Firms' Stakeholders and the Costs of Transparency

Andres Almazan
University of Texas

Javier Suarez
CEMFI and CEPR

Sheridan Titman*
University of Texas and NBER

26 May 2008

Abstract

We develop a model of a firm whose production process requires it to initiate and nurture a relationship with its stakeholders. Because there are spillover benefits of being associated with a "winner," the perceptions of stakeholders and potential stakeholders can affect firm value. Our analysis indicates that while transparency (i.e., generating information about a firm's quality) may improve the allocation of resources, a firm may have a higher ex ante value if information about its quality is not prematurely generated. Transparency costs arise because of asymmetric information regarding the extent to which stakeholders benefit from having a relationship with a high quality firm. These costs are higher when firms can undertake non-contractible innovative investments that enhance the value of their stakeholder relationships. Stakeholder effects of transparency are especially important for younger firms with less established track records.

*We are grateful to comments from Aydogan Alti, Kent Daniel, Adolfo de Motta, Mark Flannery, Xavier Freixas, Ron Giammarino, Maria Gutierrez, Thomas Hellmann, David Hirshleifer, Giovanna Nicodano, Robert Prentice, Chris Parsons, Todd Pulvino, Scott Stern, Siew Hong Teoh, two anonymous referees and seminar participants at University of Amsterdam, Arizona State University, ESCP-EAP, INSEAD, Instituto de Empresa, LSE, McGill University, NYU, Northwestern University, Ohio State University, Oxford, Pompeu Fabra, UCLA, University of Texas, Tulane University, the CEPR Workshop on European Corporate Governance and the New Economy, the WFA meetings, the NBER Entrepreneurship: Strategy and Structure Conference, and the Final ECGTN Conference. Suarez acknowledges financial support from European Commission grant MRTN- CT-2004-504799 and the Consolider-Ingenio 2010 Project "Consolidating Economics" of the Spanish Ministry of Science and Innovation. Contact address: andres.almazan@mccombs.utexas.edu.

1 Introduction

The entrepreneurship literature recognizes that a prior relationship with a leading firm provides individuals with valuable entrepreneurial opportunities. For example, the papers reviewed in Audia and Rider (2005) offer evidence that is consistent with the idea that firms operating at the technological frontier are more likely to provide their employees with greater access to valuable entrepreneurial opportunities. In particular, proxies for the technological success of firms, such as early entry in a new market (Brittain and Freeman 1986), superior technology (Franco and Filson 2000) or highly-cited patents (Gompers et al 2005), have a statistically significant positive effect on the likelihood that the firm's employees create new firms.[1]

This paper starts with the dual premise that a firm's stakeholders are essential for the firm's success and that they appreciate the benefits of being associated with a successful firm, i.e., a winner. Given this premise, a firm's success is closely tied to how it is perceived, both internally, by its employees, and externally, by its customers and suppliers. This is especially true for younger firms with less established track records, and perhaps a greater need to attract stakeholders.[2]

In order to manage how their firms are perceived, entrepreneurs make a number of choices that influence the extent to which information about the firm is generated and disseminated both internally and externally. These choices determine what we call the degree of transparency of the firm. For example, a firm's decision to go public is likely to increase its transparency due to the disclosure requirements associated with an IPO, the due diligence of the underwriters, and the scrutiny brought by market participants (e.g., analysts).

Although there are a number of reasons why transparency is likely to contribute positively to firm value, in this paper we stress the offsetting cost that it may have for a young firm,

[1] A paramount example of this process is provided by Fairchild Semiconductors, the firm producing the first integrated circuit in 1959. As reported by Saxenian (1994), at least 23 out of 67 entrants to the semiconductor industry between 1957 and 1976 had at least one founder who worked for Fairchild.

[2] For a excellent discussion of the importance of attracting stakeholders to entrepreneurial firms see Bhide and Stevenson (1999).

whose success depends on its capacity to attract and retain key stakeholders. In particular, these firms face the risk that their potential as industry winners is prematurely revealed, which may in turn jeopardize their appeal to potential employees, customers and suppliers. Of course, positive news will help the firm, but as we show, the costs associated with the early revelation of negative information can exceed the benefits associated with the early revelation of positive information, tilting entrepreneurs towards choices that reduce transparency.

To illustrate these value-reducing effects of transparency we develop a model with heterogenous firms and stakeholders. The firm may or may not turn out to be an innovator that sets future standards in its industry and the stakeholders can either realize substantial benefits or modest benefits from being exposed to the firm's innovations. The model assumes that initially everyone is uncertain about the firm's quality, but depending upon its transparency, the firm's quality is revealed either sooner or later to all. In contrast, stakeholders acquire private information about their own types, and this information is not revealed during the course of their relationship with the firm.[3] This last point implies that all stakeholders must be offered the same terms of trade with the firm, which in turn means that if the firm deals with both types of stakeholders, one or the other type will obtain a rent. In particular, if the firm turns out to be an innovator, the stakeholders who benefit from their exposure to innovation earn rents, while, if the firm turns out not to be an innovator, stakeholders who do not benefit from being exposed to innovation receive rents. As we show, these expected rents are lower when less is known about the firm.

Transparency is especially costly when the firm can make non-contractible investments in innovative activities that increase the spillover gains to its stakeholders. For example, a software firm might enhance the design of its programs in ways that benefit sophisticated users or offer training to workers and customers about the internal architecture of its programs. By doing this, the firm becomes a more attractive partner and can thus attract stakeholders on more favorable terms. However, as we show, the stakeholders capture a greater portion

[3] We refer to stakeholders' "types" and potential firm "qualities" to emphasize that while stakeholders have private information about themselves the information about the firm, while imperfect, is symmetrically held by all.

of the innovation gains if the firm is more transparent, which reduces the firm's incentive to make these investments.

Our model contributes to the literature on the costs and benefits of transparency as well as to the growing literature on entrepreneurship and innovation. Regarding the former, most papers formalize the role of transparency in reducing asymmetric information in the market for the firm's securities, and study the optimal degree of transparency arising from trading off the corresponding reduction in the cost of capital with *direct* information costs.[4] For instance, Easterbrook (1984) considers the implications on the dividend decision, and Pagano and Roell (1998) examines the going-public decision. The literature on corporate governance has considered the transparency implications of shareholder activism (Burkart, Gromb and Panunzi 1997) and the connections between transparency and the effectiveness of boards (Hermalin and Weisbach 1998). Subrahmanyam and Titman (1999) show that firms are more likely to be more efficiently priced and make better investment choices when more information about them is generated. To the extent that transparency leads to more information generation, more transparent firms will be more valuable on average.

Our paper fits into the relatively small subset of papers in the former literature that analyze potential *indirect* costs of transparency. Teoh (1997) analyzes the problem of voluntary contributions to public goods and, like us, attributes the cost of transparency to an asymmetric information problem (about users' willingness to pay). Bhattacharya and Chiesa (1995) and Perotti and von Thadden (2000), among others, point to the costs of revealing potentially useful information to competitors. In their analysis of corporate governance, Hermalin and Weisbach (2007) attribute the cost of transparency to the additional uncertainty on executives' careers concerns and to the additional incentives to manipulate information. Singh and Yerramilli (2007) analyze the relationship between market scrutiny and managerial incentives, showing that there are instances in which the former can increase managerial short-termism.

[4] See Verecchia (2001) for a survey of the literature on the design of firms' accounting and auditing systems and Diamond and Verrechia (1991) for an analysis of the effect of costly disclosure on the firm's cost of capital.

Regarding the literature on entrepreneurship and innovation, our focus on stakeholder retention and on the idea that some stakeholders appropriate substantial spillover gains from the firm's innovative investments is consistent with a growing literature on the role of the transition from employee to entrepreneur in the creation of new businesses (Pakes and Nitzan 1983, Gromb and Scharfstein 2001, Lewis and Yao 2003, Cassiman and Ueda 2006, Hellmann 2007a) and, more generally, the problem of the appropriability of innovative ideas (Anton and Yao 1994, 2002, Anand and Galetovic 2000, Gans and Stern 2003, Biais and Perotti 2004, Hellmann and Perotti 2006). We contribute to this literature by showing how transparency (i.e., the premature generation of information) affects the division of the returns from innovation between the firm and its stakeholders, and hence the firm's incentives to undertake innovative investments (and engender future entrepreneurship).

The rest of the paper is organized as follows. In the next section we describe the full model. In Section 3 we consider a simplified setup in which the firm's problem is reduced to *attracting* stakeholders who are already endowed with private information about their types.[5] As we discuss, the analysis of attraction of privately informed stakeholders is formally very similar to the analysis of the problem of *retaining* stakeholders that we consider in Section 4, where stakeholders start their relationship with the firm without any private information but acquire such information as the relationship progresses over time. In Section 5, we analyze the richest case in which the firm controls both its transparency and an investment that increases the value of the experience gains that stakeholders acquire through their relationship with the firm. Section 6 is devoted to issues regarding the robustness of our approach. In Section 7 we discuss the empirical and policy implications. Section 8 concludes the paper.

2 The model

We consider a firm that operates in a risk-neutral economy where the discount rate is normalized to zero. As shown in Figure 1, there are four relevant dates in the firm's life, $t = 0, 1, 2, 3$.

[5] The problem of attracting stakeholders to startups has been addressed before in the literature on entrepreneurship. See Hellmann (2007b) for a recent contribution.

At $t = 0$, the firm is born and chooses its level of transparency. This choice can be related to its funding source (e.g., with angels' funds or with funds from venture capitalists) and to other organizational aspects that affect the degree of external involvement in the operations and analysis of the firm's business. The idea is that a higher degree of external involvement leads to a more intense scrutiny of the firm's activities and, as a result, to the generation of more information about the firm's prospects.

At $t = 1$, the firm initiates a long-term relationship with a continuum of *stakeholders*. By stakeholders we refer to a number of constituencies (employees, customers, suppliers, advisors or other agents) whose interests are intrinsically linked to the firm's prospects. Such a relationship involves a *start-up* period in which the stakeholders acquire familiarity with the firm and, then, from $t = 2$, a *development* period in which large-scale production takes place. At the beginning of the development period, stakeholders can stop doing business with the firm. At $t = 3$ the firm generates revenue proportional to the fraction of the initially attracted stakeholders retained by the firm.

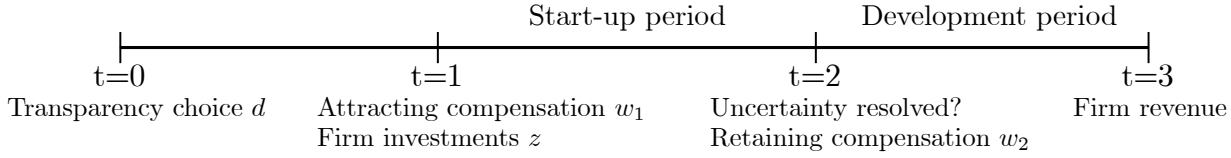

Figure 1: Sequence of Events.

A central aspect of our model is the interaction between stakeholders' unobservable heterogeneity and the timing of the resolution of uncertainty about the firm's quality. This interaction will interfere with the firm's problem of attracting and retaining its stakeholders, the transparency decision, and the incentives for the firm to undertake relationship-specific investments.

Stakeholder heterogeneity. Stakeholders are ex-ante identical and have an opportunity cost $\overline{U}$ of dealing with the firm during the start-up period. During this period, however, a proportion μ of them privately discover that they are *quick learners*, while the remaining

proportion $1-\mu$ privately discover that they are *slow learners*. Being a quick or a slow learner affects the extent to which a stakeholder can profit from the experience acquired by dealing with the firm. Hence, by discovering their types, stakeholders acquire private information about their ability to develop human capital within the firm.[6]

Stakeholders' private discovery of their types affects two aspects of the firm's stakeholder retention problem. First, by virtue of the experience acquired over the start-up period (and the surplus that they can obtain by dealing with another firm over the development period), a quick learner's opportunity cost of continuing with the firm at date $t=2$ is U_h, while the slow learner's is, instead, U_l, with $\Delta U \equiv U_h - U_l > 0$.[7] Second, dealing with the firm during the development period creates for each of the stakeholder types different experience gains, which, as we explain below, will be increasing in the firm's quality. For simplicity, we assume that stakeholder types do not affect the gross revenue that the firm can generate at $t=3$.[8]

Firm quality. The firm can turn out to be either high quality (a *winner*) or low quality (a *loser*). A winner firm is an innovator able to set the future technological and organizational standards of its industry and, hence, provides its stakeholders with especially valuable experience. To make things simple, we assume that the quick learners obtain an incremental experience gain z from their association with a winner up to date $t=3$ while the incremental gain equals zero in any other association (i.e., when a loser firm and/or a slow learner are present).[9]

We assume that all agents have *symmetric information* about the firm's quality at all

[6] This asymmetric information situation is likely to occur in young firms and innovative industries that face considerable uncertainty about their potential but provide substantial room for their stakeholders' human capital development. See Section 7 for further discussion.

[7] Notice that, to the extent that stakeholders are willing to credit the firm for the value of the experience that they can accumulate after date $t=2$, the difference between U_h and U_l does not necessarily imply that quick learners require a larger monetary reward for continuing dealing with the firm at $t=2$.

[8] Alternatively, one could assume different productivities across types in a model where the firm is a team and only the total team output is observable. We choose the current formulation for simplicity.

[9] The logic of our results also applies if slow learners acquire smaller-than-z incremental experience gains. Futhermore, experience gains from working for a loser can be interpreted as already discounted from the opportunity costs U_h and U_l. See Section 6.1 for an interpretation of U_h, U_l, and z in the context of an economy with two classes of firms where these variables could arise endogenously.

dates, which allows us to examine the choice of transparency in the absence of signaling.[10] Specifically, we assume that all parties take γ as the ex ante probability that the firm is a winner. The uncertainty about the firm's quality is publicly resolved either after the start-up period ($t = 2$) or after the development period ($t = 3$). The timing of this discovery is affected by the firm's degree of transparency.

To streamline the presentation, we assume that

$$\gamma z < \Delta U < z. \tag{1}$$

Condition (1) is a regularity condition on the size of the quick learners' experience gains z relative to the opportunity costs of remaining with the firm. Specifically, it states that experience gains are large enough so that, relative to slow learners, quick learners would be more inclined to keep their association with a winner firm (i.e., $U_h - z < U_l$ or $\Delta U < z$) but less inclined to do so if the firm's quality remains unknown (i.e., $U_h - \gamma z > U_l$ or $\Delta U > \gamma z$). In the Appendix, we briefly discuss the alternative cases (i.e., $\Delta U \leq \gamma z$ and $\Delta U \geq z$). As shown there, focusing the analysis on the case where condition (1) holds simplifies the presentation while allowing us to illustrate all the effects of interest.

The transparency decision. The firm chooses its degree of transparency $d \in [0, 1]$ at $t = 0$. We assume that d equals the probability that the firm's quality is revealed at $t = 2$, and show that this probability can affect the value that the firm extracts from its relationship with the stakeholders. On top of these effects, we capture the standard costs and benefits of favoring an earlier resolution of uncertainty about the firm's quality by postulating that the transparency decision adds some *net* benefits $X(d)$ to the firm's gross revenue. We assume that $X(d)$ is a single-peaked function, with $X(0) = 0$, that reaches an interior maximum d^*, which would be chosen by the firm in the absence of the concerns identified in this paper. Technically, this is ensured by assuming $X'(1) \leq 0 \leq X'(0)$ and $X'' < 0$.

[10] Abstracting from signaling effects simplifies the analysis and allows us to emphasize that our notion of transparency refers to enhancing the generation of information about the firm rather than to the disclosure of private information.

Relationship-specific investments. In the most general case discussed below, we allow the firm to affect the size of the experience gain z that quick learners obtain when the firm turns out to be a winner. We interpret z as arising from innovative investments (e.g., R&D activities, unconventional human capital development activities, customer training programs) undertaken by the firm after starting its relationship with the stakeholders. Importantly, we assume that these investments are non-contractible and costly for the firm. The cost of providing z is described by the function $C(z)$, with $C' > 0$ and $C'' > 0$.

Attracting and retaining the stakeholders. At $t = 3$, the firm generates a gross revenue αY, where α is the fraction of the initial stakeholders that the firm retains at $t = 2$ and Y is a productivity parameter that, for simplicity, we assume is independent of stakeholder types and firm quality.[11] Moreover, we assume that

$$Y > \max\left\{\frac{\Delta U + \mu U_l}{\mu}, \frac{U_l - \mu U_h + \mu z}{1-\mu}\right\}, \tag{2}$$

which is a sufficient condition for the firm, independent of its quality, to find it optimal to offer compensation that retains all stakeholders at $t = 2$ rather than to offer compensation that retains only one of the stakeholders' types.

We assume that the firm and the stakeholders attracted to it at $t = 1$ can unilaterally break up their relationships at $t = 2$,[12] and that the firm sets the terms of trade through take-it-or-leave-it offers. Specifically, the firm offers w_1 to attract the stakeholders at $t = 1$ and w_2 to retain them at $t = 2$.

We solve the model under the restriction that w_1 and w_2 are equal for all stakeholders. This restriction is without loss of generality for w_1 because stakeholders are identical at $t = 1$ (when w_1 is set). Offering a single w_2 after stakeholders have privately observed their types at $t = 2$ is justified by the fact that, in our setting, compensation cannot serve as a

[11] We exclude the possibility that the firm replaces its original stakeholders with unexperienced stakeholders at $t = 2$. This simplification captures the intuition that new stakeholders can only imperfectly substitute the original stakeholders attracted at $t = 1$.

[12] We discuss the robustness of our results to the introduction of termination fees or other types of long-term contracts in Section 6.2.

screening device, unless the firm chooses to retain only one of the types.[13] However, under the parametric assumption specified above, retaining just one of the types is not optimal. In essence, (2) implies that both stakeholder types are present in non-negligible proportions and that the revenue generated by each stakeholder in the firm at $t = 3$ exceeds his/her opportunity cost of doing business with the firm.[14]

Since w_2 must allow the firm to retain both stakeholder types, it will be determined by the "reservation pay" (i.e., opportunity cost net of expected incremental experience gains) of the stakeholder type that finds it relatively more costly to maintain his relationship with the firm during the development period. Since reservation compensation differs across stakeholder types and firm qualities, it follows that, depending on the perception about the firm's quality, either the quick learners or the slow learners appropriate some rents in addition to their reservation compensation. The firm's transparency and investment choices will then be partly driven by its desire to reduce the expected value of these rents.

3 Attracting stakeholders with asymmetric information

In order to highlight the mechanism that makes transparency costly in our model, we first analyze a simplified setting of a firm that must *attract* rather than *retain* privately informed stakeholders. Specifically, the firm must attract quick learners, who profit from an exogenous experience gain z when doing business with a winner firm, and slow learners who do not. Formally, this simplified problem corresponds to a modified version of the problem described

[13] In this setting, the possibility of using retaining compensation to screen stakeholders' types is severely limited. In fact, only offers that are acceptable for one type but not acceptable for the other are effective to screen stakeholders' types. By contrast, any attempts to offer differential compensation which is acceptable for both types of stakeholders is not incentive compatible since both stakeholder types would choose the largest available compensation. Notice that privately observed types also preclude mechanisms based on the revelation of each other's types.

[14] As it turns out, retaining all stakeholders rather than only the slow learners increases the retention cost of a loser firm by $U_h - (1-\mu)U_l$ but increases its output by μY. Similarly, for a winner firm, retaining all stakeholders rather than only the quick learners increases the retention cost by $U_l - \mu(U_h - z)$ but increases its output by $(1-\mu)Y$. This comparison is reflected in condition (2) which ensures that both types of firms will find in their interest to retain both types of stakeholders.

in Figure 1 where (i) we are at $t = 2$, so that stakeholders know their types, and (ii) the investment z is exogenous.[15]

The analysis of the simplified problem will provide us with results that are valid for the analysis of the late stages of the full game (by backwards induction). In particular, it will illustrate how greater transparency induces greater dispersion in stakeholders' valuation of their relationship with the firm, increasing the average information rents that stakeholders are able to appropriate. To highlight the effects due to asymmetric infomation, we first consider what would happen if stakeholders' types were publicly observable and then move into the analysis of the asymmetric information case.

3.1 The perfect information benchmark

If stakeholder types are observable, the firm can attract each of the types with different compensation. Stakeholders' willingness to accept these offers depend on their perceptions about the firm in each of the three states s that can occur at $t = 2$: (i) the no-news state ($s = u$), where the firm's quality remains unknown, (ii) the good-news state ($s = g$), where the firm is revealed to be a winner, and (iii) the bad-news state ($s = b$), where the firm is revealed to be a loser. Let w_l^s and w_h^s, respectively, be the minimum compensations that attract a slow learner and a quick learner to the firm in state s. In this case, for the slow learner we have $w_l^s = U_l$ for all s, that is, regardless of his perception of the firm. In contrast, the quick learners' compensation differs across states due to the valuation of the corresponding experience gains. Specifically, in state u, the minimum compensation that attracts a quick learner is the difference between his opportunity cost, U_h, and the expected value of the experience gain that he would get if the firm turns out to be a winner, γz, so

[15] In the retention problem we argue that, since unexperienced stakeholders cannot replace trained stakeholders and since (2) holds, the firm finds it optimal to retain quick and slow learners. In this attraction problem, however, it is less clear why the firm does not focus on attracting only one type of stakeholders. We implicitly assume that there is only a limited number of potential stakeholders able to deal with the firm so that focusing on one type would limit firm production. In this case, the firm trades-off attracting one type of stakeholders (and leaving no rents to them) but limiting firm production versus attracting both types (and leaving rents) but not constraining its production. As in the retention case, the combination of high firm productivity and a sizeable proportion of both types of stakeholders, i.e., assumption (2), ensures that attracting both types is the optimal firm policy.

we have $w_h^u = U_h - \gamma z$. By the same token, the minimum compensation required by a quick learner in states g and b are $w_h^g = U_h - z$ and $w_h^b = U_h$, respectively.

Therefore, the expected cost of attracting both stakeholders when the firm's quality will be revealed is

$$\gamma[(1-\mu)w_l^g + \mu w_h^g] + (1-\gamma)[(1-\mu)w_l^b + \mu w_h^b] = (1-\mu)U_l + \mu(U_h - \gamma z), \tag{3}$$

and equals the cost of attracting stakeholders when the firm's quality will remain unknown, $(1-\mu)w_l^u + \mu w_h^u$. Thus, with symmetric information the expected cost of attracting stakeholders is the same regardless of whether or not firm quality is discovered early. In other words, if stakeholder types are observable, the transparency of the firm has no effect on the expected cost of attracting them.

3.2 The required compensation under asymmetric information

When stakeholders privately know their types, the firm must offer equal compensation to all stakeholders. This implies that in each state s the minimum compensation that attracts both stakeholder types is the highest of the amounts required by each type in the perfect information benchmark, that is, $w^s = \max\{w_l^s, w_h^s\}$. Thus, in state u we have $w^u = \max\{U_l, U_h - \gamma z\}$, which under condition (1) is

$$w^u = U_h - \gamma z, \tag{4}$$

reflecting that quick learners are harder to attract than slow learners in the absence of news about the firm's quality. Similarly, in state g, attracting both types requires $w^g = \max\{U_l, U_h - z\}$, which under (1) is

$$w^g = U_l, \tag{5}$$

reflecting that slow learners are harder to attract after good news, since they do not credit the winner firm for the experience gain z. Finally, in state b, the required compensation is

$$w^b = \max\{U_l, U_h\} = U_h, \tag{6}$$

which reflects that quick learners are harder to attract than slow learners once the prospects of getting the experience gain z vanish. Therefore, in line with intuition, the required compensation is lower under good news than under bad news ($w^g < w^b$), and also lower under no news that under bad news ($w^u < w^b$).

We can now compute $w_2(d)$, the expected costs of attracting stakeholders as a function of the firm's transparency (i.e., the probability d that the firm's quality is publicly observed at $t = 2$):

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

After subsituting for w^g, w^b, and w^u, we obtain the following result:

Proposition 1 *The expected attraction costs,*

$$w_2(d) = U_h - \gamma z + \gamma(z - \Delta U)d, \tag{7}$$

are increasing in the firm's degree of transparency d.

Intuitively, the increase in attraction costs due to transparency can be related to the fact that the firm finds it more costly to attract different types of stakeholders in different states. Quick learners are more expensive to attract than slow learners in states $s = b$ and u and slow learners are more expensive to attract in state $s = g$. Transparency makes slow learners "pivotal" in $s = g$ and precludes the firm from reducing the attraction costs by the amount $z - \Delta U > 0$, which corresponds to the cost reduction that the firm would obtain if quick learners were the only stakeholder type to attract. Accordingly, expression (7) shows that the degree of transparency d increases attraction costs in proportion to the probability of state g and the discount $z - \Delta U$. Notice that private information about stakeholder types is essential for the effect of transparency on stakeholder costs. If all stakeholders were either quick learners (implying $w_2(d) = U_h - \gamma z$) or slow learners (implying $w_2(d) = U_l$), expected attraction costs would be like in the perfect information benchmark (i.e., like in (3) for $\mu = 1$ and $\mu = 0$, respectively), and transparency would not affect stakeholder costs.

4 Long-term relationships and the retention problem

In this section, we consider the extended model in which stakeholders are attracted at $t = 1$ (when they are ex-ante identical) and must be retained at $t = 2$ (after they learn their types).[16] The time structure of the model allows us to proceed by backward induction. We first analyze the retaining compensation at $t = 2$, and the initial stakeholder compensation at $t = 1$, taking as given the firm's degree of transparency d. Then we consider the firm's transparency choice at $t = 0$.

4.1 Total cost of stakeholder relationships

Section 3 characterizes the cost of attracting privately informed stakeholders in the simplified model, $w_2(d)$. This characterization, however, also describes the cost of retaining privately informed stakeholders at $t = 2$ in the extended model. The main difference between attracting privately informed stakeholders and retaining stakeholders who have acquired information in the course of their dealings with the firm is that in the latter case, stakeholders could accept a lower initial compensation to credit the firm for the rents that will accrue to them in the retention stage.

To examine this issue, we define $w_1(d)$ as the stakeholders' compensation over the start-up period, i.e., the firm's payment to the stakeholders at $t = 1$. In what follows, we distinguish between the cases of wealth-constrained stakeholders, for whom setting $w_1(d) < 0$ is unfeasible, and unconstrained stakeholders, for whom setting $w_1(d) < 0$ is feasible. Since stakeholders anticipate the retaining compensation at $t = 2$, $w_1(d)$ must always satisfy:

$$w_1(d) + [w_2(d) + \mu\gamma z] - (U_l + \mu\Delta U) \geq \overline{U}, \tag{8}$$

where the term in brackets accounts for the expected monetary compensation and experience gains obtained from $t = 2$ onwards, and the term in parenthesis reflects the ex ante identical stakeholder's expected reservation utility at that date. The difference between the term in

[16] We treat the experience gain z as exogenous, and postpone the analysis of the underlying investment decision to Section 5.

brackets and the term in parentheses is positive and measures the informational rents that stakeholders appropriate from $t = 2$ onwards.

Under (7), the minimum $w_1(d)$ that satisfies (8) is given by

$$\widehat{w}_1(d) = \overline{U} - (1 - \mu)(\Delta U - \gamma z) - \gamma(z - \Delta U)d. \tag{9}$$

It follows from (9) that, due to the informational rents anticipated at $t = 2$, stakeholders would be willing to accept an initial compensation $\widehat{w}_1(d)$ which is lower than their opportunity cost of dealing with the firm during the start-up period, $\overline{U}$. Such an initial compensation is decreasing in d because transparency increases the compensation received by stakeholders in the development period.

If stakeholders are not wealth constrained or if $\widehat{w}_1(d) \geq 0$, setting $w_1(d) = \widehat{w}_1(d)$ is feasible and, then, the total stakeholder costs $W(d) = \widehat{w}_1(d) + w_2(d)$ become

$$W(d) = \overline{U} + (U_l + \mu\Delta U) - \mu\gamma z \equiv \overline{w}. \tag{10}$$

In this case, total stakeholders' costs equal $\overline{w}$ (i.e., the stakeholders' intertemporal expected reservation utility net of expected experience gains), which does not depend on the firm's transparency d.

In contrast, if stakeholders are wealth constrained and $\widehat{w}_1(d) < 0$, their initial compensation is $w_1(d) = 0$ and total stakeholder costs become $W(d) = w_2(d)$. Now transparency increases the firm's total stakeholder costs, since $w_2(d)$ is increasing in d, as already established in Proposition 1.

The following proposition summarizes the conclusions from this discussion:

Proposition 2 *Total stakeholder costs are increasing in the firm's degree of transparency d when stakeholders are wealth constrained and $\widehat{w}_1(d) < 0$. The last condition is more likely to hold for small values of $\overline{U}$ and μ, and for large values of z, γ, and d.*

4.2 The transparency decision

At $t = 0$, firm value equals the present value of its gross revenue plus the net non-stakeholder-related benefits of transparency minus the total stakeholder costs:

$$V(d) \equiv Y + X(d) - W(d). \tag{11}$$

The firm makes its transparency decision in order to maximize $V(d)$. In general, the firm's optimal transparency decision must solve the first order condition:

$$X'(d) = W'(d), \tag{12}$$

which states that the conventional marginal net benefits from transparency, $X'(d)$, must equal the marginal stakeholder-related cost of transparency, $W'(d)$.[17] From (12) and using our previous results on the form of $W(d)$ in the various scenarios, we obtain the following result which is proven in the Appendix:

Proposition 3 *When stakeholders are wealth constrained and $\widehat{w}_1(d^*) < 0$, it is optimal for the firm to be less transparent than under the conventional trade-offs, $d < d^*$. Otherwise, the optimal degree of transparency is determined by the conventional trade-offs, $d = d^*$.*

Intuitively, when $\widehat{w}_1(d^*) < 0$ and stakeholders are wealth constrained, the firm is not able to fully offset the rents that stakeholders will obtain during the development period (which are increasing in d) by reducing their compensation during the start-up period. Choosing a lower transparency level $d < d^*$ allows the firm to reduce total stakeholder compensation at the cost of deviating from the degree of transparency that would optimally resolve the conventional trade-offs, $d^* \equiv \arg\max X(d)$. Prior discussion implies that the transparency effects are more likely when the firm's stakeholders are wealth constrained, when $\overline{U}$ and μ are small, and when z and γ are large.

[17] To be sure, the case of wealth-constrained stakeholders requires paying attention to the non-differentiability of $W(d)$ at the point $\bar{d}$ in which $\widehat{w}_1(\bar{d}) = 0$ and $w_2(\bar{d}) = \overline{w}$, if it exists.

5 Endogenous relationship-specific investments

We now endogenize the experience gains z that quick learners obtain if the firm turns out to be a winner. We consider such gains as the result of some *innovative investments* undertaken by the firm during the start up period, after initiating its relationship with the stakeholders (at $t = 1$) but before the possible resolution of the uncertainty about firm quality (at $t = 2$). The investments that we have in mind include training programs that allow stakeholders (e.g., employees, customers or suppliers) to acquire the firm's know-how, R&D investments that widen the outside applicability of the firm's proprietary technologies, or the establishment of confidentiality procedures and licensing practices that limit the ability of those who do not keep a relationship with the firm to develop marketable skills. We assume that these investments, while observable for both the firm and its stakeholders, are unverifiable and hence non-contractible.[18] We model them as a direct choice of z by the firm, at a cost described by the strictly increasing and strictly convex function $C(z)$ already described in Section 2.[19]

We assume that the choice of z is restricted to an interval $[\underline{z}, \overline{z}] \subset (\Delta U, \Delta U/\gamma)$ so that the regularity condition (1) holds.[20] In addition, in order to highlight the effects channelled through the investment level z, we assume that either the stakeholders are not wealth constrained or their opportunity cost of dealing with the firm during the start-up period $\overline{U}$ is large enough to have $w_1(d) \geq 0$ for all d, so that the wealth constraints are not binding at $t = 1$.[21] Then, according to the analysis in Section 4.1, the total stakeholder compensation is, as in (10), $\overline{w} \equiv \overline{U} + (U_l + \gamma \Delta U) - \mu\gamma z$,which does not directly depend on the transparency

[18] Maskin (1999) shows that the unverifiability problem may be solved with the use of a mechanism based on the parties' announcements. Nevertheless, we exclude the possibility of using this type of mechanism in our analysis. This is in line with the approach taken by the incomplete contracts literature (e.g., Aghion and Bolton 1992, and Hart and Moore 2007), which argues that these mechanisms lack realism, are not robust to the possibility of renegotiation, and may not be robust to small amounts of private information (i.e., Aghion, Fudenberg, and Holden 2007).

[19] See Grossman and Hart (1986) and Hart (1995) for a theory of the firm that emphasizes the importance of relationship-specific investments.

[20] Technically, this can be ensured by assuming $\lim_{z^+ \to \Delta U} C'(z) = 0$ and $\lim_{z^- \to \frac{\Delta U}{\gamma}} C'(z) = +\infty$.

[21] At the end of the section we discuss the case in which stakeholders' wealth constraints are binding.

decision d.

It is also worth noting that stakeholders' expected gains from the innovative investments, $\mu\gamma z$, directly reduce $\overline{w}$, which implies that stakeholders are willing to receive such gains in lieu of their monetary compensation. Also, as we show, the firm's transparency choice d (made before the firm initiates the relationship with its stakeholders) can act as a commitment device to ensure the stakeholders a certain level of investment z.

5.1 Contractible investment scenario

As a benchmark, we start by examining the case where the innovative investments z are contractible and, hence, can be set at their first-best level. Since the stakeholders' experience gains $\mu\gamma z$ reduce their monetary compensation, ignoring additive constants, the value maximization program can be expressed as:

$$\max_{d\in[0,1],\ z\in[\underline{z},\overline{z}]} X(d) + [\mu\gamma z - C(z)], \tag{13}$$

whose first order conditions implicitly define the first-best solution (d^*, z^*)

$$X'(d^*) = 0, \tag{14}$$

$$\mu\gamma = C'(z^*). \tag{15}$$

Expressions (14) and (15) show that with contractible investments, the transparency decision is separable from the investment decision. In particular, transparency d^* is determined by the conventional non-stakeholder-related trade-offs, exactly as in the case of exogenous z and nonbinding wealth constraints considered in the previous section.[22]

5.2 Non-contractible investment scenario

We now consider the case of interest where the innovative investments z are not contractible. As we show, the investment level z is a decreasing function of the firm's transparency. Absent

[22] Notice that the marginal value of the z investment, $\mu\gamma$, is less than one because only quick learners in winner firms obtain experience gains. These results can be generalized to a situation where both types of stakeholders obtain gains as long as the marginal valuations of the investments **remain** higher for the quick learners in winner firms.

other transparency effects, the firm would make the transparency choice that commits it to choose the first-best z^*. In general, however, since there are other costs and benefits of transparency, z^* is not implemented.

We proceed by backwards induction. When z is chosen, the transparency d and the stakeholders' compensation $w_1(d)$ have already been determined. So z is set to maximize the firm's continuation value, which is affected by z through its effect on the compensation required to retain the stakeholders,

$$w_2(d, z) = U_h - \gamma z + \gamma(z - \Delta U)d, \tag{16}$$

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

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

which has the first order condition

$$\gamma(1-d) = C'(z). \tag{17}$$

For each possible value of d, (17) defines a unique solution $z = h(d)$, where, by the implicit function theorem, $h'(d) = -\gamma / C''(z) < 0$. This implies the following lemma.

Lemma 1 *When the stakeholders' wealth constraints are not binding and the firm's innovative investments z are not contractible, the level of the latter, $h(d)$, is a decreasing function of the firm's transparency d.*

Equation (17) captures an important feature of the analysis. In contrast to the first-best case, the investment z and the transparency decisions d are not separable. Specifically, a less transparent firm tends to invest more in its stakeholder relationships because, with less information disclosure, the costs of stakeholder retention are more sensitive to changes in stakeholders' expected experience gains. In other words, the transparency decision d works as a mechanism that allows the firm to commit to any desired level of z. Such a commitment device, however, is costly for the firm because the transparency level that implements the first-best level of z is generally different from the first-best transparency level d^*.

Specifically, the *second-best* level of transparency, d^{**}, takes into account its effect on the investment z and, thus, solves

$$\max_{d\in[0,1]} X(d) + [\gamma\mu h(d) - C(h(d))], \tag{18}$$

where we have replaced $h(d)$ for z in the terms that account for the benefits and costs of the z investment. Under our assumptions, the objective function in the above maximization is quasi-concave so a necessary and sufficient condition for a maximum is:

$$X'(d^{**}) = -h'(d^{**})[\gamma\mu - C'(h(d^{**}))], \tag{19}$$

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

It follows from (14) and (15) that, if $h(d^*) = z^*$, then $d^{**} = d^*$ solves (19) and, thus, the second-best solution coincides with the first-best solution. In general, however, under- and over-investment can occur. A parameter that determines which of the cases holds is μ, that is, the proportion of quick learners among the stakeholders. Specifically, by comparing (14) and (17), and noting that if $h(d^*) = z^*$ then $d^* = 1 - \mu$, we establish the following result:

Proposition 4 *When the stakeholders' wealth constraints are not binding and the proportion of quick learner stakeholders μ is above (below) the level $\mu^* \equiv 1 - d^*$, the firm chooses a lower (higher) transparency level, $d^{**} < d^*$ ($> d^*$), and underinvests (overinvests) in relationship-specific innovation, $h(d^{**}) < z^*$ ($> z^*$). Furthermore, as μ increases, d^{**} decreases and $h(d^{**})$ increases.*

The relation between transparency and the incentives to undertake relationship-specific investments stems from the time inconsistency problem that affects the firm's investment decision. Forward-looking stakeholders are willing to compensate the firm for their expected experience gains by improving their terms of trade (i.e., by accepting a lower monetary compensation). The investment level z, however, is set once the terms of trade for the start-up period (attracting compensation) are already fixed; hence, at that point, the firm only considers the effect of z on the terms of trade for the development period (retaining

compensation). When, as a result of this, the firm anticipates a problem of underinvestment (overinvestment) in relationship-specific innovation, it can partially correct the problem by choosing lower (higher) transparency, since this makes the terms of trade of the development period more (less) sensitive to z and thus increases (reduces) the ex post incentives to invest in z.[23]

The second part of the proposition states that when stakeholders are more likely to be quick learners (but do not know their types yet), they are willing to accept a larger reduction in their initial compensation in exchange for the potential experience gain z. Thus the optimal z investment is increasing in the stakeholders' ex ante probability of being quick learners, μ.

5.3 What if stakeholders' wealth constraints are binding?

So far in this section we have assumed that either the stakeholders are not wealth constrained or $\overline{U}$ is large enough so that, regardless of the choice of z, $w_1 > 0$ and there are no transparency costs due to stakeholders' inability to transfer rents back to the firm. Focusing on such a case allowed us to isolate the effects of transparency stemming from distortions in non-contractible investments. To complete the analysis, we now consider the case in which the stakeholders are wealth constrained and $\overline{U}$ is small enough to induce $w_1 = 0$. In this case, stakeholders cannot fully pay at $t = 1$ for the rents that they appropriate at $t = 2$.

In this situation, the firm's transparency level d has a direct effect on the firm's stakeholder costs, as in Section 4, and an effect via the investment z, as in Section 5. Specifically, since in this case the attracting compensation 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 are equal to

$$X(d) - w_2(d, z) - C(z), \tag{20}$$

[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 retention costs and, thus, reduces the rents appropriated by the slow learners. Notice that, as shown by (15), the ex ante optimal z increases with the proportion of quick learners, μ, while, as shown by (17), the ex post choice of z does not directly depend on μ but on the transparency level d.

where $w_2(d, z)$ is given by (16). Therefore, the value maximization program can be expressed as

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

whose solution $(\widehat{d}, \widehat{z})$ is implicitly defined by its first order conditions:

$$X'(\widehat{d}) = \gamma\widehat{z}, \tag{21}$$

$$\gamma(1-\widehat{d}) = C'(\widehat{z}). \tag{22}$$

From a direct examination of (21) and (22), we obtain the following proposition:

Proposition 5 *When stakeholders' wealth constraints are binding, the firm chooses a lower transparency level $\widehat{d} < d^*$ and a level of investment $\widehat{z}$ that can be either above or below the first best level z^*. Both $\widehat{d}$ and $\widehat{z}$ are independent of the proportion of quick learner stakeholders μ.*

This result leads us back to the logic of Proposition 3. Similarly to the exogenous z case, more transparency produces an increase in stakeholder retention costs and in total stakeholder costs as well. This leads the firm to choose a level of transparency below what would be optimal according to the conventional trade-offs (from (21), it is immediate to check that $\widehat{d} < d^*$, since $X'(d^*) = 0$). Furthermore, since stakeholders' wealth constraints are binding, z is set to reduce stakeholder retention costs and d plays no role as a commitment device. By comparing (15) and (22) it follows that $\widehat{z}$ may be above (if $\widehat{d} < 1-\mu$) or below (if $\widehat{d} > 1-\mu$) the first best level z^*.

6 Robustness issues

This section considers a number of robustness issues regarding modeling choices made in the analysis.

6.1 Stakeholders in a market setting

We have analyzed the relationship between the firm and its stakeholders in a partial equilibrium setting where some key determinants of stakeholders' attraction and retention costs

have been taken as exogenous. Specifically, we have assumed that (i) at the start up period, the stakeholders' opportunity cost of doing business with the firm equals $\overline{U}$; (ii) at the development period, slow and quick learners' opportunity costs of doing business with the firm are private information and equal to U_l and U_h, respectively; and (iii) experience gains z accrue solely to quick learners associated with winner firms during the development period.

Since stakeholders' types are private information, it is important to explain how they affect stakeholders' opportunity costs of staying with the firm. Specifically, in this section we describe a market setting in which the stakeholders' type does not affect compensation within the firm, but can affect what the stakeholders can realize from their outside alternatives. For clarity, we will assume that the stakeholders of interest are the firm's workers.[24]

Consider a setting with two classes of firms. In the first class, which is the focus of our model, production requires a team effort so that it is impossible to evaluate the productivity of each individual team member. In the second class of firms, which we can view as the workers' outside option, production is done by individuals rather than teams, so that the workers' production can be ex post observed.[25] Hence, the quick learners, who are more productive within the second class of firms, can be paid a higher wage. However, in contrast to the first class of firms, the second class offers its workers no experience gains during the development stage.

Within this setting, the quick learners might benefit from spending time with the first class of firms and then switching to the second class to obtain a higher salary. The optimal switching time for workers will depend on the (retention) salary offered by the first class of firms as well as the potential experience gains that it can provide to the worker. If a firm of the first class offers very large experience gains, and if the productivity difference between

[24] One can similarly view the stakeholder as a consumer who is considering two competing software products. The software will increase the productivity of both slow learners and quick learners, but will increase the productivity of quick learners more if it is produced by an innovative firm that will provide useful support. In this case, the quick learner will be willing to pay more than the slow learner for the product if it turns out that the experience gains are high, but would be willing to pay less than the slow learner for the product if it turns out that the experience gains are low.

[25] Alternatively, one can consider the workers' outside option as stemming from the possibility that, after getting training, the workers run their own business.

the sectors is small, the quick learner can be retained at a wage that is lower than what is required to retain the slow learner. However, if the productivity difference is very large and the experience gain is small, the quick learner will require a higher wage than the slow learner.

One can also interpret U_l and U_h without requiring that the experience acquired during the startup stage is valuable in the second class of firms. To see this, suppose that z is the only valuable experience, and that U_l, U_h reflect the workers' expectations about what they could get by breaking their relationship with a loser firm and starting a new relationship with a new startup of unknown quality. Under this interpretation, $\Delta U > 0$ reflects the fact that slow learners can never obtain z, while quick learners find it possible to get z by associating with a winner.[26]

As for the stakeholders' opportunity cost of doing business with the firm at the startup stage, $\overline{U}$, the model imposes no particular restriction. The interpretation of U_l and U_h as what each of the stakeholder types can earn somewhere else after accumulating experience during the startup period suggests that it is reasonable that $\overline{U} < U_l + \mu\Delta U$. This additional restriction, however, would not invalidate or qualify any of our results.

6.2 Long-term contracts

In this subsection, we discuss whether a more general contracting environment would modify our key results. We do so by revisiting the scenarios in which, according to the analysis in previous sections, transparency is costly.

In the scenario in which stakeholders' 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 stakeholder costs from the effects of transparency, making the distortion of the firm's transparency decision unnecessary. The short answer is no, except

[26] These interpretations of U_l, U_h, and z imply that $\Delta U > 0$ and $z > 0$, but do not impose any particular constraint on ΔU relative to z. Our results on the relevance of transparency only require that the former are less important than the latter, $\Delta U < z$ or, in other words, that the quick-learner winner-firm complementarity is important.

in the trivial—and arguably implausible—case in which stakeholders can fully commit to do business with the firm for both periods. In such a case, stakeholders would accept a total intertemporal monetary compensation of $\overline{w}$ when starting their relationship with the firm and the firm's transparency decision would be determined by the conventional non-stakeholder-related trade-offs.

Notice that even if stakeholders cannot directly commit to deal with the firm for more than one period, an equivalent commitment can be obtained by introducing a pecuniary penalty, L, imposed on stakeholders who break off their relationship with the firm. However, the penalty L would reduce stakeholders' retaining compensation to $w_2 = w_2(d) - L$ only if their attracting compensation were (at least) $w_1 = L$, in which case, the total expected stakeholder costs would be $w_1 + w_2 = L + (w_2(d) - L) = w_2(d)$, as in the case without the penalties analyzed in Section 4. If this is the case, our previous results remain valid.

In the main 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 retaining compensation to z) and the objective of ex ante value maximization (that calls for minimizing the sum of stakeholder compensation and z costs). However, long-term contracts cannot address the fundamental non-contractibility of z. They can 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.[27]

This polar no-investment solution is inferior to the solution without long-term contracts characterized in Section 5 if the proportion of stakeholders who are quick learners is above the critical level μ^* since, in such a case, the firm already underinvests in relationship-specific innovation (see Proposition 4); investing zero would simply aggravate the problem.

[27] Indeed, the sensitivity of w_2 to z can be eliminated by either committing the firm to a very high retaining compensation, so that all stakeholders are willing to continue their business with the firm in all states, irrespective of the value of z, or by fixing a very high break-up penalty for the stakeholders, so that they are willing to keep their relationship with the firm even with a zero retaining compensation and regardless 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, irrespective of its transparency level.

In contrast, if the proportion of quick learners is below μ^* (so that the firm overinvests in relationship-specific innovation), it is possible that, by fully eliminating the sensitivity of the retaining compensation to z, firm value increases relative to the solution characterized in (19).[28]

6.3 Other robustness issues

Our model makes a number of simplifying assumptions (on the number of stakeholder and firm types, the allocation of bargaining power, and the lack of variability of the firm's gross revenue with its type) that facilitate the analysis but are not essential to the results. In particular, we have checked that the mechanisms behind the transparency effects that we identify still work when: (i) there is a continuum of stakeholder types θ (i.e., stakeholders that differ in their opportunity costs of dealing with the firm in the development period, $U(\theta) = a + b\theta$ where $a, b > 0$ and $\theta \in [0, 1]$, as well as in the experience gains obtained by dealing with a winner, θz), (ii) there is a continuum of firm qualities (i.e., firms that differ in z), (iii) stakeholders have some bargaining power when their retention compensation is set, and (iv) the gross revenue of the firm, Y, varies with its quality and stakeholders' compensation can be made contingent upon it.[29]

7 Discussion of the results

While stakeholder relationships are important for all firms, they are essential to the inception, development, and survival of new firms (see Bhide and Stevenson 1999). In our analysis, we have identified three ingredients whose interplay create transparency costs: (i) ex-ante uncertainty about the firm's prospects that affect stakeholders' prospects, (ii) asymmet-

[28] Actually, in this case, the optimal z investment lies somewhere between the amounts invested when all stakeholders 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 stakeholders and short-term contracts to the rest. This argument suggests that the problem of overinvestment in z (and the remedy based on an aggressive transparency decision) is less pervasive than the problem of underinvestment in z (and the remedy based on a conservative transparency decision).

[29] Details of the derivations regarding the robustness of the results are available from the authors upon request.

ric information about stakeholders' ability to benefit from their experience with the firm, and (iii) the presence of either stakeholders' wealth constraints or some non-contractible relationship-specific investments that affect the value of stakeholders' experience with the firm. In this section we briefly describe how this analysis applies to stakeholders such as workers, suppliers, and customers.

The simplest way to illustrate the applicability of our model is to consider a firm that is hiring wealth constrained employees who are likely to gain from their experience with the firm. As we show in our model, because of rents caused by ex post information asymmetries, the hiring firm captures a smaller part of the benefits associated with those experience gains if the firm is more transparent. If the employees are not wealth constrained, however, the larger expected rents that workers expect to receive in the future are offset with a reduction in their initial wage. In contrast, wealth constrained employees may not be able to fully compensate their employer, ex ante, for the rents appropriated ex post, and the reduction in transparency may produce some net savings on employee compensation for the firm.

A very similar logic would also be applicable to financially constrained suppliers. For example, consider the suppliers of customized inputs of a new technology. If such a technology becomes an industry standard, the more capable suppliers will benefit by supplying a much larger market. Our theory predicts that suppliers can appropriate rents ex post if there is asymmetric information about the extent to which they benefit from their relationship with the firm. If the suppliers are financially constrained and cannot initially compensate the firm by charging a sufficiently low price, the firm may choose to be less transparent in order to reduce those rents.

The case for financially constrained customers is harder to make, but might also apply to some business-to-business sales in which the relevant buyers are start-ups with little financial capacity in the initial periods. In the absence of financial constraints, a more transparent firm might sell its product for a higher price. If, alternatively, there are upper limits to the price that the firm can initially charge for its products (e.g., piracy concerns in a software firm), the firm may reduce its transparency in order to gain a larger share of the consumer

surplus.

Our analysis also suggests that limiting transparency can benefit firms when they must make non-contractible investments that affect the value of the relationships with stakeholders. This transparency cost affects all classes of stakeholders, wealth constrained or not. Consider, for example, a software company and the early customers of a new software product. If the product succeeds, the more talented users of the earlier versions may profit from developing applications for the now dominant software. Our analysis suggests that with lower transparency, which allows the firm to capture a greater share of the rents from such activities, the firm has an incentive to commit to a larger investment in customer training and take other steps that increase the experience gains of its customers. All in all, our theory predicts preference for less transparency than what one could infer from the analysis of the standard transparency trade-offs.

Our comparative statics results indicate that, controlling for the importance of the relationship-specific investments (or if they are exogenous), the tilt toward less transparency should be more noticeable among firms for which the relevant stakeholders are: (i) wealth constrained (e.g., workers, independent professionals, small firms or start-ups, as opposed to, say, large or well-established corporations), (ii) young, relatively inexperienced, with a short track record, and (iii) sufficiently heterogeneous (so that their initial reservation compensation $\overline{U}$ is small, their potential experience gains z are large, and their types remain unknown and are sufficiently different).

Our results also predict a tilt toward less transparency for firms where stakeholders are not financially contrained but have a high probability of being able to benefit from uncontractible relationship-specific investments that the firm can undertake. According to our comparative statics results, among these firms, we would expect transparency to decrease and the investments to increase with the proportion of quick learners.[30] In constrast, for firms dealing with stakeholders with binding financial constraints, we would expect no sys-

[30] These implications are valid for values of μ compatible with assumption (2). Otherwise, no systematic relationship between μ and transparency is expected.

tematic relationship between the proportion of quick learners and transparency, or between the proportion of quick learners and the importance of relationship specific investments.

Overall, our analysis suggests that transparency choices may have important unintended consequences for firms that need to initiate and nurture relationships with their stakeholders. While we are not aware of empirical studies which formally investigate these effects, our model suggests that this may be an area of fruitful future research. Our analysis also has public policy implications. While imposing high transparency standards may have some merits, our analysis suggests that for young firms that are heavily dependent on stakeholder relationships, such an imposition is not without costs.

8 Concluding remarks

The perceptions of stakeholders play an important role in getting a firm started and continue to play an important role as the firm matures. As we emphasize in this paper, entrepreneurs make a number of choices that can affect the transparency of the firm and need to be cognizant of how these choices can influence stakeholder perceptions. For example, as we mentioned in the Introduction, transparency considerations can potentially influence how a firm is financed, e.g., the choice of private versus public equity financing, and the timing of their IPOs. There is a large literature on the costs and benefits of going public, some of which describe the information generated by the due diligence and book building process of the investment banker and the analysts. Our contribution to this literature is the observation that the increased scrutiny by public investors and analysts is not necessarily a good thing. We provide a rationale for firms to (at least temporarily) stay out of the lime light of the public markets, and remain, say, a less transparent private firm that gets "the benefit of the doubt".[31]

There are many other choices that firms make that can also affect the extent to which the

[31] Investment banks have a legal mandate to investigate firms (i.e., perform due diligence) before marketing their shares, and there exists evidence that suggests that institutional investors tend to be relatively informed when they acquire shares in a secondary offering (i.e., Gibson et al., 2004).

firm is scrutinized. For example, an entrepreneur may choose to locate away from industry clusters, like Silicon Valley, to keep a lower profile while the firm is getting established. The firm may also want to avoid high profile investments , which are likely to attract the scrutiny of journalists and analysts, and similarly, they might want to discourage would be suitors, who might uncover unfavorable information in the course of their due diligence.

More broadly, the transparency concerns that we have analyzed applies to a number of other corporate decisions. For instance, regarding firms' financing decisions, the Wall Street Journal reported that during uncertain times corporations failed to take advantage of lower interest rates to refinance their debt (see "The Refinancing Boom Hasn't Hit Corporations," October 15, 2002). As suggested in the article, if a bond deal goes awry it can raise questions about a company's financial health and weigh on its stock price at a time when investors are particularly punishing. The head of the U.S. capital markets at Credit Suisse First Boston was quoted as saying that "Chief financial officers are saying for a relatively small amount of savings, I don't want to expose myself to that risk."

Transparency concerns are also likely to play a role on a firm's decision to merge. For example, Branderburger and Nalebuff (1996) discuss how the board of Continental Insurance decided not to accept a lucrative takeover offer from CNA that was conditional on due diligence (p. 214). 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 Insurance's proxy statement, March 29, 1995). Similarly, on July 12, 2007, Reuters reported that, in the context of the dealings between Iberia Airlines and TPG, a consortium interested in purchasing the airline, Iberia's board agreed to provide additional information but only if it received a binding offer that the board considered interesting for the company. One can interpret Iberia's board behavior as an attempt to protect Iberia from the negative effects of transparency.

APPENDIX

Analysis of the scenarios with $\Delta U \notin (\gamma z, z)$ For brevity, we neglect the borderline cases in which $\Delta U = \gamma z$ or $\Delta U = z$. As in the derivation of (4)-(10), it follows that:

1. If $\Delta U < \gamma z$, then $w^u = w^g = U_l$ and $w^b = U_h$, so $w_2(d) = U_l + (1-\gamma)\Delta U d$, and $\widehat{w}_1(d) = \overline{U} - \mu(\gamma z - \Delta U) - (1-\gamma)\Delta U d$. Thus, as in Proposition 1, stakeholder retention costs $w_2(d)$ are increasing and $\widehat{w}_1(d)$ is decreasing in d. Therefore, stakeholders' financial constraints (if they exist) are more likely to be binding (i.e., $\widehat{w}_1(d) \leq 0$) if d is large. As in Section 4.1, if the constraints bind, we have $W(d) = w_2(d)$, which is increasing in d, while otherwise we have $W(d) = \overline{w}$, which is independent of d. The results in Propositions 2 and 3 hold without qualification. In this case $w_2(d)$ does not feature any interaction between d and z—in fact, $w_2(d)$ does not depend on z. Hence, in the range with $z > \Delta U/\gamma$, the firm will have no ex post incentive to further increase z, and the transparency decision d cannot play the committment role identified in Lemma 1 and Proposition 4. The results referred to z in Proposition 5 do not apply either.

2. If $\Delta U > z$, then $w^u = U_h - \gamma z$, $w^g = U_h - z$ and $w^b = U_h$ (i.e., the quick learner stakeholders are always pivotal), so $w_2(d) = U_h - \gamma z$, and $\widehat{w}_1(d) = \overline{U} - (1-\mu)(\Delta U - \gamma z)$. In this case, d does not affect stakeholder retention costs or the likelihood that stakeholders' financial constraints (if they exist) are binding (i.e., $\widehat{w}_1(d) \leq 0$). As in Section 4.1, total stakeholder costs are $W(d) = w_2(d)$ if stakeholders' financial constraints are binding, and $W(d) = \overline{w}$ otherwise. Thus, in the scenario with exogenous f z, transparency has no stakeholder-related effects and $d = d^*$. With endogenous $z < \Delta U$, the chosen z would satisfy the first order condition $\gamma = C'(z)$ (see Section 5.2), which is obviously independent of d. Summing up, in this scenario z is too small for the stakeholder related effects of transparency to be relevant.

Proof of Proposition 3 When stakeholders are not wealth constrained, $W(d) = \overline{w}$ for all d including d^*. Hence, $W'(d^*) = 0$ and d^* solves (12). When stakeholders are wealth

constrained, the analysis in Section 4.1 implies that:

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

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

$$\bar{d} \equiv \frac{\overline{U} - (1-\mu)(\Delta U - \gamma z)}{\gamma(z - \Delta U)} \in (0,1) \tag{23}$$

such that $\widehat{w}_1(\bar{d}) \geq 0$, which implies $W(d) = \overline{w}$ for $d \leq \bar{d}$ and $W(d) = w_2(d)$ for $d > \bar{d}$.

(iii) If $\overline{U} - (1-\mu)(\Delta U - \gamma z) \geq \gamma(z - \Delta U)$, then $\widehat{w}_1(d) > 0$ and $W(d) = \overline{w}$ for all d. In this case, the situation is equivalent to the case of wealth unconstrained stakeholders.

For convenience, let us extend the definition of $\bar{d}$ making it take value 0 if $\overline{U} \leq (1-\mu)(\Delta U - \gamma z)$. Then, when looking for candidate solutions to the first order condition (12) in cases (i) and (ii), we can have three exhaustive possibilities:

(a) $d < \bar{d}$. In this case, $W(d) = \overline{w}$ so (12) becomes $X'(d) = 0$, whose solution is $d = d^*$. Hence if $d^* < \bar{d}$, the firm's optimal transparency is d^*, which is then exclusively determined by the conventional non-stakeholder-related trade-offs captured by $X(d)$.

(b) $d > \bar{d}$. In this case, $W(d) = w_2(d)$ so, using (7), (12) becomes $X'(d) = \gamma(z - \Delta U)$, whose solution is $d = \widehat{d} < d^*$. Hence if $\widehat{d} > \bar{d}$, the firm's optimal transparency is $\widehat{d}$, which is smaller than d^* due to the stakeholder-related costs of transparency.

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

Therefore, the solution is $d = \max\{\widehat{d}, \bar{d}\} < d^*$ when $\bar{d} < d^*$, and $d = d^*$ when $\bar{d} \geq d^*$. Finally, notice that $\bar{d} \geq d^*$ whenever $w_1(d^*) \geq 0$.■

REFERENCES

Aghion, P., and P. Bolton (1992), An incomplete contracts approach to financial contracting, *Review of Economic Studies* 59, 473-494.

Aghion, P., D. Fudenberg, and R. Holden (2007), Subgame perfect implementation with almost perfect information, mimeo, Harvard University.

Anand, B., and A. Galetovic (2000), Weak property rights and hold-up in R&D, *Journal of Economics and Management Strategy* 9, 615-642.

Anton, J., and D. Yao, (1994), Expropriation and inventions: Appropriable rents in the absence of property rights, *American Economic Review* 84, 190–209.

Anton, J., and D. Yao (2002), The sale of ideas: Strategic disclosure, property rights and contracting, *Review of Economic Studies* 69, 513-531.

Audia, P., and C. Rider (2006), Entrepreneurs as organizational products: Revisited in *The Psychology of Entrepreneurship* by J. Baum, R. Baron & M. Frese (Eds.), Hillsdale, NJ: Lawrence Erlbaum Associates.

Bhattacharya, S., and G. Chiesa (1995), Proprietary information, financial intermediation, and research incentives , *Journal of Financial Intermediation* 4, 328-357.

Bhide, A., and H. Stevenson, 1999, Attracting stakeholders, in *The Entrepreneurial Venture*, W. Sahlman and H. Stevenson (eds.), Harvard Business School Publications, Boston, Massachusetts, 2nd edition.

Biais, B., and E. Perotti (2004), Entrepreneurs and new ideas, CEPR Discussion Paper no 3864, London.

Brandenburger, A., and B. Nalebuff (1996), *Co-opetition,* Currency and Doubleday, New York.

Brittain, J., and J. Freeman (1986), Entrepreneurship in the semiconductor industry, mimeo, University of California at Berkeley.

Burkart, M., D. Gromb, and F. Panunzi (1997), Large shareholders, monitoring, and the value of the firm, *Quarterly Journal of Economics* 112, 693-728.

Cassiman, B., and M. Ueda (2006), Optimal project rejection and new firm start-ups, *Management Science* 52, 262-275.

Diamond, D., and R. Verrecchia (1991), Disclosure, liquidity, and the cost of capital, *Journal of Finance* 46, 1325-1359.

Easterbrook, F. (1984), Two agency-cost explanations of dividends, *American Economic Review* 74, 650-659.

Franco, A., and D. Filson (2000), Knowledge diffusion through employee mobility, Staff Report 272, Federal Reserve Bank of Minneapolis.

Gans, J., and S. Stern (2000), Incumbency and R&D incentives: Licensing in the gale of creative destruction, *Journal of Economics and Management Strategy* 9, 485-511.

Gibson, S., A. Safieddine, and R. Sonti (2004), Smart investments by smart money: Evidence from seasoned equity offerings, *Journal of Financial Economics* 72, 581-604.

Gompers, P., J. Lerner, and D. Scharfstein (2005), Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986 to 1999, *Journal of Finance* 60, 577-614.

Gromb, D., and D. Scharfstein (2001), Entrepreneurial activity in equilibrium, mimeo, Massachusetts Institute of Technology.

Grossman, S., and O. Hart (1986), The costs and benefits of ownership: A theory of vertical and lateral integration, *Journal of Political Economy* 94, 691-719.

Hart, O. (1995), *Firms, contracts and financial structure,* Clarendon Press Oxford.

Hart, O. and J. Moore (2007), Incomplete contracts and ownership: Some new thoughts, *American Economic Review* 97, 182-86.

Hellmann, T. (2007a), When do employees become entrepreneurs?, *Management Science* 53, 919-933.

Hellmann, T. (2007b), Entrepreneurs and the process of obtaining resources, *Journal of Economics and Management Strategy* 16, 81-109.

Hellmann, T., and E. Perotti (2006), The circulation of ideas: Firms versus markets, mimeo, University of British Columbia.

Hermalin, B., and M. Weisbach (1998), Endogenously chosen boards of directors and their monitoring of the CEO, *American Economic Review* 88, 96-118.

Hermalin, B., and M. Weisbach (2007), Transparency and corporate governance, NBER WP No. 12875.

Lewis, T., and D. Yao. (2003), Innovation, knowledge flow, and worker mobility, Duke University Working Paper.

Maskin, E. (1999), Nash equilibrium and welfare optimality, *Review of Economic Studies* 66, 23-38.

Pagano, M., and A. Röell (1998), The choice of stock ownership structure: agency costs, monitoring, and the decision to go public, *Quarterly Journal of Economics* 113, 187-225.

Pakes, A., and S. Nitzan (1983), Optimum contract for research personnel, research employment, and the establishment of rival enterprises, *Journal of Labor Economics* 1, 345-365.

Perotti, E., and E.-L. von Thadden (2003), Strategic transparency and informed trading: Will capital market integration force convergence of corporate governance?, *Journal of Financial and Quantitative Analysis* 38, 61-85.

Saxenian, A. (1994), *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge: Harvard University Press.

Singh, R., and V. Yerramilli (2007), Can transparency be too much of a good thing?, mimeo, University of Minnesota.

Subrahmanyam, A., and S. Titman (1999), The going public decision and the development of financial markets, *Journal of Finance* 54, 1045-1082.

Teoh, S. (1997), Information disclosure and voluntary contributions to public goods, *RAND Journal of Economics* 28, 385-406.

Verrecchia, R. (2001), Essays on disclosure, *Journal of Accounting and Economics* 32, 97-180.