wage contract that fixes the manager's

[17] The firm's stock price is based on investors' expectation of future cash flows, and these expectations are based on their beliefs about the manager's ability.

[18] This objective is similar to that in Harris and Raviv (1985), Miller and Rock (1985), and other recent financial signaling models. Dybvig and Zender (1991) point out that when contracting is unconstrained, a manager should be compensated so as to render him indifferent with respect to the timing of uncertainty resolution. However, when the manager's ability is unknown and being inferred through time, constraints on contracting may induce resolution preference on the part of the manager. For example, as Holmstrom and Ricart i Costa (1986) have shown, the option to quit can cause him to desire to seem good early in his career to increase the value of this option.

date 1 compensation, insulating it from date 1 information about his ability and thereby rendering reputational concerns moot.

Both of these alternatives to our formulation suffer from serious practical limitations. For successful implementation, both require *two-sided* precommitment. The firm must obviously precommit to paying the manager a wage that is dictated by its ex ante optimal scheme (i.e., the scheme that eliminates reputational incentives). However, these wages will generally be ex post nonoptimal either because the manager's ability is revealed perfectly by self-selection or because the fixed wage promised to him exceeds that justified by the ability inference afforded by the ex post outcome. While one could conceivably bind the firm to long-term wage contracts that are legally protected, these commitments can sometimes be breached by bankruptcy or takeovers [Shleifer and Summers (1988)]. From the manager's perspective, the infeasibility of involuntary servitude implies that the manager possesses an option to quit whenever the ex post assessment of his ability exceeds that which is consistent with his precommitted wage [Harris and Holmstrom (1982), Narayanan (1985), and Holmstrom and Ricart i Costa (1986)].

We will also refer to the case in which the manager is offered a contract that eliminates reputational concerns (such as a fixed-wage contract) as the "unobservable outcome" since it is equivalent to the project outcome being unobservable at date 1. Similarly, we will label as the "unobservable outcome" the case in which the outcome is observable at date 1 and the manager maximizes (1).

1.1.4 Basic parametric restrictions. We will now describe our assumptions about shareholder preferences between different projects in the absence of debt. First, shareholders prefer even a bad manager to choose *GR* over *SM,*

$$p_B R^G > qR^S. \tag{2}$$

Since the probability of success in *GR* is higher for a good manager, it follows that shareholders prefer that a good manager choose *GR* as well. Second, the NPV of the good risky project, even if selected by a bad manager, is positive[19]:

$$p_B R^G(1 - \tau) - 1 > 0. \tag{3}$$

It follows that the NPV of investing a dollar at either date 0 or 1 is positive when the pooled expected payoff is received, given that a

[19] We have assumed that there are no tax shields (such as depreciation) associated with capital investment; these would not change the nature of the results.

manager of either type selects *GR*. Thus, defining the pooled probability of success to be $p_P = \gamma_G p_G + \gamma_B p_B$, we have

$$p_P R^G(1 - \tau) - 1 > 0. \tag{4}$$

1.1.5 Equilibrium concept. In all of our results, we will employ the subgame perfect Nash equilibrium concept. The only strategic decision of the manager in this model is his project choice. However, this choice is unobservable at all points in time, which means that out-of-equilibrium moves by the manager cannot be observed. When we introduce leverage, we will explicitly consider out-of-equilibrium debt levels. But since these debt levels are chosen by the uninformed shareholders, they do not convey any information about the manager's ability.[20] It is well known that in a game like this, subgame perfection is as powerful in eliminating "unreasonable" Nash equilibria as stronger refinements such as sequential equilibrium or its further refinements.

1.2 Analysis

Our goal in this section is to demonstrate that reputation building can be detrimental to the firm's shareholders owing to the propensity of bad managers to avoid good but risky projects. To show this, we compare a scenario in which the outcome is unobservable at date 1, so that there is no gain to reputation building, with one in which shareholders can observe the outcome.

1.2.1 Unobservable outcome. The manager's behavior does not affect V_1, so the manager's problem reduces to choosing projects to maximize the firm's date 2 expected cash flow. By (3) and (4), this is maximized by the choice of *GR* in both periods 1 and 2. Consequently, the value of shares at date 0 will be[21]

$$V_0 = 2R^G(1 - \tau)p_P - 2. \tag{5}$$

1.2.2 Observable outcome. Since $q > p_B$, a bad manager may now select *SM* over *GR* at date 0 in order to avoid failure and thereby protect his reputation.[22] We verify conditions under which this is an

[20] We do, however, allow for the possibility that, if the observed debt level is off the equilibrium path, investors will revise their beliefs about the manager's ability in response to an observed cash flow differently from the way beliefs would be revised in equilibrium.

[21] As in many models in which a stock price objective function is assigned to managers, we do not deduct wages in calculating firm value; similar results could be derived with a calculation that explicitly contains wages.

[22] We interpret the model as one in which a manager wishes to improve his reputation for high quality; however, it applies equally to a manager who wishes to improve the reputation of his firm for having high-quality investment projects.

equilibrium. At date 1, the manager will still select *GR,* because at this point V_1 has been set, so that only the date 2 stock price is relevant for the manager's decision; even for a bad manager, V_2 is maximized by choosing *GR.*

We wish to write the condition that a bad manager prefers *SM* over *GR* at date 0, owing to a desire to seem good at date 1 when the project outcome is revealed. We therefore calculate the stock prices that a bad manager expects to arise from his choice of $\phi_0^B = SM_0$ or GR_0, given that investors believe that SM_0 will be selected in the proposed equilibrium. Since investors are risk neutral, the stock price at date 1 is just investors' date 1 expected value of the date 2 cash flows; the conditioning of the expectation reflects outcome observability at date 1. If, as investors anticipate, SM_0 is selected, then the expected value of the date 1 stock prices based on their information must, by the rule of iterated expectations, be the same as the true expectation of the date 2 cash flow. Thus,

$$E_0[V_1 \mid \text{Obs}, \phi_0^B = SM_0] = R^G(1-\tau)\gamma_G p_G + R^S(1-\tau)\gamma_B q + R^G(1-\tau)p_P - 2. \tag{6}$$

On the other hand, if the manager defects by choosing GR_0, then to calculate the expected date 1 stock price we must calculate explicitly the stock prices in the event of success and failure. Letting S_t and F_t denote success and failure, respectively, at date t, these are

$$\begin{aligned} V_1(F_1) &= \Pr(S_2 \mid F_1)R^G(1-\tau) - 2, \\ V_1(S_1) &= \Pr(G \mid S_1)R^G(1-\tau) + \Pr(B \mid S_1)R^S(1-\tau) \\ &\quad + \Pr(S_2 \mid S_1)R^G(1-\tau) - 2. \end{aligned} \tag{7}$$

Thus, the expected date 1 stock price if the (bad) manager defects by choosing GR_0 is

$$E_0[V_1 \mid \phi_0^B = GR_0] = (1-p_B)V_1(F_1) + p_B V_1(S_1). \tag{8}$$

The probabilities of p_B and $1 - p_B$ here correspond to the probability of a bad manager succeeding at date 1 based on his choice of GR_0. By choosing *SM* instead of *GR,* he could replace his probability of success p_B with $q > p_B$, which would thus increase his expected date 1 stock price. Thus, there is a reputational incentive for a bad manager to choose the safety of *SM* over *GR.* This may or may not be offset by the cost of choosing *SM,* which reduces the expected date 2 stock price because *SM* has a lower expected cash flow than *GR.*

Assuming equilibrium behavior, the value to stockholders under observability, $V_0(\phi_0^B, SM_0)$, is given by (8) and (6). We prepare to

substitute for various probabilities in (8) and (6), by noting that if, as proposed in equilibrium, investors believe that a good manager chooses GR_0 and a bad manager chooses SM_0, then their posterior probability assessments at date 1 are

$$\begin{aligned}
&\Pr(S_2 \mid G) = p_G, \qquad \Pr(S_2 \mid B) = p_B,\\
&\Pr(G \mid S_1) = \frac{\gamma_G p_G}{\gamma_G p_G + \gamma_B q},\\
&\Pr(B \mid S_1) = \frac{\gamma_B q}{\gamma_G p_G + \gamma_B q},\\
&\Pr(G \mid F_1) = \frac{\gamma_G(1 - p_G)}{\gamma_G(1 - p_G) + \gamma_B(1 - q)},\\
&\Pr(B \mid F_1) = \frac{\gamma_B(1 - q)}{\gamma_G(1 - p_G) + \gamma_B(1 - q)}.
\end{aligned} \tag{9}$$

It follows that

$$\begin{aligned}
\Pr(S_2 \mid S_1) &= \Pr(G \mid S_1)p_G + \Pr(B \mid S_1)p_B\\
&= \frac{\gamma_G p_G^2 + \gamma_B q p_B}{\gamma_G p_G + \gamma_B q},\\
\Pr(S_2 \mid F_1) &= \Pr(G \mid F_1)p_G + \Pr(B \mid F_1)p_B\\
&= \frac{\gamma_G p_G(1 - p_G) + \gamma_B(1 - q)p_B}{\gamma_G(1 - p_G) + \gamma_B(1 - q)}.
\end{aligned} \tag{10}$$

In the proposed equilibrium, investors believe that $\phi_0^B = SM_0$. Defection to *GR* is not visible. Hence, (9) and (10) give the probabilities assessed by investors in forming stock prices even if a bad manager defects to *GR*. Furthermore, investors believe that success by a bad manager implies a cash flow arising from the date 1 project of R^S, not R^G.

Comparing (5) with (6), we see that

$$V_0(\text{Obs}) - V_0(\text{Unobs}) = (1 - \tau)\gamma_B(R^S q - R^G p_B) < 0, \tag{11}$$

by (2). Intuitively, reputation building leads to a loss owing to the choice of *SM* instead of *GR* at date 0. Thus, in this equilibrium, observability is bad for shareholders ex ante.[23]

To determine whether a bad manager prefers SM_0 or GR_0, we need to calculate the expected date 2 cash flow as well. Rather than looking

[23] In a previous version of this article, we showed that observability could be bad for shareholders even if there is a gain from firing a manager who has failed and replacing him with a new manager. This benefit of improved investment choice at date 1 can be outweighed by the inferior choice of *SM* over *GR* by a bad manager at date 0.

at total cash flows, it suffices to examine those date 2 cash flows which arise as a result of the date 0 project choice. Let the value of this cash flow be denoted by V_2^0. Then,

$$E_0[V_2^0 \mid SM_0, B] = R^S(1 - \tau)q - 1,$$
$$E_0[V_2^0 \mid GR_0, B] = R^G(1 - \tau)p_B - 1. \tag{12}$$

The condition that a bad manager prefer SM_0 over GR_0 then becomes

$$E_0[V_1 \mid GR_0, B] + \alpha E_0[V_2^0 \mid GR_0, B] < E_0[V_1 \mid SM_0, B] + \alpha E_0[V_2^0 \mid SM_0, B]. \tag{13}$$

In view of the discussion following Equation (8), it is clear that (13) will hold for α sufficiently small.

In the Appendix we provide a numerical example that verifies that the parameter restrictions (2)–(4) and (13) can obtain, implying that the detrimental effects of reputation building on project choice can make observability undesirable for shareholders. It is perhaps surprising that observability leads to adverse incentives, given that it is the *lack* of observability that is usually a major source of agency problems.[24] The intuition for our result is as follows. The observability of outcome (but not of project choice) in conjunction with an ex post "correct" managerial wage—which reflects the market's perception of the manager's ability based on the observed outcome—implies that a manager of a project that fails is penalized. This imposes a cost on bad managers for pursuing the shareholders' optimum and biases these managers toward the selection of excessively safe but low-return projects. All of this discussion is summarized below as a proposition.

Proposition 1. *There exists a nonempty set of exogenous parameter values such that the value of an unlevered firm to shareholders is higher in the (subgame perfect) Nash equilibrium when they are unable to observe project outcomes than in the (subgame perfect) Nash equilibrium when they can observe these outcomes.*

This proposition shows that reputation building can lead to the choice of the inferior project *SM*. This will tend to occur more under the following circumstances: (1) *SM* is not very much inferior to *GR* in expected cash flows (R^S close to R^G), because the cost of reputation building is then small; (2) when a good manager is much better than a bad manager ($p_G - p_B \approx 1$), so that the value of trying to appear

[24] The reason is that only the project outcome, not the project choice, is observable here. Thus, the analysis illustrates that in a second-best situation without observability, introducing only partial observability can make problems worse.

good is high; and (3) when the reputational signaling incentive is strong relative to his concern for the firm's long-run cash flows (α small). An implication of this proposition is that, consistent with other models of managerial reputation cited in the introduction, the shareholders may want to reduce the manager's preoccupation with *interim* stock prices (i.e., stock prices that prevail prior to the culmination of significant long-term projects). This is because early signals of project success or failure will enter prices, and the manager's anticipation of these signals can potentially distort project choices in the direction of value-dissipating conservatism. This may provide a perspective on Jensen and Murphy's (1990) finding that the compensation of top executives is relatively insensitive to their firms' stock prices. Although we have not allowed the manager to be fired in this version of our model, a failure-based firing policy leads to similar results, as we noted earlier. Thus, shareholders may wish to insulate managers from the negative consequences of failure by providing golden parachutes and other forms of protection. The need for these protections should be smaller as a CEO approaches retirement, because reputational considerations become relatively weak.

In our setting, because managers are concerned with building reputations for superior ability, they are concerned with the timing of uncertainty resolution as well as underlying firm value. Specifically, a bad manager will be *resolution averse,* preferring late resolution of uncertainty about his ability. The above proposition shows that his resolution preference will affect project decisions. The choice of the *SM* project, by making it harder to distinguish a good from a bad manager based on early failure or success, in effect allows a bad manager partially to defer resolution of uncertainty about his type.[25] This makes an interesting contrast to Ross' (1989) result that resolution timing is irrelevant to investors in pricing securities.[26]

2. The Model with Debt

In this section, we introduce debt and show how reputation building can increase shareholder value. The basic argument is as follows. Because of the well-known agency problem between bondholders and shareholders, the latter may be inclined to accept highly risky

[25] See Hirshleifer and Chordia (1991) for a model of resolution preference in which a decision to advance or defer resolution shifts the date of news arrival.

[26] The importance of resolution timing is not specific to this model. In general, a "signaling" objective function such as that in Harris and Raviv (1985) or Miller and Rock (1985) will induce resolution preference in the sense that a manager with favorable information about an uncertain event wishes the outcome to be resolved publicly, and a manager with unfavorable information wishes the outcome to remain unresolved.

projects that have a negative risk-adjusted NPV. Rational anticipation of this by bondholders forces shareholders to bear this agency cost. Hence, the delegation of investment decisions to managers who avoid risk for reputational reasons may be desirable for shareholders. In effect, shareholders can commit—through their known inability to observe managerial project choice—to refrain from expropriating debt. This commitment, by reducing the cost of debt capital to the firm, raises exploitation of the interest tax shield, and thus increases total firm value. Of course, in other modeling settings, there may be reputational reasons for managers to take high-risk projects [see, e.g., Hirshleifer and Chordia (1991) and Zwiebel (1990)]. Thus, while we identify reasons for conservatism, it is also possible that managers will be too aggressive in circumstances different from those of this model.

We modify the basic model by assuming that *SM* is unavailable, and instead introduce a project with high-risk and low-return known as the "terrible" project *T*.[27] The terrible project has probability $\delta < p_B$ of success for either manager, but has the higher payoff of $R^T > R^G$ if successful, and 0 otherwise. We assume that absent debt, shareholders prefer even the bad manager to choose *GR* over *T*:

$$p_B R^G > \delta R^T. \tag{14}$$

We assume that two-period debt is issued at date 0, and that single-period debt is issued at date 1. (The date 0 debt is necessarily two period, since cash flows are assumed to be unobservable until date 2.) Date 0 debt is a claim to payoffs on the first project, and date 1 debt is contractually written as a claim to cash flows from the second project. Hence, if the date 0 project fails, the bondholders of this project receive zero, yet shareholders remain in control of the firm, and the firm still retains the capital raised at date 0 for purposes of investment in the second project.[28] If either project pays more than *S*, the shareholders can, through artificial transfer pricing or other means, siphon off the returns to the project, since bondholders are unable to observe any cash flows beyond *S*. We assume (somewhat artificially) that debt repayment is tax deductible without distinguishing interest and principal.

We will derive an interior equilibrium level of debt that maximizes shareholder value by balancing the agency cost of debt against the

[27] The same menu of projects could be maintained in this and the previous sections if we introduce a horrible manager who does not have project *SM* available, only *T*; the assumption then would be a relatively low frequency of horrible managers relative to bad managers in Section 1, and a relatively high frequency in Section 2. Our purpose in varying the project menu is to illustrate possible costs and benefits of reputational incentives.

[28] The assumption of project debt is not essential for the main intuition of the analysis, but greatly simplifies the algebraic development.

interest tax shield. The agency problem in our model arises from a distortion of project choice when the debt level is high.[29] We will see that observability of project outcome can shift the optimal capital structure toward more debt, permitting a greater exploitation of interest deductibility of debt without sacrificing investment efficiency.

2.1 Unobservable outcome

The problem for the firm is the temptation for the manager, acting in the shareholders' interest, to choose the riskier but less profitable project T in order to expropriate debt. If managers do this in the ex post interest of shareholders, then it becomes more costly to raise debt ex ante, and reduces the extent to which the firm will exploit the interest tax shield. Reputation building helps by limiting the expropriation incentive.

Shareholders' desire for T is greater if they have a bad rather than a good manager, since T is equally good with either type of manager but GR is worse with a bad manager. Since success or failure from the date 0 project and resulting cash flows are irrelevant to the current decision, we focus on the value of the cash flow accruing to shareholders as a result of the date 1 project only, denoted V_2^1. At $t = 1$, the maximum debt level that still dissuades *either* manager (acting to maximize the value of the date 2 cash flow, knowing his own type) from choosing T is the level D_1^* that equates

$$E_1[V_2^1 \mid GR_1, B] = E_1[V_2^1 \mid T_1, B], \tag{15}$$

where B refers to a bad manager. Clearly $D_1^* < R^G$, because otherwise shareholders would be sure to receive zero after debt repayment under the choice of GR_1, as compared with a chance of doing better under the choice of T_1.

A possible candidate for the optimal level of debt (as set by ignorant shareholders) is D_1^*, the level of debt that renders the bad manager indifferent. Another candidate is D_1^{**}, the level such that a bad manager chooses T, while a good manager chooses GR. (By the same argument as above, $D_1^{**} < R^G$.) This higher level of debt will generate a higher expected tax shield, but leads to a worse project choice if the firm has a bad manager. Last, it could be most profitable to issue debt up to R^T, despite the fact that this will lead the manager to select the terrible project, because of a high tax advantage to high debt. For purposes of illustrating our basic point, we restrict the exogenous parameters so that in equilibrium, D_1^{**} and $D = R^T$ are both inferior to D_1^* for the shareholders.

The explicit expressions for (15) are

[29] Examples of previous articles on agency problems as determinants of equilibrium capital structure are those by Jensen and Meckling (1976) and Chaney and Thakor (1985).

$$E_1[V_2^1 \mid GR_1, B] = (R^G - D_1)(1 - \tau)p_B + D_1 p_P - 1,$$
$$E_1[V_2^1 \mid T_1, B] = (R^T - D_1)(1 - \tau)\delta + D_1 p_P - 1. \tag{16}$$

The explanation for the top expression is that shareholders "pay" for the initial cash inflow of $D_1 p_P$ from debt by providing bondholders an expected future cash flow of $D_1 p_B$. This is because bondholders pay the pooling price for debt, but future payoffs are conditional on the manager being bad. In the bottom expression, on the other hand, we examine the benefit to T if debtholders *incorrectly* expect GR. Thus, the cash inflow from issuing debt is $D_1 p_P$, but the expected repayment to bondholders is $D_1\delta$. Equating the two expressions of (16) gives

$$D_1^* = (R^G p_B - R^T\delta)/(p_B - \delta) > 0. \tag{17}$$

This is necessarily positive for two reasons. First, in the numerator, the expected value of GR exceeds that of T, and, second, in the denominator, $p_B > \delta$.

D_1^{**}, the indifference level for a good manager between T and GR, can be calculated in a similar fashion; in the Appendix it is shown that $D_1^{**} = D_1^*$. We define p_P^{**} to be the probability of success of the pooled good and bad manager types given that a debt level of D_1^{**} is chosen (so that a bad manager chooses T); that is, $p_P^{**} \equiv \gamma_G p_G + \gamma_B\delta$. To ensure that the expected shareholder value at this level of debt is less than the shareholder value at D_1^*, we will assume parameter values such that

$$E_1[V_2^1 \mid D_1^{**}] < E_1[V_2^1 \mid D_1^*]. \tag{18}$$

The algebraic calculation of these expectations is given in the Appendix.

We also restrict parameters to ensure that at date 1 shareholders prefer D_1^* rather than issuing (just less than) $D_1 = R^T$ (implying choice of T by the manager) to obtain a greater tax shield; that is,

$$R^T\delta < R^G(1 - \tau)p_P + \delta D_1^* p_P. \tag{19}$$

The left-hand side is the fully tax-shielded income from high debt level if T is chosen. The right-hand side is the partially tax-shielded income, net of tax, under a lower debt level with the choice of GR by the manager.

Since we have assumed project debt, the optimal debt level is the same for both periods,

$$D_0^* = D_1^*.$$

Consequently, the date 0 shareholder value is

$$V_0^{\text{Unobs}} = 2R^G(1 - \tau)p_P + 2\tau D_1^* p_P - 2. \tag{20}$$

2.2 Observable outcome

We now consider the case in which the outcome of the date 0 project (success or failure) is observable and the manager maximizes (1). The project outcome will therefore affect investors' beliefs about the quality of the manager, and will affect V_1, the date 1 stock price. The manager, taking this into account, will have a greater tendency to favor GR_0, because it has a higher probability of success than T_0. We will see that this preference of the manager for greater safety reduces the agency problem between stockholders and bondholders, and thus leads to a higher level of debt and greater shareholder value at date 0.

2.2.1 The date 1 debt choice. We begin with the date 1 debt choice. Note that the date 1 capital structure decision is based on the cash flow that will result from GR_1 versus T_1. This implies that regardless of whether success or failure is revealed at date 1, the optimal face value of second-period debt is D_1^*, the debt level that makes a bad manager indifferent between GR_1 and T_1 as in the unobservable case. Letting D_1^{i*} denote the optimal second-period debt after event $i = S$ or F, we have $D_1^{S*} = D_1^{F*} = D_1^*$, so long as we impose the condition that after either success or failure the shareholder value is still higher issuing debt only to D_1^* (so that T is never chosen), not up to D_1^{**} or R^T.

The condition for D_1^* to be preferable to D_1^{**} after success is stronger than (18) of the unobservable case, because after success the manager is more likely to be good. The more likely it is that the manager is good, the less likely it is that a debt level of D_1^{**} would lead to the inefficient project choice T. Thus, a visible success raises the amount of funds that the firm can raise by issuing D_1^{**} of debt. Let γ_G^S, γ_B^S, γ_G^F, and γ_B^F denote the probabilities that the manager is good (G) or bad (B) after success (S) or failure (F) given the equilibrium date 0 capital structure choice. We denote this debt level by $\hat{D}_0^*$, where the hat denotes the value in the observable case, which may differ from the date 0 value under the unobservable case owing to reputation effects. Let γ_G^{S**}, γ_B^{S**}, γ_G^{F**}, and γ_B^{F**} denote the corresponding probabilities given debt level $\hat{D}_0^{**}$ (under which a bad manager chooses T at date 0). We will replace γ's with p's to denote probabilities of success at date 2. We impose the condition that D_1^* be preferred to D_1^{**} after success:

$$E_1[V_2^1 \mid D_1^{**}, S_1] < E_1[V_2^1 \mid D_1^*, S_1]. \tag{21}$$

We will also restrict parameters so that at date 1, D_1^* is preferable

to $D_1 = R^T$. Choice of the higher level of debt leads to an inefficient investment choice of T over GR. Since a good manager does better than a bad manager with the choice of GR, the expected efficiency loss associated with maximum debt is greater the more likely it is that the manager is good. Shareholders, of course, absorb this efficiency loss through the price at which the firm can sell debt. Thus, a sufficient condition for the choice of D_1^* is that shareholders prefer D_1^* even if the manager is sure to be bad. [This condition is stronger than (19) of the unobservability case, which assumed the prior probabilities for the manager.] This condition is

$$R^T\delta < [R^G(1 - \tau) + \tau D_1^*]p_B. \tag{22}$$

At date 1, investors assign the following values to the firm's stock following success and failure, respectively:

$$\begin{aligned} E_1[V_2^1 \mid S_1] &= R^G(1 - \tau)p_P^S + \tau D_1^* p_P^S - 1, \\ E_1[V_2^1 \mid F_1] &= R^G(1 - \tau)p_P^F + \tau D_1^* p_P^F - 1. \end{aligned} \tag{23}$$

At date 0, the value investors assign to the random cash flow arising from the date 1 project is

$$E_0[V_2^1] = R^G(1 - \tau)p_P + \tau D_1^* p_P - 1, \tag{24}$$

as verified in the Appendix.

2.2.2 The date 0 debt choice. A manager whose wages are competitively set at every point in time will tend to favor a project with a higher probability of early success if the project outcome is observable early. Owing to the manager's reputational concern, the date 0 debt under observability will in general be greater than that when the project outcome is unobservable. Thus, letting $\hat{D}_0^*$ denote the level of debt chosen at date 0 under observability that just makes a bad manager willing to select GR, we will show that $\hat{D}_0^* > D_0^*$. Depending on parameters, there could be a corner solution in which debt is raised to full capacity so that $\hat{D}_0^* = R^G$, or an interior solution in which $\hat{D}_0^* < R^G$. Intuitively, an interior capital structure will tend to occur when α is large, so that the manager is concerned not only with current reputation, but with long-run cash flows. In such a situation, it will be necessary to keep D_0 relatively low to persuade the manager to choose GR_0 over T_0.

We will focus on parameter values in which $\hat{D}_0^* < R^G$. We will also impose constraints that shareholder value be higher under debt level $\hat{D}_0^*$ than under levels $\hat{D}_0^{**}$ or R^T. A necessary detail in examining the

gains to defecting to a different level of debt[30] arises indirectly from the fact that debt levels of $\hat{D}_0^{**}$ or of R^T cause the manager to make different project choices at date 0. Because of this, different debt levels will cause the date 1 project outcome to give rise to different inferences about managerial quality. These different posterior beliefs about the manager potentially could lead to a different optimal choice of D_1 (i.e., it is possible that $D_1 \neq D_1^*$ off the equilibrium path).

To ensure subgame perfection of the Nash equilibrium, we will restrict parameters so that even if the "wrong" level of debt is chosen at date 0, the optimal debt choice is still D_1^* at date 1. In other words, we focus on the case in which, after a date 0 debt choice of $\hat{D}_0^{**}$ or R^T, it still pays to issue debt at date 1 just to the point where a bad manager is still willing to select the efficient project GR_1. This guarantees that the Nash equilibrium debt choice is sustained in the second-period subgame. To describe conditions under which this is the case, suppose that $\hat{D}_0^{**}$ instead of $\hat{D}_0^*$ were chosen at date 0. Then a bad manager chooses T instead of GR. Since $\delta < p_B$, this means that the inference about the manager from failure at date 1 becomes more adverse, while the inference from success is more favorable.

We have discussed that the condition for choice of D_1^* over D_1^{**} becomes stronger the more likely it is that the manager is good. As just noted, if $\hat{D}_0^{**}$ is chosen, the inference about the manager from success is more favorable than under $\hat{D}_0^*$. Thus, we obtain a condition stronger than (21) by replacing γ_G^S and γ_B^S with γ_G^{S**} and γ_B^{S**}, respectively. Therefore, this condition is

$$E_1[V_2^1 \mid D_1^{**}, S_1; \hat{D}_0^{**}] < E_1[V_2^1 \mid D_1^*, S_1; \hat{D}_0^{**}], \tag{25}$$

calculated algebraically in the Appendix. In the case in which a debt level of R^T instead of $\hat{D}_0^*$ is chosen at date 0, the manager always chooses T instead of GR. Since good and bad managers have equal probability of success with project T, the posterior inferences about the manager must remain the same as the prior belief (probability γ_G that the manager is good). Thus, the conditions for the manager to choose D_1^* at date 1 over D_1^{**} and R^T are precisely (18) and (19) of the unobservable case.

The various conditions we have given ensure that the capital structure decision at date 0 has no effect on (i) the optimal capital structure at date 1, (ii) the choice of the date 1 project, and (iii) the cash flow arising from the date 1 project. Given this, we now impose the condition that $\hat{D}_0^*$ is preferred by shareholders to D_1^{**} and R^T. This is the same as conditions (18) and (19) of the unobservable case, except

[30] This observable defection from the equilibrium is by the uninformed shareholders who set the debt level. Hence, it does not directly convey any information about managerial ability.

that D_1^{**} is replaced with $\hat{D}_0^{**}$, and D_1^* is replaced with $\hat{D}_0^*$. Therefore, we require

$$E_1[V_2^1 \mid \hat{D}_0^{**}] < E_1[V_2^1 \mid \hat{D}_0^*], \tag{26}$$

calculated algebraically in the Appendix, and

$$R^T\delta < R^G(1 - \tau)p_P + \tau\hat{D}_0^* p_P. \tag{27}$$

Since reputation raises the debt level that can be set without project distortion, $\hat{D}_0^* > D_1^*$ (as will be proved below), (27) is implied by (19).

The condition determining the debt level of $\hat{D}_0^*$ is that

$$E_0[V_1 \mid GR_0, B] + \alpha E_0[V_2^0 \mid GR_0, B] = E_0[V_1 \mid T_0, B] + \alpha E_0[V_2^0 \mid T_0, B]. \tag{28}$$

The expectations of (28) are calculated in the Appendix. Since $p_B > \delta$, the LHS is larger than the RHS, so $\hat{D}_0^* > \hat{D}_1^* = D_1^*$ as in the unobservable outcome case. The equity values after success and after failure are calculated in the Appendix.

The condition determining the debt level of $\hat{D}_0^{**}$ is

$$E_0[V_1 \mid GR_0, G] + \alpha E_0[V_2^0 \mid GR_0, G] = E_0[V_1 \mid T_0, G] + \alpha E_0[V_2^0 \mid T_0, G]. \tag{29}$$

These equity values are calculated in the Appendix.

In equilibrium, the shareholders' value arising from the date 0 project's cash flow, $E_0[V_2^0]$, is the RHS of (26). The $\hat{D}_0^*$ term above arises from reputation building, so that the firm can issue debt up to $\hat{D}_0^*$ rather than just D_0^* and have the manager still select GR_0 over T_0. By (23) and (24), it follows that total date 0 shareholder value is

$$\begin{aligned} V_0^{\text{Obs}} &\equiv E_0[V_2^0] + E_0[V_2^1] \\ &= 2R^G(1 - \tau)p_P + \tau\hat{D}_0^* p_P + \tau D_1^* p_P - 2. \end{aligned} \tag{30}$$

Comparing this with (20) in the *nonobservability* case, and recalling that $D_1^* = D_0^*$, we have

$$V_0^{\text{Obs}} - V_0^{\text{Unobs}} = \tau(\hat{D}_0^* - D_1^*)p_P. \tag{31}$$

Since $\hat{D}_0^* > D_1^*$, it follows that value increases when the outcome is observable. The reason is that reputation building allows the firm to raise the tax shield.[31]

[31] If a manager can be fired after failing, there will be a second reinforcing effect promoting higher shareholder value arising from the benefit of replacing a poorly performing manager.

The conclusion drawn from this discussion is summarized below. The proof, contained in the Appendix, consists of a numerical example that satisfies constraints (14), (18), (19), (25), (26), and (27).

Proposition 2. *In a levered firm with risky debt, reputation building by managers, which is detrimental ex post to the shareholders' interests, may be ex ante beneficial to the shareholders. That is, shareholders' wealth may be greater in the (subgame perfect) Nash equilibrium when they can observe project outcomes than in the (subgame perfect) Nash equilibrium when they cannot.*

This result stands in sharp contrast to Proposition 1. It is related to the well-known dissonance between ex ante and ex post optimality. For an unlevered firm, lack of project outcome observability (or granting the manager an outcome-insensitive wage contract) may be beneficial for the shareholders ex ante because it eliminates the manager's reputation-building incentive and thus avoids investment distortions. However, this ex ante efficiency gain is achieved at the expense of the cost to the firm of deviating from the ex post optimal rule of compensating the manager based on the revealed outcome (or perhaps of firing a manager who has failed).[32]

For a levered firm, the trade-off is different. Eliminating managerial reputation building increases the agency cost of debt by aligning the manager's interests with those of shareholders. Note that this alignment of interests is ex post beneficial for the shareholders in the sense that, once the debt is issued, the manager selects the project desired by the shareholders.[33] (If firing is possible, however, there will be an ex post loss from not being able to fire a manager who fails.) However, it is not ex ante efficient in the sense that the resultant increase in the agency cost of debt is absorbed by the shareholders at the time of debt issuance. The consequent lower optimal debt level brings with it a reduction in debt tax shield that, in conjunction with the loss induced by continuing with a possibly poor manager, may more than offset the gains from avoiding investment distortions. Thus, project outcome observability is likely to be wealth enhancing for the shareholders of a firm with risky debt.

[32] As argued earlier, we can view V_1 as representing the competitive wage that the firm must pay to keep the manager at date 1 based on the information about his ability revealed by the project outcome and reflected in the stock price. A manager will stay with the firm if the wage offered is at least as great as his wage in an alternative employment (assuming that the outside market obtains information about his ability) and will quit otherwise. Promising the manager a *fixed* wage at $t = 1$ will not be ex post optimal for the firm, because at date 1, the firm optimally should pay the manager the minimum needed to keep him from quitting, which is a function of the revealed outcome.

[33] "Ex post" here is at $t = 0$, but after debt is issued and the project choice is made. "Ex ante" here is also at $t = 0$, but before debt is issued and the project is selected. In Proposition 1, "ex post" is at $t = 1$, after the project cash flow is observed, and "ex ante" is at $t = 0$, before the project choice is made.

The beneficial effect of reputational incentives arises here from the ability of the firm to issue more debt. Since reputational considerations become less important as a manager ages, an empirical implication of the model is that, as a CEO approaches retirement, the cost of a firm's debt capital for a given level of debt will tend to rise, and the amount of new debt acquired by the firm will tend to decrease.[34] In the next section, we discuss further predictions from the analysis by relating reputational incentives to the threat of takeovers.

In this section, we have focused primarily on the case where the inferior project is riskier than the better project, so that reputational incentives are desirable for shareholders ex ante. Alternatively, the riskier project might be superior, or there could be several projects, with the best project having some intermediate level of risk. In either case, the conservatism induced by reputational incentives can be too strong, leading to the choice of an inferior safe project. Thus, even with debt, reputational incentives can make shareholders worse off ex ante. Nevertheless, if debt provides the manager with a greater incentive to choose excessive risk (to raise the long-run stock price), then the excessive reputational incentive for safety is less costly for a firm with high debt than one without debt. Thus, we maintain the prediction that factors that raise the importance of reputational incentives will be associated with a lower cost of debt capital and a higher level of debt.

3. Takeovers and Reputation Building

It has been alleged in the popular press that takeover threats promote excessive conservatism by managers. Our basic model without debt is consistent with this view, if hostile takeover attempts are viewed as representing an outside judgment by the acquirer about the ability of incumbent management to select desirable projects. The acquirer, using his time, money, and skill, may be able to form an expert assessment of the extent to which the projects selected by incumbent management have been successful. If so, then hostile takeovers may cause reputation-building incentives to tilt managers toward conservatism.

Consistent with this interpretation is the evidence of Mitchell and Lehn (1990) that firms whose previous acquisitions are evaluated negatively by investors frequently become targets of hostile takeovers in turn. This suggests that a manager contemplating at least one kind of investment project, an acquisition, may need to take into account

[34] Narayanan (1985) also relates project distortions to the strength of a manager's reputation incentives at different career stages.

not just risk-adjusted expected cash flows, but also the likelihood that failure could cost him his job.[35]

In the model with debt, we suggest that the reputation-building incentives arising from the threat of takeover may promote conservatism, but that this may be good for shareholders, owing to alleviation of the stockholder/bondholder conflict. Suppose that the firm's directors and the stock market in general cannot observe the success or failure of projects at $t = 1$. Then managers will not be concerned about reputation in the absence of a takeover threat, and, as a result of a lack of managerial reputation seeking, the optimal level of debt for the firm will be low.

Consider now a scenario in which takeovers are more likely, perhaps as a result of some financial innovation, such as junk bond financing. Now takeover activity increases and acquiring firms can find out, possibly at a cost, whether success or failure occurred. Hence, firms whose projects failed will be takeover targets, and so managers *will* be concerned about reputation. Thus, takeover threats increase debt usage by distorting investment policy toward lower risk. By the same token, golden parachutes and antitakeover measures will reduce leverage utilization. In general, there will be a trade-off between the costs of investment distortions that arise from reputation building (as described in Section 1) and the benefits of a greater ability to expand leverage (as in Section 2).

While the model implies that takeover threats will lead to higher debt, takeover threats should also lead to a higher market value of the firm because of the improvement in project choices induced by such threats. Thus, while the model predicts a higher ratio of debt to book value of assets (or to current cash flows), it does not necessarily imply a higher ratio of debt to market value of assets. Thus, the model is consistent with the evidence discussed in note 11 about shifts in leverage during the 1980s, a period of increasing hostile takeover activity.

The analysis further suggests that, when the cost of hostile takeovers falls, investment conservatism and increased debt levels should be greatest in industries with high risk,[36] and in which capital investments are recovered only after long delay. This is because high risk

[35] Just as a poor takeover can cost a manager his job, a successful takeover can reduce a manager's likelihood of being removed. However, our argument is that after a plan for acquisition is announced, failure will often become apparent fairly quickly, often resulting either in divestiture or in cancellation of the strategies or projects associated with the acquisition. For takeovers that are not immediate and evident failures, however, the degree of success may still be very uncertain. Thus, the manager's personal downside risk associated with a takeover gone sour may outweigh his possible upside gain from success, even for a takeover that is ex ante desirable for shareholders.

[36] A positive association between leverage and risk also arises in Shah and Thakor (1987), although for a different reason.

and slow recovery of investment maximize the asymmetry of information between managers and outsiders about the future cash flows of the firm in the event of project success. For example, these tendencies should be particularly strong when takeover threats increase in industries with high R&D investments, such as chemical and pharmaceutical firms.[37]

An interesting aspect of our analysis is that the threat of takeovers, by removing a threat of expropriation, is an *aid* to ex ante contracting. This contrasts with an argument of Shleifer and Summers (1988). They point out that takeovers can be a means of breaching the trust of stakeholders of the firm, such as workers, who expected the old management to promote their welfare at the expense of the ex post welfare of stockholders. They further emphasize that the ability of management to make credible commitments to stakeholders is impaired by the possibility of takeover. By limiting the extent to which stakeholders are willing to make firm-specific investments, takeovers may therefore make shareholders as well as the other stakeholders worse off ex ante.

Our argument in this article, though phrased in terms of debt, would also apply to the stakeholder claims discussed by Shleifer and Summers, to the extent that these claims are debt-like in having bounded upside risk. Examples of such claimants are the recipients of a computer firm's commitment to support a system with compatible upgrades, consumers of service provided by an equipment firm, and the employees of a firm. Such claimants are expropriated if, after contracting, the firm switches to an investment policy with higher-than-foreseen risk.[38] Our analysis suggests that, because of managerial reputation building, implicit contracting with stakeholders may sometimes be *facilitated* by takeover activity.[39]

[37] An interesting case is Henry Wendt, President of SmithKline Beckman Corporation, which announced a surprise drop in the firm's sales in June 1988. "Now, the 55-year-old Mr. Wendt is fighting for his corporate life amid charges that SmithKline has stumbled as it prepared for the day when the Tagamet gusher would taper off. An ambitious research effort has failed so far to yield another blockbuster drug. . . . The upshot: The eighth-largest U.S. drug company, with a market value of $6.5 billion, has become a takeover candidate" (*Wall Street Journal,* December 13, 1988). In an effort to avoid takeover, the firm spun off its Beckman Instruments unit, but takeover rumors have continued. "SmithKline has been slow to develop new drugs to boost earnings, and analysts don't see any 'superdrugs' in the wings. . . . It must either do more serious restructuring quickly or run the risk of being gobbled up by a larger company" (*Business Week,* January 23, 1989).

[38] Titman (1984) analyzed this agency problem.

[39] Brander and Poitevin (1989) have shown that managerial compensation contracts may be written to encourage managers to favor safety, in order to mitigate the debt–equity agency problem. Our analysis suggests that reputational effects can sometimes work to the same effect, reducing or eliminating the need for such contracts.

4. Conclusion

We have analyzed a model of managerial reputation building and project choice, and have derived implications for the firm's optimal capital structure and the real and financial effects of takeover activity. Our principal results are listed below.

(1) In an unlevered firm, ceteris paribus, managerial reputation building can cause excessive conservatism in investment policy relative to the shareholders' optimum.

(2) In a levered firm, managerial reputation building helps reduce the agency cost of risky debt, and thus results in a higher debt–equity ratio relative to a nonreputational equilibrium.

(3) Increased takeover activity can increase a *firm's* optimal debt–equity ratio even when debt is *not* exploited by the incumbent management as a takeover defense. This increased leverage is optimal for the shareholders.

(4) A firm that adopts antitakeover measures will find it optimal to employ less leverage than an "unprotected" firm. However, offsetting the reduced debt tax shield will be a more efficient choice of investments by the manager.

(5) Managerial wages in levered firms will be relatively more sensitive to firm performance than in unlevered firms.

(6) As a firm's top manager approaches retirement, the firm will progressively reduce the amount of new debt that it acquires.

While our model is stylized, the results are robust with respect to a number of possible variations. The model may be extended to accommodate arbitrary (continuous) probability density functions for project cash flows, more than two time periods, or more than two types of managers, without altering the qualitative implications of the analysis.

On the other hand, our conclusion that conservatism can be good for shareholders is necessarily conditional. The reputational incentive favoring debt under observability may be too strong, tilting the manager toward such extreme conservatism that shareholders are hurt ex ante, reducing firm value. Whether this is the case will depend on the available menu of projects. For example, with debt, if the safer project is worse (e.g., if the available projects were *SM* and *GR*), then managerial conservatism is still bad for shareholders. Therefore, we do not claim that reputational effects will be desirable regardless of the attributes of firms and their managers. Rather, our principal conclusion is that in a firm with delegated decision-making, corporate capital structure choice depends on the career concerns of top management. This reinforces the observation in earlier articles [e.g., Broadman (1989) and Gibbons and Murphy (1992)] that the career

concerns of top managers influence the design of optimal incentive contracts and corporate resistance to takeovers. Our results suggest that it may be fruitful to investigate empirically how corporate leverage ratios vary cross-sectionally and over time in relation to the reputational incentives of managers.

Appendix

A.1 Numerical example illustrating harmful reputational incentives

We first provide a numerical example for Section 1 that illustrates that reputation incentives can reduce firm value by causing bad managers to select excessively safe projects. Let

$$R^S = 11, \qquad R^G = 16,$$
$$\gamma_G = .6, \qquad \gamma_B = .4,$$
$$p_G = .9, \qquad p_B = .5,$$
$$\tau = 0.05, \qquad q = 0.65, \qquad \alpha = 1.$$

These parameter values lead to constraints (2), (3), and (13) being satisfied.

A.2 Detailed calculations of the model with debt

The probabilities in this section are calculated directly as

$$\begin{aligned}
\gamma_G^S &\equiv \Pr(G \mid S_1) = p_G\gamma_G/p_P &&\equiv 1 - \gamma_B^S,\\
\gamma_G^F &\equiv \Pr(G \mid F_1) = (1 - p_G)\gamma_G/(1 - p_P) &&\equiv 1 - \gamma_B^F,\\
\gamma_G^{S**} &\equiv \Pr(G \mid S_1) = p_G\gamma_G/p_P^{**} &&\equiv 1 - \gamma_B^{S**},\\
\gamma_G^{F**} &\equiv \Pr(G \mid F_1) = (1 - p_G)\gamma_G/(1 - p_P^{**}) &&\equiv 1 - \gamma_B^{F**}.
\end{aligned}$$

Let

$$\begin{aligned}
p_P^F &\equiv \Pr(S_2 \mid F_1) = \gamma_G^F p_G + \gamma_B^F p_B,\\
p_P^S &\equiv \Pr(S_2 \mid S_1) = \gamma_G^S p_G + \gamma_B^S p_B,\\
p_P^{F**} &\equiv \Pr(S_2 \mid F_1) = \gamma_G^{F**} p_G + \gamma_B^{F**} p_B,\\
p_P^{S**} &\equiv \Pr(S_2 \mid S_1) = \gamma_G^{S**} p_G + \gamma_B^{S**} p_B.
\end{aligned}$$

A.2.1 Unobservable case. When the outcome is unobservable, the indifference level of debt for a good manager between T and GR,

D_1^{**}, is found by setting

$$E_1[V_2^1 \mid GR_1, G] = E_1[V_2^1 \mid T_1, G].$$

Substituting for these expected values gives

$$D_1^{**} = (R^G p_G - R^T\delta)/(p_G - \delta) > D_1^* \tag{A1}$$

by (17).

Condition (18) becomes

$$(R^G - D_1^{**})(1-\tau)p_P^{**} + (R^T - R^G)(1-\tau)\gamma_B\delta - (1 - D_1^{**}p_P^{**}) < R^G(1-\tau)p_P + \tau D_1^* p_P - 1.$$

A.2.2 Observable case. In the observable case, condition (21) becomes

$$(R^G - D_1^{**})(1-\tau)p_P^{S**} + (R^T - R^G)(1-\delta)\gamma_B^S\delta - (1 - D_1^{**}p_P^{S**}) < R^G(1-\tau)p_P^S + \tau D_1^* p_P^S.$$

We verify Equation (24) as follows:

$$\begin{aligned} E_0[V_2^1] &\equiv p_P E_1[V_2^1 \mid S_1] + (1-p_P)E_1[V_2^1 \mid F_1] \\ &= R^G(1-\tau)[p_P p_P^S + (1-p_P)p_P^F] \\ &\quad + \tau D_1^*[p_P p_P^S + (1-p_P)p_P^F] - 1 \\ &= R^G(1-\tau)p_P + \tau D_1^* p_P - 1, \end{aligned}$$

where the last equality obtains because

$$p_P = p_P p_P^S + (1-p_P)p_P^F,$$

that is,

$$\Pr(S_2) = \Pr(S_1)\Pr(S_2 \mid S_1) + \Pr(F_1)\Pr(S_2 \mid F_1).$$

Condition (25) becomes

$$\begin{aligned} &(R^G - D_1^{**})(1-\tau)p_P^{S**} \\ &\quad + (R^T - R^G)(1-\delta)\gamma_B^{S**}\delta - (1 - D_1^{**}p_P^{S**}) \\ &\quad < [R^G(1-\tau) + \tau D_1^*]p_P^{S**}. \end{aligned}$$

Condition (26) becomes

$$(R^G - \hat{D}_0^{**})(1-\tau)p_P^{**} + (R^T - R^G)(1-\tau)\gamma_B\delta - (1 - \hat{D}_0^{**}p_P^{**}) < R^G(1-\tau)p_P + \tau\hat{D}_0^* p_P - 1.$$

Condition (28) becomes

$$p_B V_1(S_1) + (1 - p_B) V_1(F_1) + \alpha[(R^G - \hat{D}_0^*)(1 - \tau)p_B + \hat{D}_0^* p_P - 1]$$
$$= \delta V_1(S_1) + (1 - \delta) V_1(F_1)$$
$$+ \alpha[(R^T - \hat{D}_0^*)(1 - \tau)\delta + \hat{D}_0^* p_P - 1].$$

Condition (29) becomes

$$p_G V_1(S_1, \hat{D}_0^{**}) + (1 - p_G) V_1(F_1, \hat{D}_0^{**})$$
$$+ \alpha[\{R^G - \hat{D}_0^*\}(1 - \tau)p_G + \hat{D}_0^{**} p_G - 1]$$
$$= \delta V_1(S_1, \hat{D}_0^{**}) + (1 - \delta) V_1(F_1, \hat{D}_0^{**})$$
$$+ \alpha[(R^T - \hat{D}_0^{**})(1 - \tau)\delta$$
$$+ \hat{D}_0^{**}(\gamma_B \delta + \gamma_G p_G) - 1].$$

Here $V_1(S_1, \hat{D}_0^{**})$ and $V_1(F_1, \hat{D}_0^{**})$ depend on investors' inference from success or failure about whether it arose from a good manager choosing *GR* or a bad manager choosing *T*.

A.3 Numerical example illustrating beneficial reputational incentives

The equity values in (28) after success and failure are

$$V_1(S_1) = -2 + R^G(1 - \tau) + R^G(1 - \tau)p_P^S + \tau\hat{D}_0^* + p_P^S \tau \hat{D}_1^*,$$
$$V_1(F_1) = -2 + R^G(1 - \tau)p_P^F + p_P^F \tau \hat{D}_1^*.$$

The equity values in (29) are

$$V_1(S_1, \hat{D}_0^{**}) = -2 + R^G(1 - \tau)\gamma_G^{S**} + R^T(1 - \tau)\gamma_B^{S**}$$
$$+ \tau\hat{D}_0^{**} + R^G(1 - \tau)p_P^{S**} + p_P^{S**}\tau\hat{D}_1^*,$$
$$V_1(F_1, \hat{D}_0^{**}) = -2 + R^G(1 - \tau)p_P^{F**} + p_P^{F**}\tau\hat{D}_1^*.$$

In addition to the numerical values assumed before, let $R^T = 21$ and $\delta = 0.15$. These parameter values lead to the constraints (14), (18), (19), (22), (25), (26), and (27) being satisfied.

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