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STAKEHOLDERS, TRANSPARENCY AND CAPITAL STRUCTURE

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ABSTRACT

Firms that are more highly levered are forced to raise capital more often, a process that generates information about them. Of course transparency can improve the allocation of capital. However, when the information about the firm affects the terms under which the firm transacts with its customers and employees, transparency can have an offsetting negative effect. Under relatively general conditions, good news improves these terms of trade less than bad news worsens them, implying that increased transparency can lower firm value. In addition, we show that transparency can reduce the incentives of firms and stakeholders to undertake relationship specific investments. The negative effects of transparency can lead firms to pass up positive NPV investments that require external funding and to choose more conservative capital structures that they would otherwise choose. These effects should be especially important for technology firms that require a reputation for being on the "leading edge."

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1 Introduction

The transparency of a firm is often defined as the extent to which outsiders can evaluate the firm's operations. In some situations it is beneficial for firms to be transparent and invite the scrutiny of outsiders. However, as we stress in this paper, this is not always the case. Specifically, we show that when a firm's prospects depend on its long-term relationships with its stakeholders, external scrutiny can create costs that reduce firm value.

This paper explores the interaction of two ideas. The first idea is that there is a fundamental linkage between capital structure and transparency. Specifically, since more levered firms require more frequent access to external capital markets, they are subject to greater market scrutiny. The second idea is that if the success of a firm is related to the stakeholders' perception of the firm, (i.e., the firm's "image"), then influencing the process by which information about the firm is generated (i.e., how the firm's image is formed) becomes important to the firm. As we argue, firms that are more conservatively financed are better able to accomplish this objective.

To understand the importance of stakeholders' perceptions, and the link between capital structure and market scrutiny, consider the situation at Enron in the year leading up to its bankruptcy. In 2001, Enron was ranked by Fortune magazine as the 22nd best company to work for and was perceived to be the market leader. Given their favorable image, Enron was able to attract top graduates who were willing to toil long hours to gain the experience that one can only acquire by working with the very best.[1] However, Enron was also very highly levered and in the fall of 2002, after experiencing downturns in a number of its business units, they needed to raise

[1] In the 'Vision and Values' video that Enron sent to its new recruits, Jeff Skilling, at the time Enron's CEO, promised the workers that: "when you work for Enron you are going to see the newest thing, the newest products, the newest services, the newest way to think about things," (taken from Swartz and Watkins, (2003)).

substantial amounts of external capital. During its attempt to raise capital it became apparent that Enron's organization was deeply flawed. At this point, an association with Enron became a liability, making it difficult for Enron to keep workers and other stakeholders as committed to the firm as they were before. Perhaps, the subsequent implosion of Enron would have occurred in any event. However, personnel problems, as well as problems with other stakeholders, that were caused by the revelation of negative information about the firm, certainly hastened their demise.

Anecdotal evidence suggests that the link between the process by which firms raise external capital, and the extent to which their firms are scrutinized, plays an important role in determining firms' financing choices. For example, a recent Wall Street Journal article states that, despite the opportunity to save on financing costs, many firms avoided refinancing their debt following the recent drop in interest rates because of these concerns:

> "This year's spate of accounting and other governance scandals has meant that many companies are afraid to simply test the waters: even if a company wants to shoot for a lower rate, cutting its financing costs in the process, a bond deal that goes awry could have a damaging ripple effect, raising questions about a company's financial health and potentially weighing on its stock price at a time when investors are particularly punishing."[2]

To better understand the costs associated with scrutiny, and its link to the capital structure choice, we develop a model that allows us to analyze how transparency affects (i) the firm's cost of retaining its workers, (ii) the firm's incentives to make relationship specific investments, and (iii) the employees incentive to exert effort.[3]

[2]From "The Refinancing Boom Hasn't Hit Corporations" by Craig Karmin, published in WSJ 10/15/2002. In the article, the head of the U.S. capital markets at Credit Suisse First Boston declares: "chief financial officers are saying for a relatively small amount of savings, 'I don't want to expose myself to that risk.'"

[3]Although our argument applies to a broad range of stakeholders, for concreteness, our focus is primarily on employees. In Section 8, we explicitly discuss of how the arguments can be extended to the relationship of the firm with other stakeholders.

Specifically we consider a setting where a firm employs workers of different (and unobservable) types. Some workers develop marketable human capital by working for leading firms, and hence are willing to substitute monetary compensation for on-the-job training. Others, however, are unable to either develop or market their human capital, and hence only respond to monetary incentives. In this setting, the information that is generated from, say, an equity issue may reveal that the firm is not longer an industry leader, which would make the firm a less attractive employer for those workers who benefit from the experience of working for a leading firm. Of course, on the positive side, market scrutiny may reveal information that enhances the firm's image, which would make it easier to retain these employees. However, as it turns out, because not all workers benefit from working for a leader, the benefits of potential salary reductions do not fully offset the costs of potential salary increases. Hence, on average, the news generated by the equity issue increases the firm's expected employment costs and thereby reduces firm value.

Building on the basic intuition that the revelation of information can affect the firm's relation with its stakeholders, we show that transparency and hence, high leverage, can be especially costly when: (i) the human capital development of certain workers (and hence the cost of retaining them) depend on (non-contractible) investments that the firm must make, (ii) worker effort is an essential input and workers devote less effort if they believe that their employer may no longer be a leader, and (iii) firms have investment opportunities that require external financing. In this last case, to avoid the cost of information revelation that arises when raising external financing, firms may choose to pass up positive NPV investments.

Our analysis is related to several strands of the literature. First, our assumption that raising external capital subjects firms to more scrutiny is consistent with empirical studies of the equity issue process. For example, Hansen and Torregrosa

(1992) provide evidence of underwriters' monitoring in equity offerings that is consistent with information production by underwriters as part of their "due diligence." More recently, Altinkiliç and Hansen (2003 forthcoming) provide evidence that the process of pricing and underwriting secondary equity offers increases volatility around the issue, suggesting that information is being generated about the offering firm. In addition, Gibson et al. (2003 forthcoming) present evidence that institutions, which tend to acquire information prior to making additions to their portfolios, increase their holdings around secondary equity offerings.

There is also a large theoretical literature on the effect of transparency on firm value in general,[4] as well as a more specific literature that examines the link between capital structure and information generation. In particular, Easterbrook (1984) argues that firms that are forced to pay out a higher fraction of their cash flow are subject to greater scrutiny because of their need to access external capital, and that such a scrutiny benefits firms by reducing agency problems between shareholders and managers.[5] The scrutiny associated with the refinancing or renegotiation of existing debt is also implicit in Jensen's (1986) free cash flow argument, which states that high leverage makes it more difficult to undertake negative-NPV investments that cannot be financed internally.[6] Holmstrom and Tirole (1993), who consider the relationship between capital structure and the liquidity of the firm's securities, also examine how different capital structures produce different incentives for the production of information about a firm.[7] In contrast to our model, the above papers suggest that greater transparency improves firm value. However, Perotti and von Thadden (2000) provide

[4]For a recent survey on this literature see Verrecchia (2001) and the comments by Dye (2001).

[5]Similarly, since more transparent firms are likely to be more efficiently priced, they are also likely to make better investment choices and thus be more valuable on average. See, for example, Subrahmanyam and Titman (1999).

[6]See also Hart and Moore (1995).

[7]The trade-offs involved in the choice between more and less liquid securities is also analyzed by Boot and Thakor (1993) and Fulghieri and Lukin (2001).

a model with costs associated with making a firm's strategies more transparent to its competitors, which also has the implication that firms have an incentive to make financing choices that limit transparency.[8]

In addition, although the logic of our argument is very different, we share a number of implications with Myers and Majluf (1984). In particular, the Myers and Majluf model also suggests that highly levered firms that require external equity issues may pass up positive NPV investments. In contrast to Myers and Majluf, where firms pass up equity issues because of adverse selection problems, firms pass up equity issues in our model because the information generated by an equity issue can actually destroy value. As Dybvig and Zender (1991) and Hart (1993) have discussed, an explicit commitment by firms to issue equity would solve the underinvestment problem in Myers and Majluf. However, in our model, unless such a commitment can be designed to avoid scrutiny, it will not eliminate the incentives to be conservatively financed.[9]

The rest of the paper is organized as follows. Section 2 describes the economic setting. The basic model is developed and analyzed in Sections 3 and 4. In Section 5 we consider the richer case in which the firm controls both its capital structure and an investment that increases the value of its workers' relationship with the firm. Section 6 analyzes the interaction between transparency and endogenous effort decisions by the workers. Section 7 shows how concerns about transparency can generate an underinvestment problem. Section 8 discusses the implications and some alternative interpretations of the results and Section 9 concludes the paper. In the appendix, we discuss the robustness of our findings to a richer contracting environment, i.e., long-term contracts.

[8]Teoh (1997) also considers a setting in which greater transparency can reduce firm value.
[9]See Section 7 for further discussion on this issue.

2 The economic setting

Consider a firm that operates in a risk-neutral economy where the market rate of return is normalized to zero. There are four relevant dates in the life of the firm, $t = 0, 1, 2, 3$. The firm chooses its capital structure at $t = 0$. It hires its workers at $t = 1$ and provides them with some firm-specific training that makes them irreplaceable in future dates. At $t = 2$ the workers recontract with the firm. If all workers are retained, the firm generates a revenue of Y at $t = 3$ while if it retains a fraction $0 < \eta < 1$ of them the firm produces the corresponding output fraction ηY.[10]

The workers are hired at $t = 1$ from a population of ex-ante identical workers with a reservation utility $\overline{U} \geq 0$. The workers do not know their type when they are hired but privately learn this information during their training. Specifically, a proportion μ of the workers, which we call *quick learners,* will have at $t = 2$ a reservation utility U_h. The remaining proportion $(1 - \mu)$, which we call *slow learners,* will have at $t = 2$ a reservation utility, U_l. We denote by ΔU the quick learners' reservation utility premium, $U_h - U_l > 0$, and assume, for simplicity, that workers are equally productive within the firm.

An additional important difference between worker types is that quick learners benefit from working for leading firms (henceforth, leaders) by obtaining an additional *experience gain* of z. Intuitively, we think of a leader as a firm which sets the future technological and organizational standards for its industry and hence has the potential to provide its workers with an especially valuable experience. In contrast, we assume that non-leading firms (henceforth, losers) provide no experience gains to any of its workers (quick or slow learners) and that slow learners obtain no experience gains even if they work for a leader. The size of the experience gain z is determined by

[10] As explained later, Y is the revenue of an all-equity firm net of potential benefits from leverage.

non-verifiable investments (e.g., R&D activities) that cost the firm $C(z)$, with $C' > 0$, $C'' > 0$, and occur after workers have been hired.

The firm chooses an initial capital structure at $t = 0$, that we denote d. We assume that firms with higher leverage ratios are more likely to require external financing before $t = 2$. The idea is that firms that are required to pay out more of their earnings to debtholders are more likely to realize a financial shortfall. To conserve on notation, we also denote d as the probability that the firm will raise external capital at $t = 2$.

Initially, the firm has a probability γ of being a leader and a probability $1 - \gamma$ of not being a leader. We assume that if the firm raises capital at $t = 2$, information is generated that allows both workers and the entrepreneur to update these probabilities. Hence, with a probability d, the firm's type is revealed to all parties right at $t = 2$, while with a probability $1 - d$, the firm's type is not revealed until $t = 3$.

Workers have no wealth and enjoy limited liability so the wages w_1 and w_2 that they obtain at $t = 1$ at $t = 2$, respectively, must be non-negative. We assume that the firm interacts with its workers through spot labor markets where workers commit their labor and wages are set for just one period.[11] So a worker hired at $t = 1$ is free to leave the firm at $t = 2$ and the firm is free to lay off its workers. However, the firm needs its workers to produce and, assuming that $\mu Y > \Delta U + \mu U_l$ and $(1 - \mu)Y > U_l - \mu U_h + \mu z$, it will find it optimal to make wage offers at $t = 2$ that are sufficient to induce all workers to stay.[12] The stated assumptions essentially require that the additional revenues generated by the workers are large relative to their reservation utilities and both types of workers are present in the population in

[11] In the appendix, we explore how long-term contracts would affect our results.

[12] The worker retention problem is similar to the screening problem of a monopolist who faces customers of two unobservable types and finds it profitable to serve both of them at uniform prices. See Maskin and Riley (1984).

non-negligible proportions.[13]

Finally, we capture the standard advantages and disadvantages of leverage by postulating that debt adds some net benefits $X(d)$ to the firm's potential revenue Y.[14] Consistent with the traditional *trade-off theories* of capital structure, we assume that $X(d)$ is a single-peaked function that reaches a maximum for some interior value d^* of the leverage ratio.[15]

The sequence of events in the model that we have just described is summarized in Figure 1.

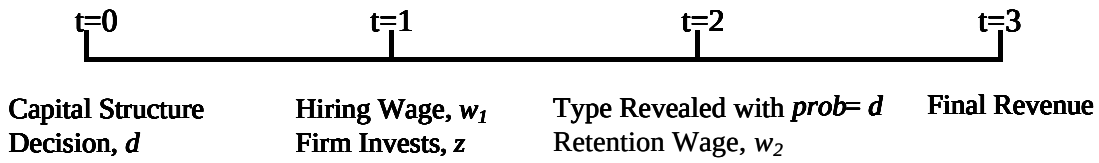

Figure 1: Sequence of Events.

3 Capital structure and retention wages

We start by considering the wage that the firm must offer to retain both types of workers at date 2. To examine the advantages and disadvantages of transparency, we compare the wage when the firm's type is not revealed, with the *expected* wage when the firm's type is revealed. As we show, the wage that allows the firm to retain both types of worker provides one of the two types with rents, the size of which depends on whether or not the firm's type is revealed.

[13]For a non-leading firm, retaining all worker types rather than only the slow learners pushes the wage bill up to μU_{h} (to retain the quick learners), giving an additional compensation of $(1-\mu)(U_{\mathsf{h}}-U_{\mathsf{l}})$ to the slow learners. Similarly, for a leading firm, retaining all workers rather than only the quick learners pushes the wage bill up to $(1-\mu)U_{\mathsf{l}}$ (to retain the slow learners), giving an additional compensation of $\mu[U_{\mathsf{l}}-(U_{\mathsf{h}}-z)]$ to the quick learners.

[14]So Y represents the revenue of an all-equity firm while $X(d)$ is the incremental revenue (net of financial distress costs) due to the positive (tax-related or incentive-related) effects of leverage.

[15]To guarantee that $d^* \in (0,1)$, we assume $X'(1) \leq 0 \leq X'(0)$ and $X'' < 0$.

3.1 Retention wages

Three possible states can occur at $t = 2$: what we call the *opaque* state in which the firm's type remains unknown ($s = u$), and the *transparent* states, in which the firm is revealed to be a leader ($s = g$) or a loser ($s = b$). If the firm's type is not revealed, the minimum wage required to retain both types of worker is

$$w^u = \max\{U_l, U_h - \gamma z\}, \tag{1}$$

where U_l is the minimum wage required to retain a slow learner (his reservation utility) and $U_h - \gamma z$ is the minimum wage required to retain a quick learner (his reservation utility minus the expected experience gain).

If the firm is revealed to be a leader, the wage required to retain both types is

$$w^g = \max\{U_l, U_h - z\} \tag{2}$$

where the wage required to retain a slow learner is again U_l, but the wage required to retain a quick learner is now $U_h - z$ since, due to transparency, a quick learner is now certain about his experience gain, z.

Finally, if the firm is revealed to be a loser, the minimum wage that retains both worker types is

$$w^b = \max\{U_l, U_h\} = U_h, \tag{3}$$

since, due to transparency, a quick learner knows that his experience gain will be zero.

Clearly, the required wage is lower when the firm is revealed to be a leader rather than a loser ($w^g < w^b$) and when its type remains unknown rather than revealed as a loser ($w^u < w^b$). Moreover, $w^g \leq w^u$, where this inequality holds strictly when $\Delta U > \gamma z$. To understand this last result, note that:

1. If $\Delta U \leq \gamma z$, the opaque firm is attractive enough to the quick learner so that the retention wage is the reservation utility of a slow learner. Hence $w^g = w^u = U_l$.

2. If $\gamma z < \Delta U < z$, the retention wage of a leading firm is determined by the reservation wage of a slow learner, but that of a opaque firm is determined by the reservation wage of a quick learner. Hence $w^g = U_l$ and $w^u = U_h - \gamma z$, which implies that $w^g < w^u$.

3. If $\Delta U \geq z$, retaining a quick learner is always more difficult than retaining a slow learner. Hence $w^g = U_h - z$ and $w^u = U_h - \gamma z$, which also implies $w^g < w^u$.

Intuitively, if there is only one type of worker, the expected wage paid by a firm that is transparent equals the wage paid by a firm that is opaque. However, with multiple type workers, this need not be the case, since at least one of the types earn rents in each of the three possible states, and as we show, the expected value of these rents is higher for a transparent firm.

3.2 Expected labor retention costs

Let $w_2(d)$ denote the firm's expected retention wage as a function of the firm's leverage ratio that, under our assumptions, is measured by the probability d that the firm's type is disclosed at $t = 2$. Clearly,

$$w_2(d) = d[\gamma w^g + (1 - \gamma)w^b] + (1 - d)w^u,$$

where the expressions for w^g, w^b, and w^u, given above, lead to the following lemma:

Lemma 1 *The expected retention wage is given by*

$$w_2(d) = \begin{cases} U_l + (1 - \gamma)\Delta U d, & \text{if } \Delta U \leq \gamma z, \\ U_h - \gamma z + \gamma(z - \Delta U)d, & \text{if } \gamma z < \Delta U < z, \\ U_h - \gamma z, & \text{if } \Delta U \geq z. \end{cases} \tag{4}$$

Hence, the expected labor retention costs per worker are either independent of (if $\Delta U \leq \gamma z$) or increasing in (if $\Delta U > \gamma z$) the firm´s leverage ratio d.

In words, when the quick learners' reservation utility premium exceeds their potential experience gains (i.e., $\Delta U \geq z$), retention wages are driven by the requirements of the quick learners in all three possible states. Specifically, the expected wage across transparent states, $\gamma w^g + (1-\gamma)w^b = U_h - \gamma z$, equals the wage required in the opaque state, $w^u = U_h - \gamma z$, hence the expected retention costs are *independent* of the firm's transparency. However, when z is sufficiently high, slow learners become the most costly workers to retain in the opaque as well as the good state.[16] When this is the case, the retention wage paid in the opaque state, w^u, is strictly lower than the expected retention wage paid across transparent states, $\gamma w^g + (1-\gamma)w^b$. Due to the shift in the worker type whose wage requirement binds for the determination of the retention wage, the additional compensation that the firm must incur when bad news about its type is revealed ($s = b$) is not fully compensated by the wage reduction in case of good news ($s = g$). Thus, on average, labor retention costs are *smaller* if the firm's type is not revealed.

4 Capital structure and total labor costs

The analysis in the previous section shows that the workers of one of the two types earn rents at $t = 2$. This does not necessarily imply that workers expect to earn rents throughout their entire relationship with the firm. Indeed, as we show below, if the workers' wealth constraints are not binding, they will offset their expected rents at

[16] In particular, w^{u} reflects the requirement of just one type—slow learners if $\Delta U < \gamma z$ and quick learners if $\gamma z < \Delta U < z$. Instead, $\gamma w^{\mathsf{g}} + (1-\gamma)w^{\mathsf{b}}$ mixes the requirements of both worker types since w^{g} is always driven by the requirements of slow learners and w^{b} is always driven by the requirements of quick learners.

$t = 2$ by accepting a lower wage at $t = 1$. In this case, transparency need not directly affect total expected wages and, thereby, need not distort the leverage decision d.

4.1 Total labor costs

Let $w_1(d)$ denote the wage offered by the firm to the workers at $t = 1$. As forward-looking workers anticipate the rents that they may obtain at $t = 2$, $w_1(d)$ must satisfy:

$$w_1(d) + [w_2(d) + \mu\gamma z] - (U_l + \mu\Delta U) \geq \overline{U}, \tag{5}$$

where the term in brackets accounts for the expected wage and experience gains obtained at $t = 2$, and the term in parenthesis reflects a worker's expected reservation utility at that date.[17] The difference between the terms in brackets and parentheses, which is always positive, measures the rents that workers obtain at $t = 2$, as a result of asymmetric information about their types.

According to (4), depending on the size of ΔU relative to γz and z, we should distinguish three different parametric regimes. To simplify the presentation, we will focus on the intermediate regime, with $\Delta U \in (\gamma z, z)$, which is the richest one in that the expected retention wage is affected by both the leverage ratio d and the size of the experience gain z:[18]

$$w_2(d) = U_h - \gamma z + \gamma(z - \Delta U)d. \tag{6}$$

Under (6), the minimum value of $w_1(d)$ that satisfies (5) is given by

$$\widehat{w}_1(d) = \overline{U} - (1 - \mu)(\Delta U - \gamma z) - \gamma(z - \Delta U)d, \tag{7}$$

[17] We assume that all workers, irrespectively of being hired by the firm or not, learn their type and, thus, their continuation reservation utility before $t = 2$. The experience gains that quick learners may obtain in other firms (if any) are implicitly included in $U_{\mathtt{h}}$.

[18] Notice that in the other two cases either d or z have no effect on the expected retention wage.

which shows that the expectation of rents at $t = 2$ makes the worker willing to accept a wage at $t = 1$ lower than his reservation utility at that date, $\overline{U}$. Such a wage is decreasing in d because leverage increases the firm's transparency and this, in turn, increases the expected retention wage.

If $\widehat{w}_1(d) \geq 0$, the workers' wealth constraints (that is, the requirement of $w_1 \geq 0$) are not binding and (5) can hold with equality, so the firm's total labor costs per worker are

$$W(d) = \widehat{w}_1(d) + w_2(d) = \overline{U} + (U_l + \mu\Delta U) - \mu\gamma z \equiv \overline{w}.$$

Basically, $\overline{w}$ is the workers' average reservation utility net of expected experience gains, which does not depend on d. However, if $\widehat{w}_1(d) < 0$, then the wealth constraint is binding, so $w_1(d) = 0$ and the firm's total labor costs per worker are $W(d) = w_2(d)$. In this case, the workers earn rents, and these rents are increasing in d (recall Lemma 1). More formally, from (7), we can distinguish three cases:

1. If $\overline{U} - (1-\mu)(\Delta U - \gamma z) \leq 0$, then, for all d, $\widehat{w}_1(d) \leq 0$ and $W(d) = w_2(d)$.

2. If $0 < \overline{U} - (1-\mu)(\Delta U - \gamma z) < \gamma(z - \Delta U)$, then there exists some

$$\overline{d} \equiv \frac{\overline{U} - (1-\mu)(\Delta U - \gamma z)}{\gamma(z - \Delta U)} \in (0,1) \tag{8}$$

   such that $\widehat{w}_1(d) \geq 0$ so $W(d) = \overline{w}$ for $d \leq \overline{d}$, while $\widehat{w}_1(d) < 0$ so $W(d) = w_2(d)$ for $d > \overline{d}$.

3. If $\overline{U} - (1-\mu)(\Delta U - \gamma z) \geq \gamma(z - \Delta U)$, then, for all d, $\widehat{w}_1(d) > 0$ and $W(d) = \overline{w}$.

In words, in Case 1 the workers' reservation utility is so small that even if the firm is totally opaque ($d = 0$), their wealth constraint is binding and they extract rents from the firm. Case 3 corresponds to the opposite situation: the workers' reservation utility is so large that even a fully transparent firm ($d = 1$) necessitates a positive

initial wage to attract workers to the firm (and workers receive no rents from the firm). In Case 2, the intermediate situation occurs: workers receive rents for high leverage ratios ($d > \overline{d}$), but not for low ones ($d \leq \overline{d}$). This discussion can be summarized as follows:

Proposition 1 *The total expected labor costs per worker are given by* $W(d) = \max\{\overline{w}, w_2(d)\}$, *which is* increasing *in the firm's leverage ratio* d *when the workers' wealth constraint is binding and, otherwise, is independent of* d.

4.2 The capital structure choice

At $t = 0$, if the number of workers hired by the firm is normalized to one, the present value of its revenue plus the other net benefits of debt financing, net of the total expected labor costs is

$$V(d) \equiv Y + X(d) - W(d). \tag{9}$$

Thus, except if $d = \overline{d}$, in which case $W(d)$ is non-differentiable, the firm's optimal leverage ratio solves the first order condition:

$$X'(d) = W'(d), \tag{10}$$

which states that the "traditional" marginal benefits from leverage, $X'(d)$, must equal its marginal cost due to greater transparency, $W'(d)$.

The form of $W(d)$ allows us to distinguish three cases:

1. $d < \overline{d}$. In this case, we have $W(d) = \overline{w}$ so (10) becomes $X'(d) = 0$, whose solution is $d = d^*$. Hence if $d^* < \overline{d}$, the firm's optimal leverage ratio is d^*, which is determined by the traditional trade-offs captured by $X(d)$.

2. $d > \overline{d}$. In this case, we have $W(d) = w_2(d)$ so, using (6), (10) becomes $X'(d) = \gamma(z - \Delta U)$, whose solution is $d = \widehat{d} < d^*$. Hence if $\widehat{d} > \overline{d}$, the firm's optimal leverage ratio is $\widehat{d}$, which is smaller than d^* due to the costs of transparency.

3. $d = \overline{d}$. Given the form of $W(d)$, having a maximum at the non-differentiability point $\overline{d}$ requires $0 \leq X'(\overline{d}) \leq \gamma(z - \Delta U)$, that is, $\overline{d} \in [\widehat{d}, d^*]$.

Summing up:

Proposition 2 *When the workers' wealth constraints are binding ($\overline{d} < d^*$), the firm chooses a conservative leverage ratio, $d = \max\{\widehat{d}, \overline{d}\} < d^*$. Otherwise, its leverage ratio is determined by the traditional trade-offs, $d = d^*$.*

Hence, whenever the workers' wealth constraints are binding ($\overline{d} < d^*$), the cost of transparency distorts the firm's capital structure decision towards a conservative leverage ratio $d < d^*$. Notice from (8) that $\overline{d}$ is a linearly increasing function of the workers' reservation utility at $t = 1$. Thus, financial conservatism arises when the initial reservation utility $\overline{U}$ is small, since in this case the initial wage constraint is more likely to bind. Transparency is costly in this case because the higher future labor retention costs cannot be fully offset by a lower initial wage.[19]

5 Capital structure and experience gains

In this section we endogenize the experience gains z, which we assume are enhanced by investments undertaken by the firm during the workers' training period, i.e., after they have been hired ($t = 1$) but before the possible disclosure of firm type ($t = 2$). The investments that we have in mind include training programs that allow workers to acquire the firm's know-how, R&D investments that widen the applicability of the firm's proprietary technologies, or the establishment of confidentiality procedures and

[19]Interestingly, irrespective of the size of workers' initial reservation utility, our analysis predicts that capital structure and, more generally, a firm's transparency, has implications for the time profile of workers' compensation. Opaqueness is related to flatter wage profiles than transparency. Then, as the leverage ratio d increases, initial wages fall and both the average and the dispersion of future wages increase.

licensing practices that limit the ability of outsiders to develop comparable human capital. As we show, the firm's capital structure has an influence on the investment z, which in turn affects the relationship between the firm and its employees.

We assume that these investments, while observable for both the firm and the workers, are unverifiable and hence non-contractible.[20] For simplicity, we model them as a direct choice of z at a cost given by a strictly increasing and strictly convex function $C(z)$. For brevity, we focus on the same case analyzed in Section 4 by assuming that the choice of z is restricted to an interval $[\underline{z}, \overline{z}] \subset (\Delta U, \Delta U/\gamma)$.[21] Additionally, in order to highlight the effects channelled through the investment level z, we initially assume that $\overline{U}$ is large enough for the worker's wealth constraint not to be binding so that total labor costs, expressed as

$$\overline{w} \equiv \overline{U} + (U_l + \gamma \Delta U) - \mu \gamma z, \tag{11}$$

do not *directly* depend on the leverage ratio d. At the end of this section we briefly comment on the case in which $\overline{U}$ is small and, hence, total labor costs are increasing in d, as in (6).

5.1 The case where z is contractible

We start by examining the relationship between capital structure and the experience enhancing investment z in a first-best world in which the latter is contractible. This provides a benchmark that allows us to determine the effect of having a non-contractible z. Since workers are assumed to have no wealth constraints, total firm value includes the worker's expected gains from the z investment, $\mu\gamma z$, which the

[20] Grossman and Hart (1986) emphasize the importance of relationship-specific investments in their theory of the firm. See also Hart (1995).

[21] Thus, we require that $\Delta U \in (\gamma z, z)$ as in the case in which our previous analysis has focused. Technically, this would be guaranteed, without further constraints, if $\lim_{z^+ \to \Delta U} C'(z) = 0$ and $\lim_{z^- \to \frac{\Delta U}{\gamma}} C'(z) = +\infty$.

firm appropriates by offering a lower initial wage.[22] So, neglecting constants, value maximization requires

$$\max_{d\in[0,1],\ z\in[\underline{z},\overline{z}]} X(d) + [\mu\gamma z - C(z)]. \tag{12}$$

Thus, the first-best solution (d^*, z^*) is implicitly defined by the first order conditions

$$X'(d^*) = 0, \tag{13}$$

$$\mu\gamma = C'(z^*). \tag{14}$$

Clearly, in the first-best world the capital structure decision d^* and the investment decision z^* are separable. The leverage ratio d^* is determined by the standard trade-offs—exactly as in the case of exogenous z and nonbinding wealth constraints considered in the previous section—while the investment z^* equalizes the marginal (social) value of the investment to its marginal cost.

5.2 Analysis when z is not contractible

We now solve the model for the case where the investment z is not contractible. As we show, the resulting level of z is a monotonically decreasing function of d, and the firm might even commit to choose the first-best z by adopting the appropriate leverage ratio. In general, however, because choosing a leverage ratio different from d^* also has costs, a novel trade-off emerges and the first-best z will not be implemented.

We proceed by backward induction: when z is chosen, the leverage ratio d and the worker's initial wage $w_1(d)$ have already been fixed. So z is set to maximize the firm's continuation value, which is affected by z through its effect on the expected labor retention costs,

$$w_2(d, z) = U_h - \gamma z + \gamma(z - \Delta U)d, \tag{15}$$

[22]Notice that the marginal value of the z investment, $\mu\gamma$, is less than one because only quick learners in winner firms enjoy the experience gain. As it will be clear, our results generalize as long as the marginal valuations of the investments remain different across worker types.

and the investment cost, $C(z)$. Thus, ignoring constants in the objective function, the firm solves

$$\max_{z\in[\underline{z},\overline{z}]} \quad \gamma(1-d)z - C(z),$$

which has the first order condition

$$(1-d)\gamma = C'(z). \tag{16}$$

For each possible value of d, this equation defines the solution $z = h(d)$, where, by the implicit function theorem, $h'(d) = -\gamma/C''(z) < 0$. This implies the following lemma.

Lemma 2 *When the investment z is not contractible, its level $h(d)$ is a* decreasing *function of the firm's leverage ratio d.*

Equation (16) captures an important feature of the analysis. In contrast to the first-best case, the investment z and the capital structure decision d are not separable. Specifically, a more conservative capital structure leads the firm to invest more in its relationship with the workers, because greater opacity makes retention wages more sensitive to changes in expected experience gains. So the capital structure decision can work as a commitment device, allowing the firm to set z at the appropriate level. The use of such a device, however, is not costless because the leverage ratio which implements the first-best level of z is generally different from the first-best leverage ratio d^*.

Specifically, the *second-best* leverage ratio, d^{**}, is set taking into account its effect on the investment z, and thus solves

$$\max_{d\in[0,1]} \; X(d) + [\gamma\mu h(d) - C(h(d))], \tag{17}$$

where we have substituted $h(d)$ for z in the terms (in brackets) which account for the effect of the investment on labor costs and, thereby, on firm value. Under our

assumptions, the objective function in the above maximization is quasi-concave so a necessary and sufficient condition for a maximum is:

$$X'(d^{**}) = -h'(d^{**})[\gamma\mu - C'(h(d^{**}))], \tag{18}$$

which uniquely determines d^{**} and, recursively, $z^{**} = h(d^{**})$.

It is clear from (13) and (14) that, if $h(d^*) = z^*$, then $d^{**} = d^*$ solves (18) and, thus, the second-best solution coincides with the first-best solution. Generally, however, one of the following cases will arise:

1. The first-best leverage ratio d^* induces a level of z lower than the first-best level, z^*. In other words, d^* makes the firm *too transparent* for the implementation of z^*. Then (18) is solved with a *conservative* capital structure, $d^{**} < d^*$, that partially corrects the problem of *underinvestment* in z: $h(d^{**}) \in (h(d^*), z^*)$.

2. The first-best leverage ratio d^* induces a level of z that exceeds the first-best level, z^*. That is, d^* makes the firm *too opaque* for the implementation of z^*. Then (18) is solved for an *aggressive* capital structure, $d^{**} > d^*$, that partially corrects the problem of *overinvestment* in z: $h(d^{**}) \in (z^*, h(d^*))$.

A parameter that determines which of the above cases holds is μ, i.e., the proportion of quick learners in the population of workers. Specifically, by comparing (13) and (16), and noting that if $h(d^*) = z^*$ then $\mu = \mu^* \equiv 1 - d^*$, we establish the following result:

Proposition 3 *When the proportion of quick learners in the population of workers is above (below) a critical level μ^*, the firm chooses a conservative (aggressive) leverage ratio d and underinvests (overinvests) in z. Furthermore, as the proportion of quick learners increases, the firm reduces its leverage ratio d and raises its z investment.*

These results are related to the *time inconsistency* problem that affects the decision to invest in z. Forward-looking workers are willing to compensate the firm for their expected experience gains by reducing their initial wages. However, the firm decides on the investment z after the initial wages are already fixed, and hence, it only considers the effect of z on retention wages. A more conservative capital structure results in less transparency and, thus, a greater incentive to invest in z. Hence, by selecting its capital structure, a firm commits to a specific investment in z. When the optimal z is high, and the firm anticipates a problem of underinvestment in z, it can partially correct it by choosing a conservative capital structure. Similarly, if the firm is ex post tempted to overinvest in z, it can mitigate the problem by choosing an aggressive capital structure.[23]

The second part of the proposition establishes that financial conservatism increases with the proportion of workers that can benefit from the z investment. This is because, when workers are hired (and do not know their type), if they are more likely to be quick learners, they are willing to accept larger initial wage cuts in exchange for the expected experience gains, implying that the optimal z is higher.

5.3 Binding wealth constraints

We finalize this section with a brief discussion of the case in which the low value of workers' initial reservation utility, $\overline{U}$, makes their wealth constraints binding (so that $w_1 = 0$). In this case, the future rents that workers appropriate under greater transparency cannot be transferred back to the firm. Hence, in addition to the effect channelled through the investment z, the leverage ratio d has a direct effect on the

[23]To understand why it is possible to have incentives to overinvest as well as underinvest one should note that although the quick learners benefit from a higher z, a higher z reduces second period wages and, thus, reduces the rents appropriated by the slow learners. Notice that, as shown by (14), the ex ante optimal z increases with the proportion of quick learners, μ, while, as shown by (16), the ex-post choice of z does not directly depend on μ but on the leverage ratio d.

firm's total labor costs, as already discussed in Section 4. Since in this case the initial wage is set at the minimum level, the ex ante value and the continuation value of the firm (which are the relevant criteria for the choice of d and z, respectively) coincide and equal

$$X(d) - w_2(d, z) - C(z), \tag{19}$$

where $w_2(d, z)$ is given by (15). Maximizing expression (19) with respect to d and z leads to the following proposition:

Proposition 4 *When workers' wealth constraints are binding, the firm always chooses a conservative leverage ratio, $\tilde{d} < d^*$, which is independent of the proportion of quick learners in the population of workers. Over- and under-investment in z are possible.*

This results leads us back to the logic of Proposition 2. When workers' wealth constraints are binding, all labor costs are incurred after the investment z takes place so the capital structure decision plays no role as a commitment device. The endogeneity of z does not alter the conclusions reached about the capital structure choice under exogenous z: financial conservatism makes the firm less transparent, which by reducing the wages required to retain the workers, saves on total expected labor costs.

6 Workers' effort

Previous sections identify two cases in which transparency reduces firm value: either by increasing labor costs in the presence of workers' wealth constraints, or by altering the firm's incentive to undertake investments that enhance the workers' human capital. In this section, we complete the analysis by considering the case of moral hazard on the workers' side. We show that an additional negative effect of transparency on

firm value can arise when workers exert some unobservable effort that increases both firm output and the value of their human capital. Specifically, under certain conditions, transparency hurts firm value because it leads to reductions in effort when the firm is revealed to be a loser.

As in previous sections, we show that whether or not workers' wealth constraints bind is important to determine the effects of transparency on firm value. Therefore, we first analyze the scenario in which workers' wealth constraints are binding (so that the total wage bill is determined by the retention wage bill) and then examine the scenario in which they are not. In both scenarios we will assume, for simplicity, that the experience gain z is exogenous and that, the effort problem affects both worker types equally.

Specifically, we consider a setting like the one described in Sections 3 and 4: the firm is interested in retaining some previously trained workers. In addition, we assume that, after the firm's type is possibly revealed at $t = 2$, each worker makes a costly non-observable effort decision e which affects both the firm's output and the worker's human capital. Specifically, we consider a representative worker, whose contribution to the firm's output is $Y(e)$, where $Y' > 0$ and $Y'' < 0$.[24] Effort has a positive effect on the worker's human capital, increasing his human capital by e, but only if the firm is a leader. Finally, effort has a cost $K(e)$ to the worker, where $K' > 0$ and $K'' > 0$.

The worker chooses e so as to maximize the value of his expected human capital gains net of the cost $K(e)$, but fails to internalize the effect of effort on firm output, $Y(e)$, so his effort is below the first-best level. Formally, in each state s, $e_s \equiv \arg\max_e \pi_s e - K(e)$, where π_s denotes the probability that the firm is a leader in such

[24] In this context, if each individual worker's contribution to firm output is not observable, free rider problems make performance-based compensation ineffective in providing workers with incentives for exerting effort. Hence, we abstain from explicitly analyzing the role of performance-based compensation.

a state (so $\pi_g = 1$, $\pi_b = 0$, and $\pi_u = \gamma$). Clearly, $e_b < e_u < e_g$.

As a first step in determining how the worker's effort choice affects our results, we demonstrate the following lemma:

Lemma 3 *If $K''' > 0$ $(= 0)$, then the worker's average effort under transparency, $\gamma e_g + (1-\gamma)e_b$, is smaller than (exactly as large as) under opaqueness, e_u.*

Transparency affects workers' effort and, hence, firm value through three different channels. The first channel relates to the average level of effort, which by Lemma 3, depends on the convexity of the function that describes the worker's cost of effort, $K(e)$. The other two channels have to do with the effect of transparency on the allocation of effort across states. From the perspective of the worker, effort is better allocated when the firm is transparent, i.e., the worker increases effort when the firm is a leader (and the human capital gain is positive) and reduces it when the firm is a loser (and effort does not enhance his human capital). However, if transparency makes effort differ across states, but keeps it the same on average, the concavity of $Y(e)$ implies that expected output will be reduced.

To evaluate which of the effects of transparency dominate, we first consider the case in which workers' wealth constraints are binding: the firm's total expected labor costs are determined by the expected retention wages and, therefore, is independent of the anticipated effect of the worker's effort on his ex ante utility. In this case, the effect of effort on the firm's expected output clearly dominates:

Proposition 5 *If $K''' \geq 0$ and workers' wealth constraints are binding, transparency reduces firm value.*

Notice that Proposition 5 provides a *sufficient* condition, $K''' \geq 0$, for the expected output effect to be positive. If $K''' < 0$, then transparency produces two opposite

effects: (i) an *increase* in average effort, and (ii) an increase in effort variability across states. Due to the concavity of $Y(e)$, the second effect is a source of potential expected output losses. Thus, with $K''' < 0$, the overall effect of transparency depends on the relative curvatures of $K(e)$ and $Y(e)$.

When workers' wealth constraints are non-binding, the firm's total expected labor costs reflect the need to compensate workers for their reservation utility and their effort costs, but are reduced by the value of workers' expected experience and human capital gains. In Section 4, where adverse selection was the only concern for workers' retention, we established that if wealth constraints do not bind, transparency was irrelevant for firm value. However, when transparency affects workers' incentives, it reduces firm value if and only if the following inequality holds:

$$Y(e_u)-[\gamma Y(e_g)+(1-\gamma)Y(e_b)] > \{\gamma[e_g-K(e_g)]+(1-\gamma)[e_b-K(e_b)]\}-[\gamma e_u-K(e_u)]. \quad (20)$$

To explain this condition, notice that the LHS is the difference between the firm's expected output under opacity and transparency, respectively, and the RHS is the difference between the worker's net gain from his effort decision (human capital gain net of the cost of effort) under transparency and opacity, respectively. In general, whether (20) holds or not depends on the relative curvature of the functions $Y(e)$ and $K(e)$.

In order to gain more intuition, consider the quadratic case with $Y(e) = y(e-\frac{h}{2}e^2)$ and $K(e) = \frac{k}{2}e^2$, where y, h, and k are positive constants. In this case, we have $e_u = \frac{\gamma}{k}$, $e_g = \frac{1}{k}$, and $e_b = 0$, and (20) becomes:

$$\frac{\gamma(1-\gamma)}{2k}\left(\frac{yh}{k}-1\right) > 0 \quad (21)$$

Hence:

Proposition 6 *In the quadratic case with* $Y(e) = y(e-\frac{h}{2}e^2)$ *and* $K(e) = \frac{k}{2}e^2$, *if*

workers' wealth constraints are not binding, transparency reduces firm value if and only if $yh > k$.

In words, transparency reduces firm value if the curvature of the (concave) output-effort schedule is larger than the curvature of the (convex) cost-effort schedule. In other words, the relative value of transparency over opacity is reduced if output effects are sizeable (high y), if output exhibits strongly decreasing returns to effort (high h), and if effort costs are small (low k). Intuitively, transparency is especially costly when human capital gains associated with working for a leader are high relative to effort costs and when effort has a major effect on output. When this is the case, workers will exert substantial effort whenever there is a positive chance that the firm is a leader, which increases output considerably relative to the case where the firm is known to be a loser.

7 Capital structure and underinvestment

In previous sections, we focused on the dynamics of the relationship between the firm and its workers, providing a microfoundation for the cost of transparency. In this section, we take the existence of these costs as given and consider the situation where the firm has an investment opportunity that, depending on its initial capital structure, may require the firm to raise external capital. We show that, to avoid the expected costs associated with the information that is generated in the process of raising external capital, the firm may pass up positive NPV investments. As in Myers and Majluf (1984), the firm, anticipating this possibility, may choose a more conservative capital structure (e.g., one that provides more financial slack).

Suppose that at date $t = 1$ the firm generates a random cash flow $\tilde{F}$, faces a repayment obligation D, arising from its previously chosen leverage ratio, and receives

a positive NPV investment opportunity that requires an outlay of I that yields $AI > I$, at $t = 2$. Assume, for simplicity, that the access to external capital markets reveals the firm's type with probability one and, hence, increases the firm's expected labor retention costs in the way analyzed in Section 3. Finally, to rule out debt overhang problems à la Myers (1977), assume that the firm's expected output at $t = 3$ allows it to meet all relevant financial obligations and wages.

Clearly, if $\tilde{F} > D + I$, the firm will be able to both pay D and invest I without relying on external finance, so the investment will be initiated. At the other extreme, if $\tilde{F} < D$, the payment of D will require access to external capital markets even without investing, so funding the investment will entail no additional transparency cost and, hence, will be initiated. In the intermediate cases with $\tilde{F} \in (D, D + I)$, however, the firm can meet its debt payments D with internally generated cash, but investing I requires external financing that would not otherwise be needed. In this case, the transparency cost generated from raising external capital may exceed the positive NPV of the investment opportunity, leading the firm to pass up the investment. Specifically, by Lemma 1, transparency implies a rise in expected labor retention costs of $\gamma(z - \Delta U)$ so we can conclude that the firm will undertake its investment opportunity if and only if the intrinsic NPV of the investment, $(A - 1)I$, exceeds this extra cost.

If instead of having a fixed size, the investment can be proportionally scaled within an interval $[0, I^*]$, then for intermediate realizations of $\tilde{F}$ the optimal solution to the investment problem may consist of investing as much as can be internally financed, i.e., $\tilde{F} - D$. More precisely:

Proposition 7 *Suppose the investment opportunity can be developed at any scale $I \in [0, I^*]$, yielding AI. Then, there is a critical value $\overline{F} = \max\{D, D + I^* - \frac{\gamma(z-\Delta U)}{A-1}\}$*

such that: (i) if $\tilde{F} \in (\overline{F}, D+I^*)$, the firm invests as much as can be internally funded, $\tilde{F} - D$, and (ii) otherwise, it invests at full scale, I^*.

Since the incidence of the underinvestment problem is positively related to D and thus to the firm's initial leverage, an implication of Proposition 7 is that firms with good future investment prospects may try to avoid the underinvestment problem by choosing conservative capital structures that provide them with sufficient financial slack. Although this implication is similar to Myers and Majluf (1984), the underlying problem in our model cannot, in contrast, be solved by ex ante committing the firm to issuing equity or to maximize total market value.[25] Only a commitment that allows the firm to issue equity without generating information would solve the problem. But this commitment is hardly feasible, since it would involve third parties such as underwriters and investors whose own interests (and fiduciary duties) call for obtaining information about firms that issue equity.

8 Discussion

We organize the discussion of our results in three parts. First, we discuss how the intuition developed in the paper can be extended to stakeholders other than workers. Second, we elaborate on the key assumption that information is generated about a firm when it goes to capital markets. Finally, we discuss some empirical implications of the analysis.

[25] These commitments might take the form of a contract obligation by the firm to issue equity when certain trigger events (such as a deterioration of financial ratios) occur. Alternatively, as noted by Dybvig and Zender (1991) and Hart (1993), firms might offer their managers compensation contracts based on total value rather equity value. The dilution of extant equityholders emphasized by Myers and Majluf (1984) would then become relevant to the managers when deciding on equity issuance.

8.1 Stakeholders other than workers

Our model focuses on the dynamics of the relationship between the firm and its workers. However, the intuition we have developed is more general and can be applied to almost any situation in which information about a firm's type influences the terms of trade between the firm and its stakeholders. To illustrate the generality of our argument, this subsection discusses the relation between a firm and its customers. As we argue, there is a direct parallel between a situation in which customers develop human capital using a firm's product and one in which workers develop human capital working for a firm.

To understand this, consider a firm that, at some initial date, sells a product like a computer system to two classes of customers (sophisticated and unsophisticated) who can purchase an upgraded version of the system at some future date. If the firm is a leading innovator, future generations of the system can improve in ways that benefit the firm's more sophisticated customers, who can better take advantage of the new improvements. However, if the firm is not viewed as a leading innovator, these sophisticated customers continue to buy the system from the firm at the second date only if the price of the system is reduced. Unsophisticated customers, who are not interested in the improvements, are not willing to pay as much for the system as the sophisticated customers if the firm is a leading innovator. However, since these less sophisticated customers are not concerned about the improvements, and find it more difficult to change systems, they are willing to pay more for the system in the event that the firm is not a leading innovator.

With minor adaptations, the analysis in Section 3 can be applied to show that in order to sell the system to both sophisticated and unsophisticated customers, the firm prices the product so that the sophisticated customers realize consumer surplus

when the firm is revealed to be an innovator and unsophisticated customers realize consumer surplus when the firm is revealed not to be an innovator. In this case, it follows that the average price of the system across the states in which the firm's type is revealed, is lower than in the state in which it remains unknown. In other words, greater transparency leads to lower expected future sale prices. From here, the logic of Section 4 can also be applied.

This parallel can also be extended to the analysis in Sections 5 and 6. As in Section 5, since the ability of firms to capture the benefits of their innovations is affected by their transparency, their incentive to invest in innovations that benefit their sophisticated customers is affected by their capital structure. In addition, following the logic described in Section 6, transparency can also affect their customers' incentives to devote time to learn how to use the system more effectively. This can be particularly important in situations in which the expertise developed by one customer enhances the value of the product to other potential customers, e.g., when network externalities exist.

8.2 Capital markets and information revelation

Since the link between raising external equity and information generation is such a key assumption in our model, it warrants additional discussion. There are two potential interpretations of this assumption. One is that raising capital provides outsiders with the opportunity to scrutinize the firm. In other words, raising capital may force firms to disclose pieces of internal information which, when combined with other information known by outsiders, provide a clear assessment of the firm's prospects. The second interpretation is that raising capital gives outsiders the incentive to scrutinize the firm. This incentive may stem from the legal mandate for investment banks to in-

vestigate firms (i.e., perform due diligence) before issuing their shares.[26] Beyond this legal mandate, several reasons, including potential fraud that can arise when firms raise capital, provide incentives for investment bankers to investigate firms when they raise new funds.[27] Although, for the purpose of our model, either interpretation is appropriate, most of our discussion focuses on the second interpretation.

Although previous arguments suggest that, in the process of raising capital, the generation of *some* information may be unavoidable, in practice firms may try to regulate the extent to which information is generated when they raise capital. Firms can and often do issue equity without going through an underwriter. For example, they can privately place their shares or they can shelf register their shares and then slowly sell them in the market without going through the book-building process.[28]

The existing evidence suggests that firms issue equity via private placements in situations where scrutiny is likely to be costly. For example, Hertzel, et al. (2003) find that firms that issue equity privately have generally done poorly in the recent past. To the extent that the asymmetry between the benefits of revealing good news and the costs of revealing bad news is more pronounced when firms are doing poorly, this observation is consistent with our model. However, private placements cannot be viewed as a costless mechanism for issuing equity without scrutiny. Indeed, as documented by Hertzel et al. (2003), shares that are privately placed sell for a substantial discount (in their sample of about 16%). Moreover, although information

[26]For instance, the Securities Act of 1933 (Section II (b)) holds the investment banker involved in new securities issues liable unless he can prove that "he had, after reasonable investigation, reasonable ground to believe and did believe, at the time such part of the investigation statement became effective, that the statements therein were true."

[27]In addition to investigating the firm on their own, they generally go through a book-building process where they solicit and aggregate information from investors.

[28]Blackwell, et al. (1990) show evidence that underwriters require a "premium" for shelf issues which is higher with firms with higher expected due diligence liabilities. They interpret these findings as suggestive that underwriters see shelf registration as eroding due diligence and, price this erosion accordingly.

is not publicly revealed from the private sale of shares, the buyers generally get a substantial amount of information from the issuing firms and generally perform their own investigation.

It is much less likely that firms use shelf registrations to avoid the costs of market scrutiny. First, very little equity is issued in this way, and casual empiricism suggests that shelf registration is used mainly by the most established firms. Second, underwriters are still subject to some legal liability (which may explain why only the most established firms use this option). Furthermore, regardless of how the new shares are issued, potential buyers must be induced to add them to their portfolios.[29] Perhaps the absence of an underwriter implies that insufficient information is provided in a centralized manner, but this does not necessarily mean that no information is produced. Indeed, some investors have their own due diligence requirements and may thus be induced to collect the information individually.

Finally, an equity issue may generate information simply because it attracts attention to the firm. In particular, an equity issue may work as a focal point, which concentrates the attention of investors who may find it easier to evaluate companies when other investors are also evaluating the company. In this sense, an equity issue may be no different than a purely cosmetic event like a stock split, which induces investors to collect information only because they believe other investors will be investigating the firm.[30]

[29]Gibson et al. (2003) present evidence that institutional investors purchase securities (i.e., increase their holdings) around secondary equity offerings. This evidence is suggestive because institutions are better positioned than individual investors to demand information from firms and their investment bankers and have the resources and expertise to investigate the issuers themselves.

[30]Grinblatt, et al. (1984) show evidence that suggests that firms may split their stock to signal that they want to be scrutinized.

8.3 Empirical implications

The capital structure choice in our model is determined by the expected negative effects of information revelation along with the costs and benefits of debt financing that have traditionally been considered in the literature.[31] In the analysis, the negative effects of information revelation are a function of (i) the proportion of workers (or other stakeholders) who acquire human capital when working for an innovative firm, (ii) whether there are constraints that require the firm to pay a minimum wage, (iii) whether firms need to make non-verifiable investments to train their workers, and (iv) whether workers require effort to develop human capital.

Our analysis generates cross-sectional and time-series implications that provide alternative interpretations of a number of empirical findings as well as new implications that are potentially testable. The cross-sectional implications arise because the effects described in this paper apply to some firms more than others. In particular, our model suggests that leverage should be lower for firms with the following characteristics:

1. Firms in industries where being at the "cutting edge" and being a technical laggard makes a big difference. This is particularly the case when employees (and other stakeholders) develop significant human capital by working with leaders, but not with laggards.

2. Firms whose stakeholders can make discretionary investments (e.g., employee effort) that increase firm productivity. This effect is especially important when the accumulation of human capital or experience gains provide the primary source of motivation for the investments.

[31] Although our model focuses on the negative aspects of scrutiny, one can envision an extension of our model where firms issue equity to invite scrutiny in situations where scrutiny is beneficial.

3. Firms which are likely to have positive investment opportunities in the future.

Our model suggests that firms with the above characteristics will experience significant losses if unfavorable information about their capabilities are revealed. These firms will thus find it especially costly to be scrutinized during downturns (i.e., when their ability to generate cash flow is low), and will thus prefer low leverage ratios that allow them to avoid external capital markets in these situations. Hence, our model is consistent with the observation that technology companies, for which these concerns are especially important, tend to have much lower leverage ratios than commodity companies, which are likely to be less concerned about the perceptions of their stakeholders.

Since our theory was developed to explain why firms tend to avoid equity offers during downturns, it is useful to consider counterexamples to this observation. Specifically, banks, insurance companies, and utilities do on occasion issue equity during downturns. These are all examples of regulated entities that are subject to external scrutiny regardless of whether they issue equity. As an interesting anecdotal example, many of the merchant energy companies chose to issue equity after Enron's bankruptcy. This is again a case of firms that were being scrutinized anyway taking steps to shore up their balance sheets during a downturn. Finally, as we mentioned above, those firms that issue equity during downturns that are not already scrutinized often issue the equity privately, to avoid the public scrutiny.

It is also interesting to consider the timing of equity issues. Korajckzyk et al. (1991) find that firms tend to issue securities right after accounting information is released, precisely the time in which the market is better informed about the firm. In addition, Chang et. al (2003) find that firms that are covered by more equity analysts tend to issue equity more than firms with less analyst coverage. However, when those

firms with less analyst coverage do issue equity, they generally issue larger amounts. While the literature has interpreted these and related findings as evidence of adverse selection effects, transparency concerns can provide an alternative interpretation.

9 Concluding remarks

We have developed a simple model where a firm's profitability depends on how it is perceived by its stakeholders.[32] If stakeholders perceive that the firm is no longer a leader, the firm will find it more expensive to retain its customers and employees, and this will, in turn, lower the firm's profits.

Our model shows that the effects of favorable and unfavorable information about the firm's prospects may be asymmetric. Specifically, the negative effect of unfavorable information may exceed the positive effect of positive information. As a result, during downturns, when uncertainty about the firm's prospects is high, firms find it costly to take actions, like issuing equity, that generate information about its type.

The link between transparency concerns and financing choices explored in this paper complements the adverse selection model considered by Myers and Majluf (1984). In particular, both models explain the observation that U.S. corporations tend to be relatively conservatively financed, and both explain why firms are often reluctant to issue equity.[33] An advantage of the model over Myers and Majluf is that we can explain why firms choose not to take steps that allow them to commit to equity issues

[32]Titman (1984) also suggests that stakeholder considerations influence the firm's capital structure choices. In Titman's model, capital structure choices affect the likelihood of bankruptcy, control changes and the firm liquidation decision which can impose costs on stakeholders. In contrast, in the model in this paper, capital structure affects whether information is revealed about the firm which, in turn, affects the firm's willingness to make investments that benefit their stakeholders, as well as the willingness of stakeholders to expend resources (e.g., workers' effort) that benefit the firm.

[33]See Graham (2000) for an estimation of the reduction in value due to conservatism and Minton and Wruck (2001) for an empirical analysis of the main features of conservatively financed firms.

when they are doing poorly. In contrast to Myers and Majluf, our model cannot explain the negative returns associated with equity offers, which suggests that adverse selection clearly plays some role in the equity issuance choice.

Perhaps, a model that combines the insights of Myers and Majluf and our model may increase our understanding of announcement returns. For example, although announcement returns are generally negative, there are a number of cases where stock prices react very favorably to the announcement of an equity issue. One possibility is that investors interpret such announcements as indicating that management welcomes more scrutiny, which would be the case when they believe that favorable information is likely to be generated by the underwriting process. This is an issue that warrants further empirical as well as theoretical research.

Finally, although our emphasis has been on the effect of capital structure on information revelation, our analysis can also be applied to other choices that can affect a firm's transparency. For example, a firm may put in place a more detailed accounting system or hire a more competent auditor, or it may take other actions that increase the attention of market analysts. In addition, firms may avoid actions, in addition to raising capital, that generate information. Examples of these actions could include the termination of a CEO, changing accounting and investment banking relationships, and forming strategic partnerships and mergers that require extensive due diligence.[34] Extending the logic of our model to consider these other actions is an interesting area for future research.

[34]For instance Branderburger and Nalebuff (1996), p. 214, discuss the case of Continental Insurance whose board decided to not entertain a lucrative takeover offer from CNA that was conditional on due diligence. The board was concerned about the revealed information "including the potential adverse effects a possible decision by CNA (following such due diligence) not to make an offer could have on market and rating agencies' views of the company and on the willingness of insurance partners to proceed with transactions" [Continental's proxy statement, March 29, 1995].

10 Appendix: On the possibility of long-term contracts

In this appendix, we revisit the scenarios in which, according to the analysis in Sections 3, 4 and 5, transparency concerns distort a firm's capital structure decision.

In the scenario in which workers' wealth constraints are binding and experience gains are exogenous (Section 4), the question is whether a long-term contract can isolate the firm's total expected labor costs from the effects of transparency, making the distortion of the firm's capital structure unnecessary. The short answer is no, except in the trivial—and unrealistic—case in which workers can fully commit to work for the firm up to termination. In such a case, workers would accept a total intertemporal wage of $\overline{w}$ when hired and the firm's capital structure decision would be determined by the standard tradeoffs.

Notice that even if workers cannot directly commit to work for the firm for more than one period, the equivalent implication can be obtained by introducing some pecuniary penalty, L, imposed on workers who depart early. The penalty L reduces workers' retention wage to $w_2 = w_2(d) - L$ only if their initial wage is (at least) $w_1 = L$, in which case, the total expected labor costs per worker would be $w_1 + w_2 = L + [w_2(d) - L] = w_2(d)$, as in the case without penalties analyzed in Section 4.

In the scenario considered in Section 5, i.e., non-binding wealth constraints and endogenous z, long-term contracts can improve matters only if they contribute to a better alignment between the firm's ex post incentive to invest in z (that depends on the sensitivity of retention wages to z) and the objective of ex ante value maximization (that calls for minimizing the sum of labor and z costs). However, long-term wage contracts, do not address the fundamental non-contractibility of z. They either preserve the original sensitivity of w_2 to z or fully eliminate it, in which case the firm

has no incentive to invest in z.[35]

This polar no-investment solution is surely inferior to the solution without long-term contracts characterized in Section 5 if the proportion of quick learners in the population of workers is above the critical level μ^* since, in such a case, the firm already underinvests in z (see Proposition 3); investing zero would simply aggravate the problem. In contrast, if the proportion of quick learners in the population of workers is below μ^* (so that the firm overinvests in z), it is possible that, by fully eliminating the sensitivity of the retention wages to z, firm value increases relative to the solution characterized in (18). Actually, in this case, the optimal investment in z lies somewhere between the amount invested when all of the workers receive either short-term or long-term contracts. As a result, the firm could implement the first-best investment level by offering long-term contracts to some of the workers and short-term contracts to the rest. In addition, this argument suggests that the problem of overinvestment in z (and the remedy based on an aggressive capital structure) is less pervasive than the problem of underinvestment in z (and the remedy based on a conservative capital structure).

[35]Indeed, the sensitivity of w_2 to z can be eliminated by either committing the firm to a very high retention wage, so that workers are willing to stay in all states, irrespective of the value of z, or by fixing a very high penalty for the workers who leave early, so that workers are willing to stay at a zero retention wage in all states, irrespective of the value of z. In either case, because w_2 does not depend on z, the firm loses its incentive to invest in z, regardless of its capital structure choice.

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