Reputable Friends as Watchdogs: Social Incentives and Modes of Governance*

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December 30, 2009

Abstract

This paper studies the effect of social ties on governance. Social ties are *per se* neutral and merely act as *incentive bridges* that transmit incentives across individuals. Whether this improves or undermines governance depends on what incentives are transmitted. We demonstrate this in a delegated monitoring model where the supervisor is friends with the agent and cares about social recognition. Two basic modes of governance emerge, *authority* and *loyalty*, which differ in whether they encourage or discourage social ties. This dichotomy reconciles opposing views on social ties and governance, and provides new perspectives on family firms, gray directors, business networks, and organizational culture.

JEL Classification: D82, D86, G30

Keywords: Social Capital, Social Networks, Governance, Organization

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We thank Patrick Bolton, Tore Ellingsen, Navin Kartik, and seminar participants at LBS and LSE for helpful comments.

1 Introduction

Granovetter (1985) emphasized that economic action is embedded in structures of social relations. Examples abound and include family firms, workplace relationships, and alumni networks. Indeed, many of us mix business with pleasure inasmuch as our personal and professional networks overlap. Accordingly, it is often crucial for the governance of an organization to understand when social ties among its members are beneficial and when they are harmful for achieving the organizational objectives. This paper attempts to shed light on this question.

Opinion about the consequences of social ties for governance is divided. This is reflected by the tension between the *crony capitalism* view of social networks as promoting expropriation and corruption and the *social capital* view of social networks as promoting trust and cooperation.[1,2] Many are, for example, critical of the mélange of social ties and corporate control evident in family firms. Yet, family ownership is the dominant form of corporate ownership around the world, and in many countries, such as Thailand and Korea, economic growth has been tantamount to the success of family business groups (Claessens et al., 2000).

[1] Compare, for example, the surveys by Morck et al. (2005) and Khanna and Yafeh (2007). More broadly, social ties have been shown to promote cooperation and trade in various settings, including regional governments (Putnam, 1993), bank lending (Petersen and Rajan, 1994; Uzzi, 1999), and job search (Granovetter, 1974; Bian, 1997). Skeptics counter that social ties may constrain a person's cooperation to her immediate network, thereby impairing adaptation and growth (Olson, 1982; Portes and Landolt, 1996). In support of this view, some studies show that social ties can lead to favoritism in bank lending (La Porta et al., 2003; Charumilind et al., 2006), discrimination and nepotism (Becker, 1971; Fershtman et al., 2005), and corruption (Callahan, 2005; Harris, 2007).

[2] In his book *The World's Banker*, Sebastian Mallaby narrates an anecdote about a discussion between James Wolfensohn, then president of the World Bank, Suharto, then president of Indonesia, and Zhu Rongji, then Vice-Premier of China, in which Suharto asks Zhu, "Don't you think we should tell the president of the World Bank about corruption in this part of the world?," whereupon Suharto turns to Wolfensohn and says, "You know, what you regard as corruption in your part of the world, we regard as family values."

Our analysis in this paper reconciles these opposing views to the extent that it encompasses them both in a single framework. The basic tenet is that social ties are, in the abstract, a neutral governance instrument; they act solely as *incentive bridges*, that is, connections that transmit incentives among agents. Whether or not an organization benefits from such a transmission of incentives among its members depends on the specific context. In other words, social ties can improve or undermine governance. More importantly, this duality gives rise to two distinct *modes of governance*, which differ in whether they encourage or discourage social ties within the organization.

To demonstrate this logic, we revisit a classic governance problem: delegated monitoring.[3] A principal relies on an agent to implement an action, and hires a supervisor to monitor the agent and, if necessary, to intervene. This may describe, for example, the situation of a company's shareholders, management, and board of directors. Our point of departure is to adapt this framework to organizations or settings in which social ties are salient. Two important examples on our mind are *family firms*, such as the Wallenberg family in Sweden, and *gray directors*, such as Bill Gates—a longtime friend of Warren Buffett—serving on the board of Berkshire Hathaway.[4] Both examples feature, and hence motivate us to build into the framework, elements of *friendship* (family, friends) and *reputability* (family name, public image) as social factors that possibly affect the quality of governance.

Our objective is to analyze how these elements affect the role of supervision. To this end, we make two assumptions about the supervisor. First, the supervisor may derive utility from being perceived as a person of integrity, that is, as having

[3]See, for example, Diamond (1984), Tirole (1986), and Holmstrom and Tirole (1997).
[4]Gray directors are non-executive board members who have social ties to the CEO.

honored her obligation to monitor the agent. Formally, we model this as a form of *social recognition*, whereby the supervisor may experience pride (or shame) to the extent that the principal credits (blames) her for the outcome.[5] Second, the supervisor and the agent may share a friendship. Formally, we model this in the form of *directed altruism*, whereby the supervisor and the agent partly internalize each other's well-being. The model allows us to vary the importance of both social recognition and friendship. We shall refer to these collectively as *social incentives*, whereas we reserve the term social ties for friendship.

To isolate the role of social incentives, we begin our analysis with the case of incomplete contracts, in which wages cannot be made contingent on the outcome. Without monetary incentives, the only motivation for the supervisor to monitor is to earn social recognition. In this setting, we study how friendship affects the equilibrium outcome. Consistent with common sense, friendship undermines the supervisor's incentives to interfere with the agent's action, and therefore reduces monitoring. However, because friendship is mutual, it also influences the agent. It makes him more averse to actions that put the supervisor in a bad light, and hence more inclined toward actions that are in the principal's interest. We refer to the first effect as *capture*, as the supervisor becomes de facto "captured" by the agent, and to the second effect as *loyalization*, as the agent becomes "loyal" to the supervisor and, by extension, to the principal.

This dual effect highlights that social ties merely make individual incentives mutually contagious. In a given context, what matters to the principal is whose

[5]More precisely, we follow Benabou and Tirole (2006) and Ellingsen and Johannesson (2008) in assuming that the supervisor values others' assessment of her type, with the difference that the type is determined *ex interim* in this model.

incentives, the supervisor's or the agent's, prevail in this incentive "tug-of-war"; that is, whether capture or loyalization is more important. Depending on this, it turns out that the principal favors one of two fundamentally different *modes of governance*. In one, which we call the *authority* regime, the agent acts opportunistically, but the supervisor assumes active responsibility by monitoring the agent. This regime is built on distance, distrust and conflict. In the other, which we call the *loyalty* regime, the agent behaves in the principal's interest on his own accord, while the supervisor assumes passive responsibility by bearing the blame for undesirable outcomes.[6] This regime is built on proximity, trust and mediation. In sum, these two regimes are polar opposites along several spectra and, as such, represent two basic modes of governance.

The discourse about social ties and governance can be recast in terms of this dichotomy. The crony capitalism view reflects the concern that social ties undermine the authority regime, whereas the social capital view reflects the hope that social ties sustain the loyalty regime. In other words, crony capitalism and social capital are but two sides of the same coin. Our theory proposes a way to empirically discriminate between one and the other. While both capture and loyalization are marginal effects of friendship, which effect dominates depends on the supervisor's desire for social recognition: a stronger desire to earn the principal's recognition weakens capture, but strengthens loyalization because the agent inherits this desire.

Allowing for monetary incentives does not affect the essence of our argument.

[6] Active responsibility is responsibility *ex ante* in the sense of taking responsibility to ensure a certain outcome in the future. Passive responsibility is responsibility *ex post* in the sense of being held responsible for an outcome in the past. See, for example, Bovens (1998).

When wages can be made contingent on the outcome, the principal optimally incentivizes either the supervisor to implement an authority regime or the agent to implement a loyalty regime. The optimal monetary incentives reinforce the propensity, toward either authority or loyalty, inherent in the social incentives. Hence, social incentives matter for optimal monetary incentives. In fact, variation in social incentives can drastically change the optimal structure of monetary incentives because it can alter the optimal mode of governance, i.e., lead to a "regime switch".

Rather than optimizing monetary incentives *given* social incentives, one can analyze how to (jointly) optimize monetary *and* social incentives. This is an important question given that many organizations carefully design the social context among their members, for example, by selecting members based on social fit or by actively shaping corporate culture. We find that, in some cases, the principal's preferences over various combinations of social and monetary incentives can exhibit two local optima, implementing an authority regime and a loyalty regime, respectively. In these cases, a gradualist approach—marginally changing monetary or social incentives, depending on which one is cheaper—brings the principal closer to the nearest local optimum, but not necessarily to the incentive system that she prefers the most. Instead, the principal may have to adopt a *big bang* approach to reform the organization's mode of governance.

Finally, our theory predicts that increasing the salience of social recognition—e.g. by ostensibly praising good performance through symbolic rewards ("employee of the month")—and promoting social ties—e.g. through team-building activities—are complementary measures to promote a loyalty regime within an organization. Together, these measures foster a culture in which organizational norms trickle down the hierarchy via social ties, so that members at different levels cooperate on the basis of trust, rather than on the basis of authority or purely monetary incentives.

This paper belongs to the economics literature that studies the role of social incentives for the design of contracts and organizations (e.g., Benabou and Tirole, 2006; Ellingsen and Johannesson, 2008; Fehr et al., 2008). We contribute to this literature by studying how social ties and social recognition affect the governance of organizations. For this purpose, we incorporate both social ties and social recognition into a delegated monitoring model (Diamond, 1984; Tirole, 1986; Holmstrom and Tirole, 1997). This extended model has several potential applications such as family firms, gray directors, and corporate culture. We relate our findings to the relevant literatures when we discuss these applications.

Our main findings are reminiscent of views expressed in the sociological literature, especially on social capital and on social networks. The notion that social ties among people are *per se* neutral is expressed in Putnam (1996)'s quote that "whether or not their shared goals are praiseworthy is, of course, entirely another matter" (p. 34). Accordingly, it is recognized that social ties can be both harmful and beneficial, even though many analyses tend to emphasize either the positive consequences (e.g, Putnam, 1993) or the negative consequences (e.g., Bourdieu, 1983). For instance, distinguishing between *strong ties* within a close-knit group and *weak ties* across different groups, Granovetter (1973, p.1378) writes:

> "Weak ties [...] are [...] indispensable to individuals' opportunities and to their integration into communities; strong ties, breeding local

cohesion, lead to overall fragmentation."

In the same spirit, Putnam (1993) distinguishes between *bonding* and *bridging* social capital.[7] In our model, the bonding and bridging effects of social ties are manifest in capture and loyalization, respectively. Capture is a bonding effect inasmuch as it creates a coalition of the subordinates against the principal and exacerbates the conflict of interest. In contrast, loyalization is a bridging effect inasmuch as it mediates the conflict of interest between the agent and the principal. From this angle, the present paper can be viewed as analyzing the role of bonding and bridging effects for the governance of organizations.

The paper proceeds as follows. Section 2 presents the basic model. Section 3 examines the role of social incentives in the case of incomplete contracts. Section 4 examines the interaction between monetary incentives and social incentives. Section 5 concludes the paper. Mathematical proofs are in the Appendix.

2 Model

2.1 Delegated Monitoring

The principal (P) can hire an agent to implement an action on her behalf. There are two possible actions, g and b. The principal cannot distinguish g from b, but the agent has this ability. Each action generates benefits for the principal, π_P,

[7] See also Portes and Sensenbrenner (1993) and Portes (1998).

and for the agent, π_A, given by

$$\begin{aligned}\pi_P(g) &= X_g > 0, \quad \pi_P(b) = X_b = 0, \\ \pi_A(g) &= B_g > 0, \quad \pi_A(b) = \tilde{B}_b > B_g,\end{aligned}$$

where $\tilde{B}_b$ is a random variable with p.d.f.

$$f(\tilde{B}_b) = \begin{cases} \alpha & \text{for } \tilde{B}_b = B_b^L \\ 1-\alpha & \text{for } \tilde{B}_b = B_b^H > B_b^L \end{cases}.$$

The agent privately observes the realization of $\tilde{B}_b$ prior to making his action choice, which the principal cannot observe. The payoff structure is commonly known and induces a conflict of interest over the choice between g and b: the agent strictly prefers b, while the principal strictly prefers g.

To mitigate this agency problem, the principal can hire a supervisor (S). The supervisor cannot freely observe whether the agent's proposed action is of type b or g. However, she can engage in monitoring, which reveals the true action with probability 1, at a random cost $\tilde{c}$, with p.d.f.

$$g(\tilde{c}) = \begin{cases} \beta & \text{for } \tilde{c} = \underline{c} \\ 1-\beta & \text{for } \tilde{c} = \overline{c} > \underline{c} \end{cases}.$$

If the supervisor monitors ($e = 1$) and discovers that the agent proposed b, the supervisor can convert b to an action of type g at no cost.[8] If she does not monitor

[8] The assumption that the supervisor can simply alter the action is not crucial. Alternatively, we could assume that successful monitoring reduces the private benefits associated with b such that the agent's preferences over g and b are reversed (cf. Holmstrom and Tirole, 1997).

($e = 0$), the agent's action choice is implemented.

The supervisor privately observes the realization of $\tilde{c}$ prior to making her monitoring choice. The principal neither observes $\tilde{c}$ nor the monitoring choice. The distribution $g(\tilde{c})$ is commonly known and, for simplicity, independent of the distribution $f(\tilde{B}_b)$. The principal may have to pay the supervisor a fixed wage $w \geq 0$ to compensate for monitoring costs.

To isolate the problem of interest, we further assume that the agent and the supervisor have no wealth (limited liability), and that the actual outcome X is observable to the three players but not verifiable by a third party (incomplete contracts). Thus, without further constraints, the principal can neither induce the agent to choose g, nor the supervisor to monitor. For now, we also abstract from the possibility of communication, including side transfers, between the agent and the supervisor. All players are risk-neutral.

Finally, we make the following assumption.

Assumption 1 *$X_g - X_b$ is an order of magnitude larger than $B_b^H + \bar{c}$.*

The assumption implies that the efficient choice for the agent is to implement g (and for the supervisor not to monitor); and that the efficient choice for the supervisor is to monitor if (and only if) the agent chooses b.

2.2 Social Recognition and Directed Altruism

The supervisor cares about the principal's opinion of her. Specifically, she derives (more) utility from being perceived by the principal as a person of high(er) integrity.[9] We suppose that the supervisor *ex ante* promises to monitor the agent's

[9] Like Jensen (2009), we define integrity as "honoring one's word".

action choice. *Ex post*, the principal evaluates the integrity of the supervisor by forming a (Bayesian) belief about whether the supervisor actually kept her promise and monitored the agent. We denote this belief by

$$\Pr(e = 1 \,|X\,) = \begin{cases} \theta_g & \text{if } X = X_g \\ \theta_b & \text{if } X = X_b \end{cases} .$$

This integrity assessment represents the social recognition that the supervisor receives from the principal. In the spirit of Ellingsen and Johannesson (2008), we assume that the supervisor values this social recognition. More precisely, the supervisor's payoff function π_S is given by

$$\pi_S = \begin{cases} \rho\theta_g + w - ec & \text{if } X = X_g \\ -\rho\,(1-\theta_b) + w - ec & \text{if } X = X_b \end{cases} .$$

If X_g is realized, the principal may give the supervisor some credit for this, which is captured by θ_g. The supervisor gets utility $\rho\theta_g$ from getting this credit, and we refer to $\rho\theta_g$ as *pride*. If X_b is realized, the principal may think that the supervisor is partly to blame for this, which is captured by $1-\theta_b$. The supervisor suffers disutility $\rho\,(1-\theta_b)$ from this blame, and we refer to $-\rho\,(1-\theta_b)$ as *shame*.[10,11]

While this formalization of pride is intuitive—the principal may partly at-

[10] The agent does not care about the principal's opinion of him. This is a simplification. If the agent cares enough about what the principal thinks of him, this will mitigate the primary agency problem. However, to the extent that it does not fully resolve this problem, the need for a supervisor remains and the current analysis characterizes the residual interaction.

[11] This formulation implicitly assumes that supervisor feels pride when a good outcome is realized (X_g) and shame when a bad outcome is realized (X_b). While this is the appropriate formalization for the applications that we discuss in this paper, it should be noted that there may be other contexts in which social recognition is conferred for negative outcomes.

tribute a good outcome to the supervisor having done a commendable job monitoring the agent, which the supervisor values—the following example provides some intuition for how shame works in the model. Note that, in the context of a firm, we think of the shareholders as P, the management as A, and the board of directors as S. Consider the shareholders of Enron, when they were faced with the firm's bankruptcy (X_b). They may have partly attributed this to the fact that Enron's board of directors had failed to do its job, i.e., to police the management. In the model, $(1-\theta_b)$ reflects the probability that the shareholders attributed to the collapse being due to the board's negligence. Being blamed for the collapse inflicted negative utility, or shame, on the directors. As Patrick McGurn, then Vice President at Institutional Shareholder Services (ISS), put it, "The directors of Enron are going to carry this stigma with them."[12] Note that, for our results, it does not matter whether the shame is affective (a purely hedonic good) or instrumental (confers deferred material consequences).[13]

The supervisor and the agent exhibit altruism towards each other (but not towards the principal). Given that π_A and π_S denote the agent's and the supervisor's *payoffs*, their other-regarding *utilities* are given by

$$u_A = \pi_A + \phi_{AS}\pi_S \quad \text{and} \quad u_S = \pi_S + \phi_{SA}\pi_A.$$

We assume that the altruism between the supervisor and the agent is *mutual* in the sense that $\phi_{SA} = \phi_{AS} = \phi$, where ϕ reflects the intensity of their personal

[12] *New York Times*, December 16, 2001.

[13] The fact that a bad outcome can confer negative utility on the supervisor implies that, *ex post*, a supervisor can regret having taken on the job. The following quote from Richard F Syron, of Freddie Mac, reflects this notion; "If I had perfect foresight, I would never have taken this job in the first place." *New York Times*, August 5, 2008.

relationship, or *friendship*.[14] The parameters $\rho \geq 0$ and $\phi \in [0, 1]$ are, for now, commonly known and exogenously given.

2.3 Timeline

The basic analysis takes the presence of the supervisor as given. In stage 0, the supervisor promises to monitor and to convert a detected type b action. In stage 1, the agent privately observes the realization of $\tilde{B}_b$, and the supervisor privately observes the realization of $\tilde{c}$. In stage 2, the agent proposes an action, and the supervisor decides whether to monitor or not. If the supervisor monitors and detects a type b action, she chooses whether to convert it or not. In stage 3, the action is implemented, the outcome of the action is publicly observed, and the principal forms beliefs about the supervisor's integrity. In stage 4, all utilities are realized, and the game ends.

2.4 Equilibrium Concept

We solve the game for pure-strategy Perfect Bayesian Equilibria.

A pure strategy of the agent specifies an action choice for each realization of $\tilde{B}_b$; it is a mapping from the information set $\left\{B_b^H, B_b^L\right\}$ to the action set $\{g, b\}$. There exist $2^2 = 4$ strategies of which only three are relevant: to never choose g, to choose g only when $\tilde{B}_b = B_b^L$, and to always choose g.[15] Each of these strategies can be characterized by the probability that g is chosen, denoted by $p \in \{0, \alpha, 1\}$.

A pure strategy of the supervisor specifies a monitoring choice for each realiza-

[14] See, e.g., Camerer (2003) and Alger and Weibull (2009).

[15] Clearly, if the agent chooses b when $\tilde{B}_b = B_b^L$, he will never choose g when the incentives for choosing b are stronger, i.e., when $\tilde{B}_b = B_b^H$.

tion of $\tilde{c}$; it is a mapping from the information set $\{\underline{c}, \overline{c}\}$ to the action set $\{0, 1\}$. There exist $2^2 = 4$ strategies of which only three are relevant: to always monitor, to monitor only when $\tilde{c} = \underline{c}$, and to never monitor.[16] Each of these strategies can be characterized by the probability of monitoring, denoted by $m \in \{1, \beta, 0\}$. The supervisor's decision whether to correct a detected type b action is subsumed in her monitoring decision. It is straightforward to show that the supervisor does not monitor unless she prefers g over b.

The principal's ex post beliefs about the probability that the supervisor monitored the agent are a function of the observed outcome $\tilde{X}$, and (when well-defined) are given by

$$\theta(X) = \frac{\hat{m}(X)}{\hat{m}(X) + \hat{p}(X)(1 - \hat{m}(X))} \equiv \begin{cases} \theta_g & \text{if } X = X_g \\ \theta_b & \text{if } X = X_b \end{cases}, \tag{1}$$

where $\widehat{\sigma}$ denotes a conjecture about a variable σ.

A Perfect Bayesian Equilibrium (henceforth equilibrium) consists of a strategy profile (p, m) and a set of beliefs (θ_g, θ_b) such that the strategies are best responses given the beliefs, and the beliefs are consistent with the strategies.

[16] Clearly, if the supervisor chooses to monitor when $\tilde{c} = \overline{c}$, he will never choose not to monitor when the cost of monitoring is lower, i.e., when $\tilde{c} = \underline{c}$.

3 The Dual Effect of Social Ties on Governance

3.1 Capture versus Loyalization

To gain intuition for how social ties affect the incentives of the supervisor and the agent, respectively, we look at their incentive compatibility (IC) constraints.

First, if the supervisor conjectures that the agent plays a given strategy, e.g., $p = \alpha$, the shape of her IC constraints is illustrated in $Fig.1$. For (ϕ, ρ) in region A, the supervisor does not monitor the agent $(m = 0)$; for (ϕ, ρ) in region B, she monitors if and only if the monitoring cost is low $(m = \beta)$; and for (ϕ, ρ) in region C, she monitors even if the monitoring cost is high $(m = 1)$. The horizontal line in $Fig.1$ illustrates the effect of friendship on the supervisor's incentives to monitor, keeping constant her desire for social recognition (ρ). As friendship increases, the supervisor becomes less likely to perform her duty as monitor. This is because she internalizes more of the agent's well-being, which effectively increases her cost of intervening against the agent's interests. We refer to this effect of friendship as *capture*.

Second, if the agent conjectures that the supervisor plays a given strategy, e.g.,

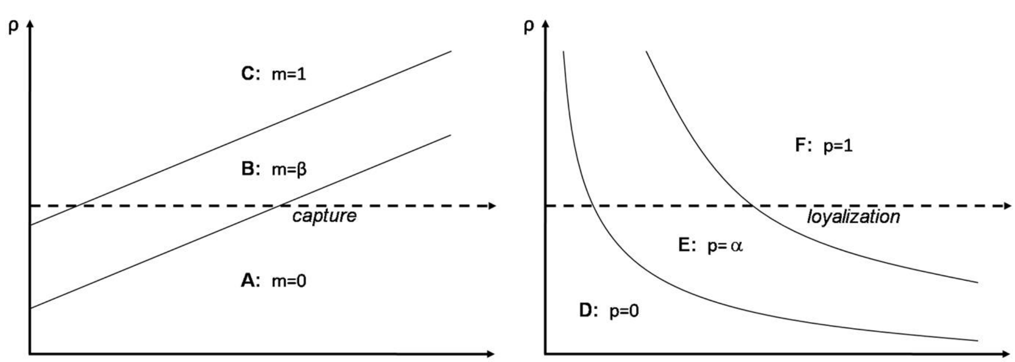

Fig. 1 Fig. 2

$m = \beta$, the shape of his IC constraints is illustrated in $Fig.2$. For (ϕ, ρ) in region D, the agent does not choose action g ($p = 0$); for (ϕ, ρ) in region E, he chooses g if and only if the private benefits from b are low ($p = \alpha$); and for (ϕ, ρ) in region F, he chooses g even if the private benefits from b are high ($p = 1$). The horizontal line in $Fig.2$ illustrates the effect of friendship on the agent's incentives to choose g, keeping constant the supervisor's desire for social recognition (ρ). As friendship increases, the agent becomes more likely to behave well. Intuitively, as the agent internalizes more of the supervisor's well-being, he experiences more disutility if the supervisor is blamed for a bad outcome, and hence be becomes increasingly reluctant to choose b. We refer to this effect of friendship as *loyalization*.

The trade-off between capture and loyalization is crucial to understanding the effect of friendship on governance, and hence it is key to the results of this paper. Both effects represent a transfer of incentives: Through capture, the supervisor inherits the interests of the agent, which are in direct conflict with those of the principal. Through loyalty, the agent inherits the interests of the supervisor, which in turn mitigates the conflict between the principal and the agent. Thus, increasing friendship is beneficial to the principal if loyalization dominates, but adverse otherwise.

3.2 Modes of Governance: Authority and Loyalty

Different equilibria represent different trade-offs between capture and loyalization. As the agent and the supervisor have three (relevant) pure strategies each, nine strategy profiles (p, m) can potentially be supported in equilibrium. However, if the agent chooses g with certainty ($p = 1$), the supervisor will not incur any monitoring cost in equilibrium. Thus, the profiles $(p,m) = (1,1)$ and $(p,m) = (1,\beta)$ can be ruled out.

Lemma 1 (Existence) *For each strategy profile $(p,m) \notin \{(1,1),(1,\beta)\}$, there exist pairs (ρ,ϕ) for which the profile can be supported in equilibrium.*

Each of the seven equilibria inhabits a certain region in the ρ-ϕ-space, i.e., it can be supported for certain combinations of desire for social recognition and friendship.[17] The principal's *ex ante* expected utility in equilibrium (p,m)[18] is given by

$$E(u_P)_{(p,m)} = X_g(m + (1-m)p) + X_b(1-m)(1-p) - w_{(p,m)},$$

where $w_{(p,m)} \geq 0$.[19,20]

Proposition 1 *For all ρ, the principal prefers the equilibrium $(p,m) = (1,0)$. Furthermore, there exist $\hat{\rho}$ and $\bar{\rho} > \hat{\rho}$ such that (i) for all $\rho \in [\hat{\rho},\bar{\rho})$, the principal's second most preferred equilibrium is $(p,m) = (0,1)$, and (ii) for all $\rho \geq \bar{\rho}$, the principal is indifferent between $(p,m) = (0,1)$ and $(p,m) = (1,0)$. These preferences over equilibria induce preferences over friendship since, for a given ρ, there exist $\underline{\phi}(\rho)$ and $\overline{\phi}(\rho)$ such that $(p,m) = (0,1)$ can be supported for all $\phi < \underline{\phi}(\rho)$, and $(p,m) = (1,0)$ can be supported for all $\phi > \overline{\phi}(\rho)$.*

[17] Some equilibrium regions overlap, so that their intersections admit multiple strategy profiles as equilibria. Nevertheless, their locations in the ρ-ϕ-space broadly determine how ρ and ϕ affect the agent's and the supervisor's behavior.

[18] We henceforth denote an equilibrium by its strategy profile (p,m) alone, hence suppressing the equilibrium beliefs derived in the proof of Lemma 1.

[19] The wage is non-zero if it is necessary to induce the supervisor's participation.

[20] The proof of Lemma 1 shows that the two equilibria with $m = 1$, $(p,m) = (0,1)$ and $(p,m) = (\alpha,1)$, yield the same payoffs for all players. Moreover, whenever $(p,m) = (\alpha,1)$ can be supported as an equilibrium, $(p,m) = (0,1)$ can be as well. Therefore, without loss of generality, we henceforth neglect $(p,m) = (\alpha,1)$.

The principal gets X_g with certainty in both of the equilibria $(p, m) = (1, 0)$ and $(p, m) = (0, 1)$, whereas she gets X_b with some strictly positive probability in all other equilibria. The principal prefers $(p, m) = (1, 0)$ for all ρ because she gets X_g with probability one, at no cost; since the supervisor never monitors, there is no need to pay her any wage.[21] In contrast, because $(p, m) = (0, 1)$ involves monitoring, the principal (in general) has to pay the supervisor a wage. This wage is decreasing in the supervisor's desire for social recognition, so for $\rho \geq \hat{\rho}$, $(p, m) = (0, 1)$ is the principal's second most preferred equilibrium (at least).[22] When $\rho \geq \bar{\rho}$, the supervisor cares so much about social recognition that she is willing to monitor at zero wage, so the principal is indifferent between the two equilibria.

By the second part of Proposition 1, the principal's preferences over equilibria induce preferences over friendship because her preferred equilibria exist only for certain ranges of ϕ, given ρ. The equilibrium $(p, m) = (0, 1)$ exists if and only if friendship is low or moderate ($\phi < \underline{\phi}(\rho)$), so that the supervisor's incentives to (always) monitor are not eroded by capture.[23] In contrast, $(p, m) = (1, 0)$ exists if and only if friendship is strong enough ($\phi > \overline{\phi}(\rho)$), so that loyalization induces the agent to (always) choose g.[24]

[21] There is no need to pay the agent any wage because, as is shown in the proof of Lemma 1, whenever the supervisor's participation constraint is satisfied, the agent's participation constraint is satisfied as well.

[22] The wage is decreasing in ρ because the supervisor's pride is increasing in ρ.

[23] Even within the range of ϕ for which $(p, m) = (0, 1)$ exists, any marginal increase in friendship harms the principal because it induces the supervisor to require a larger compensation for disciplining the agent, i.e. it increases $w_{(0,1)}$.

[24] This equilibrium is not feasible if $\bar{\phi}(\rho) > 1$. However, there exists a wide range of parameter values such that $\bar{\phi}(\rho) \leq 1$, and we restrict attention to these.

The equilibria $(p,m)=(1,0)$ and $(p,m)=(0,1)$ are of crucial importance for the subsequent results in this paper. In both of these equilibria, the principal gets X_g with certainty, yet they build on fundamentally different logics. In $(p,m)=(0,1)$ the agent always chooses b, but X_g obtains because the supervisor always monitors the agent (and hence detects the bad action and converts it to a good one). The supervisor intervenes because she prefers to incur the monitoring cost over bearing the blame for the bad outcome. Thus, the equilibrium is inherently conflictual; the agent takes an action against the interests of the supervisor, who intervenes to prevent this action from damaging her reputation. Because $(p,m)=(0,1)$ involves an active supervisor who disciplines a misbehaving agent, we will henceforth refer to this equilibrium as the *authority regime*. By Proposition 1, the authority regime requires some distance between the supervisor and the agent; if they are too close friends, capture erodes the supervisor's incentives to exercise authority. Relatedly, the authority regime can be interpreted as a situation in which the supervisor monitors because she does not trust the agent to behave well, and the agent, in turn, misbehaves.

In contrast, in $(p,m)=(1,0)$, X_g is implemented although the supervisor never monitors the agent, because the agent cares so much for the supervisor that he always refrains from choosing b. Although the supervisor is passive, she fulfils a key role as designated scapegoat; it is the fact that she would bear the blame in case of a bad outcome that induces the agent to behave well. Thus, this equilibrium demonstrates that delegated monitoring need not be active in order to be effective. Because loyalization induces the agent to behave in the supervisor's interests here, we will henceforth refer to $(p,m)=(1,0)$ as the *loyalty* *regime*. We also note that, because the supervisor's interests are aligned with those of the principal, the loyalty regime represents a situation in which the agent inherits the principal's interests via the supervisor. In this precise sense, social ties between the supervisor and the agent can serve as *incentive bridges*; friendship between the agent and the supervisor enables the principal to mitigate the root problem, i.e., the conflict between herself and the agent. By Proposition 1, the loyalty regime can be sustained if the supervisor and the agent are close enough friends; otherwise, the agent does not care enough about the supervisor to behave well. Relatedly, the loyalty regime can be interpreted as a situation in which the supervisor trusts the agent to behave well, and therefore chooses not to monitor, and the agent, in turn, honors her trust by choosing g.

In sum, the authority and loyalty regimes represent two fundamentally different modes of governance, at opposite ends of several spectra: While the authority regime reflects an inherently conflictual relationship between the supervisor and the agent, the loyalty regime entails mediation of the conflicts not only between the supervisor and the agent, but also between the principal and the agent. Moreover, while the authority regime is characterized by distance, distrust and active supervision, the loyalty regime reflects a close and trustful relationship between the (passive) supervisor and the agent. We will henceforth refer to the authority and loyalty regimes as the two basic *modes of governance*.

3.3 Reputability and the Value of Social Ties

The main message of Proposition 1 is that the principal always benefits from social ties between the supervisor and the agent if they are strong enough to sustain the loyalty regime ($\phi > \bar{\phi}(\rho)$).

Proposition 2 *The smallest level of friendship required for the loyalty regime to exist decreases with ρ, i.e., $\partial\bar{\phi}(\rho)/\partial\rho < 0$.*

Proposition 2 states a key result of this paper: the more the supervisor values social recognition, the more feasible is the principal's preferred mode of governance. Intuitively, holding friendship constant, if the supervisor cares more about social recognition, the agent suffers more when the supervisor is blamed for a bad outcome. As a consequence, the agent is more inclined to propose g. This result is important because it implies that a *given* level of ϕ can have very different implications for the welfare of the principal, depending on ρ. This yields an immediate empirical prediction: in order to assess whether a given social tie is harmful or desirable, it is crucial to consider the effects of friendship and desire for social recognition *in interaction*. Put differently, social ties are more likely to be beneficial for governance in environments where concerns for social recognition are salient. Below, we highlight three contexts in which this insight may be valuable.

Gray directors

An emerging literature in corporate governance assesses the role of gray directors, i.e. non-executive members of a firm's board who have social ties to the CEO (Kramarz and Thesmar, 2007; Cohen et al., 2008; Hwang and Kim, 2008; Schmidt, 2009; Fracassi and Tate, 2009).[25]

[25] Social ties are construed from background information such as Alma mater, military service, regional origin, and academic discipline.

In light of our model, social ties between a CEO and a non-executive director may benefit the shareholders if the director has a high concern for social recognition (e.g. in the market for directors), but may harm them otherwise. That is, it may be in the shareholders' (P) interests to appoint a board (S) which has close social ties to the management (A), and which cares considerably about its public image (sufficiently large ρ), in order to implement a loyalty regime in which the firm is well-managed although the board is passive.[26]

This implies that, to empirically analyze the effects of gray directors on governance, it may be important to interact the director's 'grayness' with measures of her reputational concerns. The idea that directors care about their reputation dates back at least to Fama (1980) and Fama and Jensen (1983), who hypothesized that a director's reputation has instrumental value in the market for directors. A number of empirical studies, which typically proxy a director's reputation by her 'popularity' in the market for directors, have found support for this hypothesis (Gilson, 1990; Kaplan and Reishus, 1990; Brickley et al., 1999; Coles and Hoi, 2003; Harford, 2003; Yermack, 2004; Fich, 2005).[27]

[26] One possible example is the appointment of Bill Gates as a director of Berkshire Hathaway; Bill Gates is both highly reputable and a close friend of the CEO, Warren Buffett.

[27] Moreover, regulators and public media increasingly demand that boards exercise meaningful oversight and accordingly condemn directorial sloth, negligence or misconduct. Shareholder activists argue that such shaming sanctions consitute effective penalties for directors, who are enmeshed in small circles of corporate elites in which reputation matters. The following example, recounted in Skeel (2001), illustrates the use of shaming as a disciplining device: In April 1992, shareholder activist and founder of ISS Robert Monks, in order to promote shareholder proposals against the management of Sears, paid for a full-page advertisement in the *Wall Street Journal* with the title: "The non-performing assets of Sears." The page showed a silhouette outline of the nine Sears directors, listing each by name and by position as responsible for the company's poor performance. Although none of the shareholder proposals were approved by vote, the embarrassed directors—in response to the ad—voluntarily adopted several of the proposals endorsed by Monks.

Family firms

The family firm, by construct, intertwines professional and social relationships. The empirical evidence on the performance consequences of family ownership is inconclusive.[28] In particular, there exist substantial differences across countries; in Thailand and Korea, for example, economic growth has been driven by the success of large family business groups (Claessens et al., 2000).

Our model suggests that this inconclusive empirical evidence may reflect that whether family managers (A) supervised by family directors (S) run the firm in the best interest of its non-family investors (P) depends on whether the firm is placed in a (cultural) context where social recognition plays an important role (e.g., where the perceived value of protecting the family's 'name' is high). If so, delegating management to family members may be a way of ensuring not only that the managers further the family's material interests, but also that they eschew actions that jeopardize the family's (brand) name, which also may benefit *non-family* shareholders.[29] This suggests that family firms should be more prevalent, and perform better, precisely in countries where such cultural traits are more salient (inter alia, in a number of Asian countries). On the contrary, our model suggests that family ownership may exacerbate agency problems in contexts where social recognition is not so important.

[28] See, e.g., La Porta et al., 1999; Faccio and Lang, 2002; Villalonga and Amit, 2008; Franks et al., 2008; Cronqvist et al., 2003; Anderson and Reeb, 2003; Khanna and Palepu, 2000.

[29] It is typically assumed that the presence of a controlling family leads to what corporate governance scholars refer to as the *controlling shareholder trade-off* (Gilson, 2006): family ownership may police the management better because of proximity and lower information costs, but it may also create a conflict between the family and non-family shareholders over the extraction of private benefits of control, which accrue to the former but not to the latter. This discussion illustrates that, in a context where social recognition is important, this trade-off need not be present; the loyalty regime resolves all conflicts of interest.

Business networks

Economic activity is sometimes facilitated through social networks that allow economic actors to build connections and generate business opportunities. Such networks tend to play a particularly important role where formal institutions are weak or unavailable, and they operate on the basis of personal relationships, word-of-mouth recommendations, referrals, and vouchers. In fact, because of their informal nature and the importance of norms, such networks sometimes become an integral part of regional or national culture.

A prime example is *guanxi*, which is a central concept in Chinese society. *Guanxi* governs the personalized networks of influence which are drawn upon to facilitate transactions and cooperation. To illustrate *guanxi*, we interpret an example of Standifird and Marshall (2000) within our framework: A seller (P) and a buyer (A) want to engage in a trade with deferred payment. A third person (S), who has ties to both parties, acts as a social intermediary (*zhongjian ren*). Her role is to vouch for the buyer, informally assuring the seller that payment will be made. If the buyer fails to meet his obligation, the intermediary loses her face before the seller (and, by word of mouth, potentially before others). Given the tie between the buyer and the intermediary, the buyer will take into account that non-payment would damage the intermediary's reputation. The seller presumes this, so the trade takes place. We find this example striking in that it *de facto* describes the loyalty regime; although S is passive, she enables the transaction to take place by putting her reputation at stake.[30]

[30] The following Wikipedia entry (http://en.wikipedia.org/wiki/Guanxi, accessed on February 28, 2009) illustrates the similarity between *guanxi* and the loyalty regime in our model: "*Guanxi* is becoming more widely used instead of the two common translations—'connections' and 'relationships'—as neither of those terms sufficiently reflect the wide cultural implications

3.4 Formal versus Informal Institutions

Given Proposition 1, we can also examine how the feasibility of both the authority and the loyalty regime—i.e., the thresholds $\underline{\phi}(\rho)$ and $\overline{\phi}(\rho)$—depend on the supervisor's monitoring costs, $\tilde{c}$, and the agent's benefits from shirking, $\tilde{B}_b$. One can interpret these parameters as measures of the quality of *formal* institutions; $\tilde{c}$ reflecting the weakness of the legal instruments that make monitoring more effective, and $\tilde{B}_b$ reflecting the agent's ability to defraud the principal.

Proposition 3 *For any ρ, (i) the feasibility of the loyalty regime is independent of monitoring costs, (ii) the authority regime becomes less feasible, and eventually infeasible, as $\overline{c}$ increases, (iii) the loyalty regime becomes less feasible, and eventually infeasible, as B_b^H increases, and (iv) the authority regime becomes less feasible as $E(\tilde{B}_b)$ increases.*

Proposition 3 indicates which types of formal institutions favor the authority or the loyalty regime. When formal institutions are weak in that monitoring is costly, the authority regime becomes more difficult to sustain, and possibly infeasible (even for $\phi = 0$). Formal institutions that are weaker in this sense make the loyalty regime more appealing. In contrast, when formal institutions are weak in that the scope for opportunism is large, the loyalty regime becomes more difficult to sustain, and possibly infeasible (even for $\phi = 1$). Although the authority regime also becomes more difficult to sustain, it at least remains feasible

that *guanxi* describes. Closely related concepts include that of *ganqing*, a measure which reflects the depth of feeling within an interpersonal relationship, *renqing*, the moral obligation to maintain the relationship, and the idea of 'face', meaning social status, propriety, prestige, or more realistically a combination of all three."

(for $\phi = 0$) provided that, of course, monitoring costs are not prohibitive. Thus, in this case, it is the authority regime that gains appeal.

This is broadly consistent with the view that family firms may be a second-best form of organization in markets with weak institutions. However, it differs from other explanations in that the costs and benefits of family ownership depend not only on the quality of formal institutions, but also on whether the institutions primarily facilitate monitoring or constrain opportunism.[31] In particular, family ownership is more likely to be detrimental when weak institutions make it easier to extract private benefits. For instance, this may be the case when control-enhancing mechanisms allow family owners to exert control while owning a very small equity stake. Consistent with our view, Silva et al. (2006) find, in a sample of Chilean firms, that the impact of family ownership on firm performance is positive *unless* the separation of ownership and control is very large. Amit et al. (2009) find a similar relationship in a sample of Chinese firms.

4 Monetary and Social Incentives

The preceding analysis highlights the role of social incentives when contracts are incomplete and the principal cannot make wages contingent on outcome. In this section, we study how, when wages can be made contingent on outcome, optimal monetary incentives interact with social incentives.

[31] Other explanations are provided in Leff (1978), Burkart et al. (2003), Almeida and Wolfenzon (2006), Khanna and Yafeh (2007).

4.1 Optimizing Incentive Pay *given* Social Incentives

A monetary incentive scheme specifies what wage the principal pays the supervisor and the agent as a function of the project outcome $\tilde{X}$:

$$\mathbf{w}(\tilde{X}) = \begin{pmatrix} w_A(\tilde{X}) & w_S(\tilde{X}) \end{pmatrix}$$

where

$$w_.(\tilde{X}) = \begin{cases} w_.(X_g) & \text{if } X = X_g \\ w_.(X_b) & \text{if } X = X_b \end{cases} .$$

We are interested in how the optimal incentive scheme $\mathbf{w}^*(\tilde{X})$ depends on the social incentives (ρ, ϕ), which we (first) treat as given.

A given social context influences, in general, not only whom the principal wants to incentivize, but also what particular outcome to implement. Assumption 1 simplifies matters. It ensures that the principal's utility from g, relative to b, is much larger than the supervisor's or the agent's gains from shirking. This in turn implies that the principal's preference for action g is so strong that she is always willing to pay the amount necessary to ensure that this action is taken, i.e., that the chosen action yields $X = X_g$ with certainty.

Any incentive scheme that implements $X = X_g$ with certainty must either incentivize the agent to always choose g ($p = 1$) or the supervisor to always monitor the agent ($m = 1$). Either mode of governance obviates the need for the other. Furthermore, as long as $\phi \in [0, 1]$, it is cheaper to provide monetary incentives for monitoring directly to the supervisor and monetary incentives for project choice directly to the agent (see proof of Proposition 4). Hence, the principal optimally provides monetary incentives either to the agent or to the supervisor—but not to both. We henceforth refer to monetary incentive schemes targeted at the agent (supervisor) as *agent*-schemes (*supervisor*-schemes).

Our next result derives the principal's preferences over these two types of monetary incentive schemes.

Proposition 4 *The outcome $X = X_g$ can be supported without monetary incentives if and only if $\rho \geq h_1(\phi)$, where $h_1(\phi)$ is a continuous function. For $\rho < h_1(\phi)$, the outcome $X = X_g$ can be supported by agent-schemes or supervisor-schemes. The principal prefers supervisor-schemes if and only if $\rho \geq h_2(\phi)$, where $h_2(\phi)$ is increasing for $E(\tilde{c}) \geq B_b^H$ and quasi-convex otherwise.*

Social incentives matter for the choice of whom to provide with monetary incentives. For $\rho \geq h_1(\phi)$, the social incentives are sufficiently strong to support the implementation of g, so that the principal need not resort to monetary incentives. For $\rho < h_1(\phi)$, the principal can induce the desired outcome through both agent-schemes and supervisor schemes. These monetary incentive schemes are intimately linked to the modes of governance discussed in Section 3.2. Supervisor-schemes support the authority regime ($(p, m) = (0, 1)$) by reinforcing the supervisor's incentives to actively monitor the agent. By contrast, agent-schemes support the loyalty regime ($(p, m) = (1, 0)$) by reinforcing the agent's incentives to choose g. Although the loyalty regime involves no monitoring, the supervisor's presence is important for agent-schemes because it reduces, by way of creating (some) loyalty, the incentive pay required to align the agent's interests with the principal's. Thus, supervisor-schemes and agent-schemes differ in whether they support authority or loyalty.

Whom the principal prefers to provide with monetary incentives therefore depends on whether the social incentives harbor a propensity towards authority or loyalty. Proposition 4 implies that, for a given ϕ, a higher ρ makes it more attractive for the principal to incentivize the supervisor. This is because the benefits of social recognition are fully internalized by the supervisor, but only partially internalized by the agent. In contrast, for a given ρ, a higher ϕ typically makes it more attractive for the principal to incentivize the agent. This is because increased friendship makes agent-schemes less expensive due to loyalization, but supervisor-schemes more expensive due to capture. However, this need not be true when $w_S(\tilde{X})$ is determined by the supervisor's participation rather than incentive-compatibility constraint. In this case, increasing ϕ mainly improves the "work climate" in that the supervisor and the agent derive more utility from their friendship, which in turn may allow the principal to reduce $w_S(\tilde{X})$ without adversely affecting the supervisor's monitoring incentives.[32]

Irrespective of the type of monetary incentive scheme, it is optimal for the principal to set $w_\cdot(X_b) = 0$. This allows us to summarize optimal wages as $w_\cdot^* = w_\cdot(X_g)$ and, with a slight abuse of notation, as a function of ϕ given ρ: $w_\cdot^*(\phi;\rho)$. When the principal implements the optimal monetary incentive scheme, $w_\cdot^*(\phi;\rho)$ depends on social incentives in the following manner.

[32] In our model, this effect turns out to be irrelevant for agent-schemes because the agent's participation constraint is never binding. A paper that puts more emphasis on the "work climate" effect of co-worker altruism is Dur and Sol (2008).

Proposition 5 *For given ρ, optimal wages are given by*

	$w_A^*(\phi;\rho)$	$w_S^*(\phi;\rho)$
Φ_S^-	0	$\max\{0, E(\tilde{c}) - \phi B_g - \rho\}$
Φ_S^+	0	$\max\{0, \bar{c} - 2\rho + \phi[E(\tilde{B}_b) - B_g]\}$
Φ_A	$\max\{0, B_b^H - B_g - \phi\rho\}$	0

(2)

where $\Phi_S^-, \Phi_S^+, \Phi_A \subset [0,1]$ and $\Phi_S^- < \Phi_S^+ < \Phi_A$ in the strong set order.[33] *Φ_S^- is non-empty for sufficiently large ρ. Φ_S^+ is non-empty for intermediate ρ, unless $h_2(\phi) > h_3(\phi)$ for all $\phi \in [0,1)$, where $h_3(\phi)$ is linearly increasing. Φ_A is non-empty for sufficiently small ρ, unless $h_2(\phi) < 0$ for all $\phi \in [0,1]$.*

Note from the various expressions in (2) that a higher ρ always decreases the optimal wages. This is because a stronger desire for social recognition reinforces both modes of governance.

The impact of ϕ on the optimal wages is more complicated (see *Fig.3*). The agent's wage is zero for low ϕ, where the principal optimally chooses a supervisor-scheme, increases discontinously at $\phi = \min \Phi_A$, where the principal optimally switches to an agent-scheme, and from there gradually decreases as ϕ increases further. In the decreasing part, larger ϕ strengthen loyalization so that a smaller wage suffices to fully incentivize the agent. The impact of ϕ on the supervisor's optimal wage is as follows: For $\phi \in \Phi_S^-$, the optimal wage is determined by the supervisor's participation constraint. Larger ϕ improve the "work climate" so that a smaller wage suffices to ensure the supervisor's participation. For $\phi \in$

[33] A set S is larger than S' in the strong set order if for any $s \in S$ and $s' \in S'$, $\max\{s, s'\} \in S$ and $\min\{s, s'\} \in S'$.

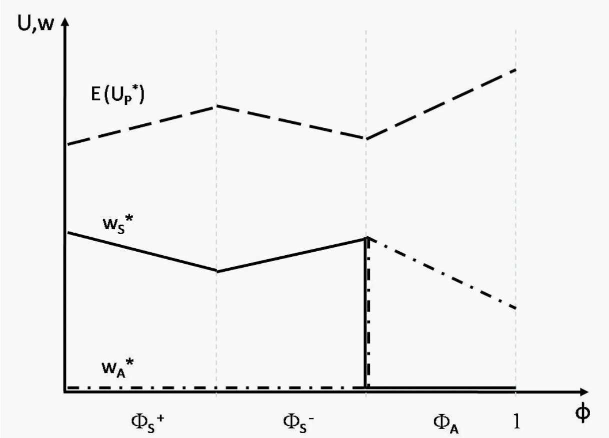

Fig. 3

Φ_S^+, the optimal wage is determined by the supervisor's incentive-compatibility constraint. Larger ϕ aggravate capture so that a larger wage is required to induce the supervisor to monitor. Finally, for $\phi \in \Phi_S^+$, the supervisor's wage drops to zero, as the principal optimally adopts an agent-scheme.

Taken together, Propositions 4 and 5 tell us that social incentives can have drastic effects on the optimal allocation and intensity of monetary incentives. This is because variation in social incentives can alter the optimal mode of governance and hence lead to "regime switches".

4.2 Optimizing Incentive Pay *and* Social Incentives

In reality, social contexts are often the outcome of careful deliberation. For instance, many organizations select job applicants not only based on (technical) knowledge but also based on personality or social competence.[34] Moreover, many

[34]For example, Fehr and Falk (2002, p.693) write: "If it is true that some people are more self-interested than others, then choosing the 'right' people is one way of affecting the preferences of a firm's workforce. For this reason employers have a strong interest in recruiting employees who have favourable preferences and whose preferences can be affected in favourable ways. There is

organizations strive to create a specific corporate culture among their members. Or as Milgrom and Roberts (1992) put it, "important features of many organizations can best be understood in terms of deliberate attempts to change preferences of individual participants."

Against this background, it is instructive to recast Proposition 5 in terms of the principal's willingness to actively shape the social incentives (ρ, ϕ). Under any incentive scheme that implements $X = X_g$ with certainty, the principal's ex ante and ex post utility is $X_g - w_A(X_g) - w_S(X_g)$. Because the principal's utility is inversely related to the total wage, it depends on the social incentives.

Corollary 1 *For all ϕ, the principal's ex ante expected utility strictly increases with ρ. For given ρ, when $\Phi_S^+, \Phi_S^-, \Phi_A \neq \varnothing$, the principal's ex ante expected utility has two local maxima in $\phi \in [0, 1]$.*

Corollary 1 implies that, for reasons explained after Proposition 5, the principal's willingness-to-pay for marginal increases in ρ is always positive, whereas it is sometimes positive and sometimes negative for marginal increases in ϕ. When the principal's preferences are monotonic in ρ or ϕ, a *gradualist* approach, which implements marginal improvements in social incentives, inevitably brings the principal closer to the globally optimal social incentive structure (ρ^*, ϕ^*) which minimizes monetary incentives. In contrast, when $\Phi_S^+, \Phi_S^-, \Phi_A \neq \varnothing$, a gradualist approach merely guarantees that the principal converges to a locally optimal social incentive structure (*Fig.3*). In fact, gradual changes in ϕ towards the global optimum may, at least initially, make matters worse for the principal. In this case the principal

circumstantial evidence for this because the testing and screening of employees is often as much about the employee's willingness to become a loyal firm member as it is about the employee's technical abilities."

may opt to be “stuck” in a less desirable local optimum or, else, take radical measures to reform the organization in a *big bang* fashion.

Another implication of Proposition 5, which is closely related to Proposition 2, is that measures to improve ρ and ϕ can reinforce each other.

Corollary 2 *Given agent-schemes, as long as $w_A^*(\phi;\rho) \neq 0$, the principal is willing to pay ϕ for a marginal increase in ρ and, conversely, to pay ρ for a marginal increase in ϕ.*

Corollary 2 implies that the principal is willing to pay more to increase ρ, the larger is ϕ, and vice versa. This complementarity arises because (i) the agent internalizes the supervisor's desire for social recognition more, the stronger their friendship, and (ii) their friendship influences the agent's incentives more, the more the supervisor cares about social recognition. In other words, boosting social recognition and promoting social ties can be mutually reinforcing measures to implement the loyalty regime in organizations.

Large ρ may describe organizations that not only articulate “organizational values” or “standards of excellence”, but also *symbolically* reward adherence to these norms, for example, by naming and showcasing the “manager of the month”. The more recognition given to this manager of the month—i.e., the more ostensibly good performance is praised—the stronger are the social incentives for managers to earn this distinction. Large ϕ may describe organizations that promote social interactions between managers and their subordinates, for example, through team-building activities, integrated workplace infrastructure, or perquisites like membership in a (common) gym or golf club.[35] Such features strengthen social

[35] As sociologist George C. Homans (1950) points out, social ties can strengthen from a mere

ties across different levels of the organization.

By Corollary 2, either of these measures—i.e., ostensibly praising good performance and promoting the development of social ties—becomes more effective, and hence more attractive, in the presence of the other. Together, these measures promote a culture of loyalty, in which employees and their superiors cooperate on the basis of trust, rather than on the basis of authority or purely monetary incentives. This loyalty regime generates corporate culture *top-down*: It relies on organizational norms—to which key members are explicitly held accountable—and social networks—through which the incentives to adhere to these norms are inherited by the other members. Thus, the norms *trickle down* the hierarchy.

5 Conclusion

This paper studies a governance problem which is embedded in a social structure: a principal hires a supervisor to monitor an agent, yet the supervisor and the agent may be connected through social ties, i.e., be "friends". We analyze how this friendship affects the supervisor's and the agent's behavior, as well as the principal's utility, across different settings where we vary the supervisor's desire for social recognition. On the one hand, friendship undermines the supervisor's incentives to monitor the agent (capture). On the other hand, friendship makes the agent reluctant to put the supervisor in a bad light, and thereby more likely to voluntarily act in the principal's interest (loyalization). The effect on the principal is therefore ambiguous.

increase in the frequency of interaction: "[T]he more frequently persons interact with one another, the stronger their sentiments of friendship for one another" (p.133).

We show that the principal prefers one of two fundamentally different modes of governance. In the authority regime, the agent is fully opportunistic, but the supervisor actively monitors the agent. This regime is built on distance, distrust, and conflict. In the loyalty regime, the agent chooses the principal's preferred action, and the supervisor only assumes passive responsibility. This regime is built on proximity, trust, and mediation. The loyalty regime is easier to achieve when the supervisor's desire for social recognition is stronger. Thus, the effect of social ties critically depends on the salience of reputational concerns.

Our theory unifies opposing views on the relationship between social ties and governance. The basic tenet is that social ties merely serve to transfer incentives between people, and hence are *per se* neutral. Whether social ties promote or undermine good governance purely depends on which type of incentives are being transferred. We discuss the implications of our analysis for family firms, gray directors, business networks, and organizational culture.

Appendix

Proof of Lemma 1

We can abstract from the participation constraints and only take the incentive compatibility constraints into account. This is because by the proof of Proposition **??** below, S will be given a fixed wage w in any equilibrium where this is necessary to satisfy her participation constraint, which in turn will guarantee that A's participation constraint is satisfied. Since the fixed wage does not affect the parameter values for which the respective equilibria can be sustained, the participation constraints can be abstracted from here.

After having observed the realization of $\tilde{B}_b$, B_b, the agent chooses g iff

$$\begin{aligned} B_g + \phi\left(\rho\theta_g - \hat{m}E\left(\tilde{c}\,|\text{S monitors}\right)\right) \quad &\geq \quad \hat{m}\left[B_g + \phi\left(\rho\theta_g - E\left(\tilde{c}\,|\text{S monitors}\right)\right)\right] \\ &\quad + (1-\hat{m})\left[B_b + \phi\left[-\rho\left(1-\theta_b\right)\right]\right]. \end{aligned} \tag{IC$_A$}$$

After having observed the realization of $\tilde{c}$, c, the supervisor monitors iff

$$\begin{aligned} \rho\theta_g - c + \phi B_g \quad &\geq \quad p\left(\rho\theta_g + \phi B_g\right) + (1-p)\left(-\rho\left(1-\theta_b\right) + \phi E\left(\tilde{B}_b\,|\text{A proposed } b\right)\right) \\ &\Leftrightarrow \quad c \leq (1-p)\,\rho\left(1-\theta_b+\theta_g\right) - \phi\left(1-p\right)\left(E\left(\tilde{B}_b\,|\text{A proposed } b\right) - B_g\right). \end{aligned} \tag{IC$_S$}$$

Equilibria in which $m = 1$

Conjecture that $m = 1$. Then, the agent is indifferent between g and b, since (IC$_A$) reduces to

$$B_g + \phi\left(\rho\theta_g - E\left(\tilde{c}\,|\text{S monitors}\right)\right) = B_g + \phi\left(\rho\theta_g - E\left(\tilde{c}\,|\text{S monitors}\right)\right).$$

(IC$_S$) is given by

$$\bar{c} \leq (1-p)\,\rho\left(1-\theta_b+\theta_g\right) - \phi\left(1-p\right)\left(E\left(\tilde{B}_b\,|\text{A proposed } b\right) - B_g\right). \tag{IC$'_S$}$$

From (1), it follows that $\theta_g = 1$ (on the equilibrium path) and $\theta_b \in [0,1]$ (off the equilibrium path). We know that $m \neq 1$ if $p = 1$. Hence, only two cases are distinguishable:

Case 1: Conjecture that $p = 0$. Then $E\left(\tilde{B}_b\,|\text{A proposed } b\right) = E\left(\tilde{B}_b\right)$. Substituting the beliefs and conjectures into (IC$_S$') yields that $m = 1$ is supported in equilibrium iff

$$\bar{c} \leq \rho (2 - \theta_b) - \phi \left[E \left(\tilde{B}_b \right) - B_g \right] \Leftrightarrow \rho \geq \frac{\bar{c}}{2 - \theta_b} + \frac{\phi \left[E \left(\tilde{B}_b \right) - B_g \right]}{2 - \theta_b}. \tag{3}$$

For any beliefs such that the supervisor prefers to incur the monitoring costs, she also prefers to convert a detected type b action, by implication. To see this, note that

$$\rho \theta_g + \phi B_g \geq -\rho (1 - \theta_b) + \phi E \left(\tilde{B}_b \right) \Leftrightarrow \rho \geq \frac{\phi \left[E \left(\tilde{B}_b \right) - B_g \right]}{(2 - \theta_b)},$$

which is implied by (3). In other words, it is individually rational for a supervisor who makes an effort to detect a type b action to also convert a type b action. Given that the principal assumes individual rationality on part of the supervisor, we can therefore eliminate all off-equilibrium beliefs such that $\theta_b > 0$. This refinement relies only on the mutual presumption of individual rationality.

Substituting $\theta_b = 0$ into (3) yields that $m = 1$ is supported in equilibrium iff

$$\rho \geq \frac{\bar{c}}{2} + \frac{\phi \left[E \left(\tilde{B}_b \right) - B_g \right]}{2}. \tag{4}$$

Hence, for (ρ, ϕ) satisfying (4), $\{(p, m) = (0, 1), \theta_g = 1, \theta_b = 0\}$ is a PBE.

Case 2: Conjecture that $p = \alpha$. Then $E \left(\tilde{B}_b \,|\text{A proposed } b \right) = B_b^H$. Substituting the beliefs and conjectures into (IC$'_S$) yields that $m = 1$ is supported in equilibrium iff

$$\bar{c} \leq \rho (1 - \alpha) (2 - \theta_b) - \phi (1 - \alpha) \left(B_b^H - B_g \right) \Leftrightarrow \rho \geq \frac{\bar{c}}{(1 - \alpha)(2 - \theta_b)} + \frac{\phi \left(B_b^H - B_g \right)}{2 - \theta_b}. \tag{5}$$

An argument analogous to the above, again, yields that only $\theta_b = 0$ under mutual presumption of individual rationality. Substituting $\theta_b = 0$ into (5) yields that $m = 1$ is supported in equilibrium iff

$$\rho \geq \frac{\bar{c}}{2 (1 - \alpha)} + \frac{\phi \left(B_b^H - B_g \right)}{2} \tag{6}$$

Hence, for (ρ, ϕ) satisfying (6), $\{(p, m) = (\alpha, 1), \theta_g = 1, \theta_b = 0\}$ is a PBE.

As will be shown in the proof of Proposition **??** below, the two equilibria with full monitoring, $\{(p, m) = (0, 1), \theta_g = 1, \theta_b = 0\}$ and $\{(p, m) = (\alpha, 1), \theta_g = 1, \theta_b = 0\}$, yield the same payoffs for all players. Moreover, note that (6) implies (4). That is, whenever $\{(p, m) = (\alpha, 1), \theta_g = 1, \theta_b = 0\}$ is an equilibrium, $\{(p, m) = (0, 1), \theta_g = 1, \theta_b = 0\}$ can also be supported as an equilibrium. Therefore, without loss of generality, we henceforth neglect $\{(p, m) = (\alpha, 1), \theta_g = 1, \theta_b = 0\}$.

Equilibria in which $m = \beta$

Conjecture that $m = \beta$. By (IC_S), this is the case when

$$\underline{c} \leq (1-p)\,\rho\,(1-\theta_b+\theta_g) - \phi\,(1-p)\left(E\left(\tilde{B}_b\,|\text{A proposed } b\right) - B_g\right) \leq \bar{c}. \tag{IC$''_S$}$$

Whenever $m \neq 1$, (IC_A) reduces to

$$B_g + \phi\rho\,(\theta_g + 1 - \theta_b) \geq B_b, \tag{IC$''_A$}$$

where B_b is a realization of $\tilde{B}_b$.

We know that $m \neq \beta$ if $p = 1$. Hence, only two cases are distinguishable:

Case 1: Conjecture that $p = 0$. Then $E\left(\tilde{B}_b\,|\text{A proposed } b\right) = E\left(\tilde{B}_b\right)$. Furthermore, it follows from (1) that $\theta_g = 1$ and $\theta_b = 0$. Substituting the beliefs and conjectures into (IC''_S) yields that $m = \beta$ is supported in equilibrium iff

$$\frac{\underline{c} + \phi\left(E\left(\tilde{B}_b\right) - B_g\right)}{2} \leq \rho \leq \frac{\bar{c} + \phi\left(E\left(\tilde{B}_b\right) - B_g\right)}{2}. \tag{7}$$

To support $p = 0$ in equilibrium, (IC''_A) must hold for both realizations of $\tilde{B}_b$. Substituting the beliefs and conjectures into (IC''_A) yields that $p = 0$ is supported in equilibrium iff

$$\rho \leq \frac{B_b^L - B_g}{2\phi}. \tag{8}$$

The boundary expressions in (7) are linearly increasing in ϕ, whereas the RHS in (8) is a downward-sloping hyperbola in ϕ. Hence, there exist (ρ, ϕ) that satisfy both (7) and (8), such that $\{(p,m) = (0,\beta), \theta_g = 1, \theta_b = 0\}$ is a PBE.

Case 2: Conjecture that $p = \alpha$. Then $E\left(\tilde{B}_b\,|\text{A proposed } b\right) = B_b^H$. Furthermore, it follows from (1) that $\theta_g = \frac{\beta}{\beta+\alpha(1-\beta)}$ and $\theta_b = 0$. Substituting the beliefs and conjectures into (IC''_S) yields that $m = \beta$ is supported in equilibrium iff

$$\frac{\underline{c}/\,(1-\alpha) + \phi\left(B_b^H - B_g\right)}{\left(2\beta + \alpha\,(1-\beta)\right)/\left(\beta + \alpha\,(1-\beta)\right)} \leq \rho \leq \frac{\bar{c}/\,(1-\alpha) + \phi\left(B_b^H - B_g\right)}{\left(2\beta + \alpha\,(1-\beta)\right)/\left(\beta + \alpha\,(1-\beta)\right)} \tag{9}$$

Substituting the beliefs and conjectures into (IC''_A) yields that $p = \alpha$ is supported in equilibrium iff

$$\frac{B_b^L - B_g}{\left(2\beta + \alpha\,(1-\beta)\right)\phi/\left(\beta + \alpha\,(1-\beta)\right)} \leq \rho \leq \frac{B_b^H - B_g}{\left(2\beta + \alpha\,(1-\beta)\right)\phi/\left(\beta + \alpha\,(1-\beta)\right)}. \tag{10}$$

Note that in both 9 and 10, the denominator is equal to $\phi(1+\theta_g)$.

The boundary expressions in (9) are linearly increasing in ϕ, whereas in (10) they are downward-sloping hyperbolas in ϕ. Hence, there exist (ρ, ϕ) that satisfy both (9) and (10), such that $\left\{(p,m) = (\alpha, \beta), \theta_g = \frac{\beta}{\beta + \alpha(1-\beta)}, \theta_b = 0\right\}$ is a PBE.

Equilibria in which $m = 0$

By (IC$_S$), this is the case when

$$\underline{c} \geq (1-p)\,\rho\,(1-\theta_b+\theta_g) - \phi\,(1-p)\left(E\left(\tilde{B}_b\,|\text{A proposed } b\right) - B_g\right), \qquad (\text{IC}_S''')$$

and as $m \neq 1$, (IC$_A$) reduces to (IC$_A''$). Three cases are distinguishable.

Case 1: Conjecture that $p = 0$. Then $E\left(\tilde{B}_b\,|\text{A proposed } b\right) = E\left(\tilde{B}_b\right)$. Furthermore, it follows from (1) that $\theta_b = 0$ (on the equilibrium path) and $\theta_g \in [0,1]$ (off the equilibrium path). Substituting the beliefs and conjectures into (IC$_S'''$) yields that $m = 0$ is supported in equilibrium iff

$$\rho \leq \frac{\underline{c} + \phi\left(E\left(\tilde{B}_b\right) - B_g\right)}{1+\theta_g} \qquad (11)$$

To support $p = 0$ in equilibrium, (IC$_A''$) must hold for both realizations of $\tilde{B}_b$. Substituting the beliefs and conjectures into (IC$_A''$) yields that $p = 0$ is supported in equilibrium iff

$$\rho \leq \frac{B_b^L - B_g}{\phi\,(1+\theta_g)}. \qquad (12)$$

There exist multiple equilibria depending on θ_g. We cannot apply the previous argument to restrict off-equilibrium beliefs, since the supervisor's incentive-compatibility constraint with respect to overturning a detected type b action,

$$\rho\theta_g + \phi B_g \geq -\rho + \phi E\left(\tilde{B}_b\right) \Leftrightarrow \rho\,(1+\theta_g) \geq \phi\left(E\left(\tilde{B}_b\right) - B_g\right),$$

is implied by neither of the equilibrium conditions (11) and (12). Yet, this is not of great concern because, in this particular equilibrium, the presence of the supervisor generates zero benefits for the principal. That is, it is equivalent to the outcome without a supervisor, which is always feasible.

The RHS in (11) is linearly increasing in ϕ, whereas the RHS in (12) is a downward-sloping hyperbola in ϕ. Hence, there exist (ρ, ϕ) that satisfy (11) and (12), such that $\{(p,m) = (0,0), \theta_g : \theta_g \in [0,1], \theta_b = 0\}$ constitute PBE.

Case 2: Conjecture that $p = \alpha$. Then $E\left(\tilde{B}_b\,|\text{A proposed } b\right) = B_b^H$. Furthermore, it follows from (1) that $\theta_g = 0$ and $\theta_b = 0$. Substituting the beliefs and conjectures into (IC$_S'''$) yields that $m = 0$ is supported in equilibrium iff

$$\rho \leq \frac{\underline{c}}{1-\alpha} + \phi\left(B_b^H - B_g\right) \qquad (13)$$

Substituting the beliefs and conjectures into (IC_A'') yields that $p = \alpha$ is supported in equilibrium iff

$$\frac{B_b^L - B_g}{\phi} \leq \rho \leq \frac{B_b^H - B_g}{\phi} \tag{14}$$

The RHS in (13) is linearly increasing in ϕ, whereas the boundary expressions in (14) are downward-sloping hyperbolas in ϕ. Hence, there exist (ρ, ϕ) that satisfy (13) and (14), such that $\{(p, m) = (\alpha, 0), \theta_g = 0, \theta_b = 0\}$ is a PBE.

Case 3: Conjecture that $p = 1$. It follows from (1) that $\theta_g = 0$ (on the equilibrium path) and $\theta_b \in [0, 1]$ (off the equilibrium path). Substituting the beliefs and conjectures into (IC_S''') yields that $m = 0$ is supported in equilibrium iff

$$\underline{c} \geq 0,$$

which holds by assumption. To support $p = 1$ in equilibrium, (IC_A'') must hold for both realizations of $\tilde{B}_b$. Substituting the beliefs and conjectures into (IC_A'') yields that $p = 1$ is supported in equilibrium iff

$$\rho \geq \frac{B_b^H - B_g}{\phi(1 - \theta_b)} \tag{15}$$

An argument analogous to the above, again, yields that only $\theta_b = 0$ under mutual presumption of individual rationality. In particular, note that the supervisor's incentive-compatibility constraint for overturning a detected type b action**,**

$$\rho\theta_g + \phi B_g \geq -\rho(1 - \theta_b) + \phi E\left(\tilde{B}_b\right) \Leftrightarrow \rho \geq \frac{\phi\left(E\left(\tilde{B}_b\right) - B_g\right)}{1 - \theta_b},$$

is implied by the equilibrium condition (15) for $\phi \in (0, 1]$**:**

$$\rho \geq \frac{B_b^H - B_g}{\phi(1 - \theta_b)} > \frac{E\left(\tilde{B}_b\right) - B_g}{\phi(1 - \theta_b)} \geq \frac{E\left(\tilde{B}_b\right) - B_g}{(1 - \theta_b)} \geq \frac{\phi\left(E\left(\tilde{B}_b\right) - B_g\right)}{(1 - \theta_b)}.$$

Substituting $\theta_b = 0$ into (15) yields that $p = 1$ is supported in equilibrium iff

$$\rho \geq \frac{B_b^H - B_g}{\phi} \tag{16}$$

Hence, for (ρ, ϕ) satisfying (16), $\{(p, m) = (1, 0), \theta_g = 0, \theta_b = 0\}$ is a PBE. ■

Proof of Proposition 1

First, the principal's and the supervisor's *ex ante* expected utilities in each equilibrium, before any wages are paid to the supervisor, are calculated. In an equilibrium where strategies (p, m) are played, denote these expected utilities $E(u_P)^{-w}_{(p,m)}$ and $E(u_S)^{-w}_{(p,m)}$, respectively.

In the equilibria $\{(p, m) = (0, 1), \theta_g = 1, \theta_b = 0\}$ and $(p, m) = \{(\alpha, 1), \theta_g = 1, \theta_b = 0\}$,

$$\begin{aligned} E(u_P)^{-w}_{(0,1)} &= X_g \\ E(u_S)^{-w}_{(0,1)} &= -[\beta\underline{c} + (1-\beta)\bar{c}] + \rho + \phi B_g. \end{aligned}$$

In the equilibrium $\{(p, m) = (0, \beta), \theta_g = 1, \theta_b = 0\}$,

$$\begin{aligned} E(u_P)^{-w}_{(0,\beta)} &= \beta X_g + (1-\beta) X_b \\ E(U_S)^{-w}_{(0,\beta)} &= \beta(\rho - \underline{c} + \phi B_g) + (1-\beta)(\phi E(B_b) - \rho). \end{aligned}$$

In the equilibrium $\left\{(p, m) = (\alpha, \beta), \theta_g = \frac{\beta}{\beta+\alpha(1-\beta)}, \theta_b = 0\right\}$,

$$\begin{aligned} E(u_P)^{-w}_{(\alpha,\beta)} &= \beta X_g + (1-\beta)[\alpha X_g + (1-\alpha) X_b] \\ E(u_S)^{-w}_{(\alpha,\beta)} &= \beta\left[\rho\frac{\beta}{\beta+\alpha(1-\beta)} - \underline{c} + \phi B_g\right] + (1-\beta)\left[\alpha\left(\rho\frac{\beta}{\beta+\alpha(1-\beta)} + \phi B_g\right) + (1-\alpha)\left(\phi B_b^H - \rho\right)\right] \\ &= \rho\beta + \phi B_g(\beta + \alpha(1-\beta)) - \beta\underline{c} + (1-\beta)(1-\alpha)\phi B_b^H - (1-\beta)(1-\alpha)\rho \\ &= \rho\beta - \beta\underline{c} - (1-\beta)(1-\alpha)\rho + \phi\left[(1-\alpha)(1-\beta) B_b^H + B_g(\beta + \alpha(1-\beta))\right]. \end{aligned}$$

In the equilibria $\{(p, m) = (0, 0), \theta_g : \theta_g \in [0, 1], \theta_b = 0\}$,

$$\begin{aligned} E(u_P)^{-w}_{(0,0)} &= X_b \\ E(u_S)^{-w}_{(0,0)} &= -\rho + \phi\left(\alpha B_b^L + (1-\alpha) B_b^H\right). \end{aligned}$$

In the equilibrium $\{(p, m) = (\alpha, 0), \theta_g = 0, \theta_b = 0\}$,

$$\begin{aligned} E(u_P)^{-w}_{(\alpha,0)} &= \alpha X_g + (1-\alpha) X_b \\ E(u_S)^{-w}_{(\alpha,0)} &= -\rho(1-\alpha) + \phi\left[\alpha B_g + (1-\alpha) B_b^H\right]. \end{aligned}$$

In the equilibrium $\{(p,m) = (1,0), \theta_g = 0, \theta_b = 0\}$,

$$\begin{aligned} E(u_P)^{-w}_{(1,0)} &= X_g \\ E(u_S)^{-w}_{(1,0)} &= \phi B_g. \end{aligned}$$

Second, the principal's *ex ante* utility, after having paid the supervisor a wage when needed, is calculated. Henceforth, we refer to the equilibrium $\{(p,m) = (0,1), \theta_g = 1, \theta_b = 0\}$ as $(p,m) = (0,1)$, and so on. Let $w_{(p,m)}$ denote the wage that the principal pays to the supervisor in equilibrium (p,m). If the principal must pay the supervisor a positive wage to ensure the latter's participation, she pays just enough to make the supervisor break even:

$$w_{(p,m)} = \begin{cases} -E(\pi_S)^{-w}_{(p,m)} & \text{if } E(\pi_S)^{-w}_{(p,m)} < 0 \\ 0 & \text{otherwise} \end{cases}.$$

Hence, the principal's ex ante utility is given by $E(u_P)_{(p,m)} = E(u_P)^{-w}_{(p,m)} - w_{(p,m)}$.

We note that here when $w_{(p,m)} > 0$, the supervisor's participation constraint is binding, and when $w_{(p,m)} = 0$, we have that $E(\pi_S)_{(p,m)} \geq 0$. This implies that the agent's participation constraint is always satisfied for $\phi \leq 1$, as $E(u_A) = \pi_A + \phi\pi_S = E(B) + \phi(E(u_S) - \phi E(B)) = (1-\phi^2) E(B) + \phi E(u_S) \geq 0$, where $E(B)$ denotes the agent's expected benefits.

Claim 1

The claim that the equilibrium with full loyalty, $(p,m) = (1,0)$, is the principal's preferred equilibrium for all ρ is proven.

The above calculations yield that in all equilibria, $E(U_P)^{-w}_{(p,m)}$ is a convex combination of $X_b = 0$ and $X_g > 0$. Hence, the equilibria $(p,m) = (0,1)$, and $(p,m) = (1,0)$ yield the principal's highest *ex ante* pre-wage expected utility, X_g. Since $E(U_S)^{-w}_{(1,0)} = \phi B_g > 0$, $w_{(1,0)} = 0$ for all ρ. Hence, $E(U_P)_{(1,0)} = X_g$. This is strictly preferred to $(p,m) = (0,1)$ whenever $w_{(0,1)} > 0$, and weakly preferred to $(p,m) = (0,1)$ whenever $w_{(0,1)} = 0$. Since $E(U_P)^{-w}_{(p,m)}$ are non-degenerate convex combinations of X_b and X_g for all equilibria except $(p,m) = (1,0)$ and $(p,m) = (0,1)$, the equilibrium $(p,m) = (1,0)$ is always strictly preferred to all equilibria $(p,m) \notin \{(1,0), (0,1)\}$, irrespective of $w_{(p,m)}$.

Claim 2

The claim that for $\rho \geq \bar{\rho}$, the principal is indifferent between $(p,m) = (0,1)$ and $(p,m) = (1,0)$ is proven. Recall from above that $E(u_S)^{-w}_{(0,1)} = -E(\tilde{c}) + \rho + \phi B_g$. If $\rho \geq \bar{\rho} \equiv E(\tilde{c}) - \phi B_g$, then $E(u_S)^{-w}_{(0,1)} \geq 0$. In this case, the principal need not pay a wage, so that $w_{(0,1)} = 0$ and $E(U_P)_{(0,1)} = X_g = E(U_P)_{(1,0)}$.

Claim 3

The claim that there exists a $\hat{\rho} < \bar{\rho}$ such that for all $\rho \in [\hat{\rho}, \bar{\rho})$, the principal's second most preferred equilibrium is $(p, m) = (0, 1)$ is proven.

Let $\rho < \bar{\rho}$, i.e., $\rho < E(\tilde{c}) - \phi B_g$. Then, $w_{(0,1)} = E(\tilde{c}) - \phi B_g - \rho > 0$, and

$$E(U_P)_{(0,1)} = E(U_P)^{-w}_{(0,1)} - w_{(0,1)} = X_g - (E(\tilde{c}) - \phi B_g - \rho) < X_g.$$

As $w_{(0,1)}$ is decreasing in ρ,

$$\rho \to \bar{\rho}^- \Rightarrow E(U_P)_{(0,1)} \to X_g. \tag{17}$$

Since $E(U_P)^{-w}_{(p,m)}$ are non-degenerate convex combinations of X_b and X_g for all equilibria $(p, m) \notin \{(1, 0), (0, 1)\}$, it follows that $E(U_P)_{(p,m)} < X_g$ for all equilibria $(p, m) \notin \{(1, 0), (0, 1)\}$. Given this, it follows from (17) that there exists a unique $\hat{\rho} < \bar{\rho}$ such that $E(U_P)_{(0,1)} > E(U_P)_{(p,m)}$ for all $(p, m) \notin \{(1, 0), (0, 1)\}$ if and only if $\rho > \hat{\rho}$. That is, $(p, m) = (0, 1)$ is strictly preferred to any other equilibrium $(p, m) \notin \{(1, 0), (0, 1)\}$ if and only if $\rho > \hat{\rho}$.

Claim 4

Comparing the conditions in the proof of Lemma 1 yields $\underline{\phi}(\rho) \equiv \frac{2\rho - \overline{c}}{\left[E\left(\tilde{B}_b\right) - B_g\right]}$ and $\overline{\phi}(\rho) = \frac{B_b^H - B_g}{\rho}$. ■

Proof of Proposition 2

$\frac{\partial \bar{\phi}(\rho)}{\partial \rho} = \frac{\partial}{\partial \rho}\left(\frac{B_b^H - B_g}{\rho}\right) = -\left(B_b^H - B_g\right)/\rho^2 < 0.$ ■

Proof of Proposition 3

First, to see that, for any ρ, the range of ϕ for which the full monitoring equilibrium exists decreases in $\overline{c}$, note that $\partial \underline{\phi}(\rho)/\partial \overline{c} = -\left[E\left(\tilde{B}_b\right) - B_g\right]^{-1} < 0$. Second, we need to show that, for a given $\phi < \underline{\phi}(\rho)$, the principal's utility in a full monitoring equilibrium decreases in $E(\tilde{c})$. For $(p, m) = (0, 1)$, by the proof of Proposition **??**, we have that

$$E(u_P)_{(0,1)} = E(u_P)^{-w}_{(0,1)} - w_{(0,1)} = \begin{cases} X_g - [-(-E(\tilde{c}) + \rho + \phi B_g)] & \text{if } \rho \leq \bar{\rho} \equiv E(\tilde{c}) - \phi B_g \\ X_g & \text{if } \rho > \bar{\rho} \equiv E(\tilde{c}) - \phi B_g \end{cases}.$$

For $\rho > \bar{\rho}$, $\frac{\partial E(u_P)}{\partial E(\tilde{c})} = 0$. The result follows from (i) for $\rho \leq \bar{\rho}$, $\frac{\partial E(u_P)}{\partial E(\tilde{c})} = -1 < 0$ and (ii) $\partial \bar{\rho}/\partial E(\tilde{c}) > 0$. Thus, $\frac{\partial E(u_P)}{\partial E(\tilde{c})} \leq 0$ for $(p, m) = (0, 1)$.

Third, note that both $\bar{\phi}(\rho) = \left(\frac{B_b^H - B_g}{\rho}\right)$ and $E(u_P)_{(0,1)} = X_g$ are independent of monitoring costs. Thus, neither the range for which the full loyalty equilibrium exists nor the principal's utility in this equilibrium depend on (the distribution of) monitoring costs.

Finally, note that $\partial\underline{\phi}(\rho)/\partial E\left(\tilde{B}_b\right) = -\frac{2\rho - \bar{c}}{\left[E\left(\tilde{B}_b\right) - B_g\right]^2} < 0$ and $\partial\overline{\phi}(\rho) = \rho^{-1} > 0$. ■

Proof of Proposition 4

Optimal shape of incentive contracts

Lemma 2 *The principal optimally provides monetary incentives either to the supervisor or to the agent.*

Proof. Under any incentive scheme that implements $X = X_g$ with certainty, at least one of the following must be true: $p = 1$ or $m = 1$. If the incentive scheme implements $m = 1$, the agent is indifferent between choosing g and b. Hence, to implement an equilibrium $(p, m) = (\cdot, 1)$, the agent need not be incentivized. Similarly, to implement an equilibrium $(p, m) = (1, \cdot)$, the supervisor need not be incentivized. ■

Lemma 3 *Irrespective of whom the principal provides with monetary incentives, it is always optimal for the principal to set $w_\cdot(X_b) = 0$.*

Proof. Suppose that the principal implements $(p, m) = (1, 0)$. In this equilibrium, the agent's incentive-compatibility constraint is given by

$$w_A(X_g) + B_g \geq w_A(X_b) + B_b^H - \phi\rho. \tag{18}$$

It is straightforward to see that setting $w_A(X_b) = 0$ must be optimal for the principal. It relaxes the constraint such that the principal can set a lower $w_A(X_g)$ to ensure incentive-compatibility. This also implies that the total expected wage paid in equilibrium becomes smaller. In this equilibrium, all participation constraints are satisfied.

Suppose that the principal implements $(p, m) = (0, 1)$. In this equilibrium, the supervisor's incentive-compatibility constraint is given by

$$w_S^{IC}(X_g) - w_S^{IC}(X_b) \geq \bar{c} - 2\rho + \phi\left[E\left(\tilde{B}_b\right) - B_g\right]. \tag{19}$$

It is straightforward to see that setting $w_S(X_b) = 0$ relaxes the constraint such that the principal can set a lower $w_S(X_g)$ to ensure incentive-compatibility. That is, the total expected wage needed to satisfy incentive-compatibility becomes smaller. Further note that, in the equilibrium $(p, m) = (0, 1)$, the outcome $X = X_b$ is never obtained. Hence, $w_S(X_b)$ does not enter, i.e. is irrelevant for, the supervisor's participation constraint. ■

Lemma 4 *If the principal implements* $(p, m) = (1, 0)$ *by incentivizing the agent, the optimal compensation scheme is given by* $w_S(\tilde{X}) = \mathbf{0}$ *and*

$$w_A(\tilde{X}) = \begin{cases} \max\left\{B_b^H - B_g - \phi\rho, 0\right\} & \text{if } X = X_g \\ 0 & \text{if } X = X_b \end{cases}. \tag{20}$$

If the principal implements $(p, m) = (0, 1)$ *by incentivizing the supervisor, the optimal compensation scheme is given by* $w_A(\tilde{X}) = \mathbf{0}$ *and*

$$w_S(\tilde{X}) = \begin{cases} \max\left\{\bar{c} - 2\rho + \phi[E\left(\tilde{B}_b\right) - B_g], E(\tilde{c}) - \phi B_g - \rho, 0\right\} & \text{if } X = X_g \\ 0 & \text{if } X = X_b \end{cases}. \tag{21}$$

Proof. Setting $w_A(X_b) = 0$ in (18) reduces the agent's incentive-compatibility constraint to

$$w_A(X_g) \geq B_b^H - B_g - \phi\rho. \tag{22}$$

Note that $(p, m) = (1, 0)$ can be implemented without any monetary incentives if this inequality holds for $w_A(X_g) = 0$. This proves the first part.

Similarly, setting $w_S(X_b) = 0$ in (19) reduces the supervisor's incentive-compatibility constraint to

$$w_S^{IC}(X_g) \geq \bar{c} - 2\rho + \phi\left[E\left(\tilde{B}_b\right) - B_g\right]. \tag{23}$$

To ensure that the supervisor's participation constraint is satisfied, the principal must further set $w_S(X_g)$ such that

$$w_S^{PC}(X_g) + \rho - E(\tilde{c}) + \phi B_g \geq 0. \tag{24}$$

Hence, the optimal wage depends on which of the two previous inequalities is binding. Note that $(p, m) = (0, 1)$ can be implemented without any monetary incentives if both of the inequalities hold for $w_S^{IC}(X_g) = w_S^{PC}(X_g) = 0$. This proves the second part. ■

Choice of whom to incentivize

First, we derive the function $h_1(\phi)$. From Lemma 4, it follows that $w_A(X_g) = 0$ if and only if

$$\rho \geq \frac{B_b^H - B_g}{\phi} \equiv h_1^a(\phi). \tag{25}$$

It also follows that $w_S(X_g) = 0$ if and only if $\max\left\{\bar{c} + \phi[E\left(\tilde{B}_b\right) - B_g] - 2\rho, E(\tilde{c}) - \phi B_g - \rho\right\} \leq 0$. The first element is negative when

$$\begin{aligned} 0 &\geq \bar{c} + \phi[E\left(\tilde{B}_b\right) - B_g] - 2\rho \\ \rho &\geq \frac{\bar{c} + \phi[E\left(\tilde{B}_b\right) - B_g]}{2} \equiv h_1^b(\phi), \end{aligned} \tag{26}$$

whereas the second element is negative when

$$\begin{aligned} 0 &\geq E(\tilde{c}) - \phi B_g - \rho \\ \rho &\geq E(\tilde{c}) - \phi B_g \equiv h_1^c(\phi). \end{aligned} \tag{27}$$

When ρ satisfies only one of the inequalities (26) and (27), the associated wage is negative for the inequality that is satisfied but positive for the other inequality. Thus, the max operator selects the (positive) element associated with the inequality that is not satisfied. This implies that, when the principal incentivizes the supervisor, the outcome $X = X_g$ can be implemented with $w_S(X_g) = 0$ if and only if

$$\rho \geq \max\left\{h_1^b(\phi), h_1^c(\phi)\right\}. \tag{28}$$

Combining (25) and (28), we conclude that the principal can implement $X = X_g$—either by incentivizing the supervisor or the agent—whenever

$$\rho \geq h_1(\phi) \equiv \min\left\{h_1^a(\phi), \max\left\{h_1^b(\phi), h_1^c(\phi)\right\}\right\}.$$

Since $h_1^a(\phi)$, $h_1^b(\phi)$, and $h_1^c(\phi)$ are continuous, $h_1(\phi)$ is continuous. This proves the first part of the proposition.

For all $\rho < h_1(\phi)$, the principal must pay either the agent or the supervisor a positive incentive wage. It follows from Lemma 4 that, for all $\rho < h_1(\phi)$, the principal prefers incentivizing the supervisor (i.e., implementing $(p, m) = (0, 1)$) over incentivizing the agent (i.e., implementing $(p, m) = (1, 0)$) if and only if

$$B_b^H - B_g - \phi\rho \geq \max\left\{\bar{c} + \phi\left[E\left(\tilde{B}_b\right) - B_g\right] - 2\rho, E(\tilde{c}) - \phi B_g - \rho\right\}. \tag{29}$$

Using the first element, this inequality becomes

$$\begin{aligned} B_b^H - B_g - \phi\rho &\geq \bar{c} + \phi\left[E\left(\tilde{B}_b\right) - B_g\right] - 2\rho \\ \rho &\geq \frac{\phi\left[E\left(\tilde{B}_b\right) - B_g\right] + \bar{c} - \left(B_b^H - B_g\right)}{2-\phi} \equiv h_2^a(\phi), \end{aligned} \tag{30}$$

whereas, using the second element, it becomes

$$\begin{aligned} B_b^H - B_g - \phi\rho &\geq E(\tilde{c}) - \phi B_g - \rho \\ \rho &\geq \frac{E(\tilde{c}) - B_b^H}{1-\phi} + B_g \equiv h_2^b(\phi). \end{aligned} \tag{31}$$

When ρ satisfies only one of the inequalities (30) and (31), the associated supervisor wage is smaller than the agent wage for the inequality that is satisfied, but larger for the other inequality. Thus, the max operator selects the supervisor wage that is larger than the agent wage, i.e., the one associated with the inequality that is not satisfied. Hence, when ρ satisfies only one of the inequalities (30) and (31), inequality (29) is satisfied and the principal incentivizes the agent.

From the above it follows that the principal prefers incentivizing the supervisor if and only if

$$\rho \geq h_2(\phi) \equiv \max\left\{h_2^a(\phi), h_2^b(\phi)\right\}. \tag{32}$$

Since $h_2^a(\phi)$ and $h_2^b(\phi)$ are continuous in $[0,1)$, $h_2(\phi)$ is continuous in $[0,1)$.

Shape of $h_2(\phi)$

The shape of $h_2(\phi)$ depends on the shapes of $h_2^a(\phi)$ and $h_2^b(\phi)$.

Lemma 5 *$h_2^a(\phi)$ is strictly increasing.*

Proof. The function $h_2^a(\phi)$ is continuously differentiable in $[0,2]$. Furthermore, $h_2^a(0) = \left(c - B_b^H + B_g\right)/2$ and $\lim_{\phi\to 2} h_2^a(\phi) = \infty$. We want to show that it is strictly increasing in this interval. Consider any pair (ρ', ϕ') such that $\rho' = h_2^a(\phi')$, which—by construction—requires that $w_A(X_g) = w_S^{IC}(X_g)$, i.e.

$$B_b^H - B_g - \phi'\rho' = \bar{c} + \phi'[E\left(\tilde{B}_b\right) - B_g] - 2\rho'. \tag{33}$$

The LHS is decreasing in ϕ', whereas the RHS is increasing in ϕ'. Thus, keeping ρ' fixed, it must be that, for all $\phi > \phi'$,

$$B_b^H - B_g - \phi\rho' < \bar{c} + \phi[E\left(\tilde{B}_b\right) - B_g] - 2\rho', \tag{34}$$

or $w_A(X_g) < w_S^{IC}(X_g)$. By construction, this implies that $\rho' < h_2^a(\phi)$ for $\phi > \phi'$. By the same token, keeping ρ' fixed, it must be that, for all $\phi < \phi'$,

$$B_b^H - B_g - \phi\rho' > \overline{c} + \phi[E\left(\tilde{B}_b\right) - B_g] - 2\rho', \tag{35}$$

or $w_A(X_g) > w_S^{IC}(X_g)$. By construction, this implies that $\rho' > h_2^a(\phi)$ for all $\phi < \phi'$. Taken together, these observations imply that $h_2^a(\phi)$ is strictly increasing everywhere. ■

Lemma 6 *$h_2^b(\phi)$ is increasing if $E(\tilde{c}) \geq B_b^H$ and strictly decreasing otherwise.*

Proof. $\partial h_2^b(\phi)/\partial\phi = E(\tilde{c}) - B_b^H$. ■

For $E(\tilde{c}) \geq B_b^H$, it follows from the two previous lemmas that $h_2(\phi)$ is increasing. For $E(\tilde{c}) < B_b^H$, we must distinguish two cases. If $h_2^b(0) < h_2^a(0)$, it follows from the two previous lemmas that $h_2^b(\phi) < h_2^a(\phi)$ for all $\phi \in [0, 1)$. By contrast, if $h_2^b(0) > h_2^a(0)$, then there exists a unique $\phi^* \in (0, 1)$ such that the two functions intersect, $h_2^b(\phi^*) = h_2^a(\phi^*)$. In this case, $h_2(\phi)$ strictly decreases for $\phi \in [0, \phi^*]$ and strictly increases for $\phi \in [\phi^*, 1]$. Thus, $h_2(\phi)$ is quasi-convex. This proves the second and the third part of the proposition. ■

Proof of Proposition 5

Table 2 can be constructed from Lemma 4. For completeness, note the following comparative statics: For strictly positive wages, we have that

$$\frac{\partial}{\partial\rho}w_A(X_g) = -\phi < 0, \quad \frac{\partial}{\partial\rho}w_S^{PC}(X_g) = -1 < 0, \quad \text{and} \quad \frac{\partial}{\partial\rho}w_S^{IC}(X_g) = -2 < 0$$

as well as that

$$\frac{\partial}{\partial\phi}w_A(X_g) = -\rho < 0, \quad \frac{\partial}{\partial\phi}w_S^{PC}(X_g) = -B_g < 0, \quad \text{and} \quad \frac{\partial}{\partial\phi}w_S^{IC}(X_g) = E\left(\tilde{B}_b\right) - B_g > 0.$$

That is, the optimal wage is always decreasing in ρ, and it is also decreasing in ϕ unless the principal incentivizes the supervisor through w_S^{IC}.

To determine Φ_S^-,, we must find the region in which (i) the supervisor is incentivized and (ii) the optimal wage is given by $w_S^{PC}(X_g)$. From Proposition 4, we know that condition (i) is satisfied when $\rho \geq h_2(\phi)$. Condition (ii) is satisfied when $w_S^{IC}(X_g) \leq w_S^{PC}(X_g)$, i.e.

$$\begin{aligned} \overline{c} + \phi[E\left(\tilde{B}_b\right) - B_g] - 2\rho &\leq E(\tilde{c}) - \phi B_g - \rho \\ \rho &\geq \phi E\left(\tilde{B}_b\right) + \overline{c} - E(\tilde{c}) \equiv h_3(\phi). \end{aligned} \tag{36}$$

Note that $h_3(\phi)$ is an affine function with a positive intercept, $\overline{c} - E(\tilde{c})$, and a positive slope, $E\left(\tilde{B}_b\right)$. Thus, conditions (i) and (ii) are both satisfied for all $\rho \geq \max\{h_2(\phi), h_3(\phi)\}$, i.e., for sufficiently large ρ.

To determine Φ_S^+, we must find the region in which (i) the supervisor is incentivized and (iii) the optimal wage is given by $w_S^{IC}(X_g)$. From the preceding arguments, it is clear that the conditions (i) and (iii) are both satisfied iff $\rho \in [h_2(\phi), h_3(\phi)]$, i.e., for intermediate ρ. However, it can happen that the interval $[h_2(\phi), h_3(\phi)]$ is empty for all $\phi \in [0, 1)$. This is the case when $h_2(\phi) > h_3(\phi)$ for all $\phi \in [0, 1)$.

To determine Φ_A, we must find the region in which (iv) the agent is incentivized and the optimal wage is given by $w_A(X_g)$. From Proposition 4, we know that condition (iv) is satisfied when $\rho \in [0, h_2(\phi)]$, i.e., for sufficiently small ρ. However, it can happen that the interval $[0, h_2(\phi)]$ is empty for all $\phi \in [0, 1)$. This is the case when $h_2(\phi) < 0$ for all $\phi \in [0, 1)$.

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