

# Influence-Cost Models of Firm Boundaries and Structures

Michael Powell\*

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## Abstract

This paper explores organizational responses to influence activities - costly activities aimed at persuading a decision maker. As Milgrom and Roberts (1988) argued, rigid organizational practices that might otherwise seem inefficient (including closed-door policies, flat incentives, defensive information acquisition, and rigid decision-making rules) can optimally arise. If more complex decisions are more susceptible to influence activities, optimal selection may partially account for the observed correlation between the measured quality of management practices and firm performance reported in Bloom and Van Reenen (2007). Further, the boundaries of the firm can be shaped by the potential for influence activities, providing a theory of the firm based on ex-post inefficiencies. Finally, boundaries and bureaucratic institutions interact: non-integrated relationships should optimally be governed by less restrictive rules than relationships within integrated firms. (JEL D02, D23, D73, D83)

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# 1 Introduction

This paper explores the organizational implications of influence activities—costly activities aimed at persuading a decision maker—both within and between firms. Such activities are commonplace in business relationships. Employees may devote a significant fraction of their otherwise-productive time building their credentials and seeking outside opportunities to convince management that they are ideal for promotion to a key position (Milgrom and Roberts (1988)). Division managers may lobby corporate headquarters for larger budgets to pursue pet projects (Wulf (2009)). Buyers of intermediate goods may try to persuade sellers to provide favorable delivery time slots, to give them first pick of the highest quality batches of goods, or to assign specific personnel to their case. Such activities are often privately costly and can lower the quality of decision making, so part of the problem organizational design problem is to mitigate them.

Organizations often adopt rigid practices that seem inefficient from a neoclassical perspective but can make sense, because they reduce influence activities. A seniority-based promotion rule can sometimes promote a less talented worker or one who is not a good fit for the new position, but it reduces the incentives for workers to waste time "buttering up the boss" (Milgrom (1988), Milgrom and Roberts (1988)). Low-powered managerial incentives can stifle motivation but can help reduce an own-division bias in lobbying for corporate resources (Scharfstein and Stein (2000), Rajan, Servaes, and Zingales (2000)). Closed-door organizational practices that hamper communication can make it difficult to implement continuous-improvement initiatives, but a more open policy may invite lobbying. Moreover, as Milgrom and Roberts (1990) point out, "even the very boundaries of the firm can become design variables." That is, divesting a business unit can create barriers to influence (Meyer, Milgrom, and Roberts (1992)). Influence activities are not absent between firms, however—many business relationships are on-going and involve significant relationship specificity, and hence a firm *does* care about (and thus may hope to influence) what its business partners do.<sup>1</sup>

This paper seeks to provide a unified theory of the costs and benefits of integration that is based on the logic of influence-activity mitigation. To do so, I embed a tractable model of influence activities into an organizational-design problem. As in Grossman and Hart (1986) and Hart and Moore (1990), analysis is carried out under a common economic environment (i.e. preferences, information structure, contracting possibilities, and decision sets do not exogenously vary with the control structure). In a model with two decision rights, integration

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<sup>1</sup>As Williamson (1971) and Klein, Crawford, and Alchian (1978) emphasize, even in a perfectly competitive environment for homogeneous intermediate goods, the fundamental transformation ensures that firm boundaries do not eliminate all externalities between parties involved in a transaction.

is unified control and non-integration is divided control. The tractability of this approach allows me to explore the impacts of alternative mechanisms for influence-activity mitigation, such as closed-door policies, low-powered incentives, or rigid decision-making rules, and their interaction with control structures.

To ground ideas, suppose two parties are in a working relationship. Contracts are *incomplete*—the parties are unable to meet ex ante and specify an enforceable state-contingent rule regarding how two decisions are to be carried out—and, in the course of their relationship, decisions must be taken. The rights to make these decisions are contractible ex ante, but neither the rights to make decisions nor the actual decisions to be made are contractible ex post.<sup>2</sup> That is, when a particular contingency arises, the interested parties cannot costlessly bargain over the decision that is to be taken. Control is thus *exercised*—the party with the control right unilaterally chooses his ideal decision given his information. Additionally, there are *decision externalities*—each party cares directly about both decisions.

Finally, information regarding the ideal decision is most easily discernible by the parties who care about the decision to be taken. As such, a decision maker must often rely on reports and messages that originate from parties who have both a direct interest in altering the decision maker’s beliefs and the ability to do so. The party may seek out additional information that favors his view, he may neglect to mention certain points that do not, or he may attempt to tell a story consistent with the facts but heavily biased in its conclusion. In any case, crafting such an argument takes time that would be better spent on more productive tasks—the direct cost of influence activities is the opportunity cost of the influencer’s time. As such, these costs are convex—engaging in influence activities crowds out less productive tasks before more productive tasks. Of course, the decision maker recognizes that the influencer has the incentive to manipulate information in this way and will take this into account when making a decision. Nevertheless, following the logic of Holmstrom (1982/1999), equilibrium may involve non-zero levels of influence activities, for if the decision maker anticipated none, the influencer would have the incentive to carry out some.

The model shows that for a fixed control structure, the equilibrium level of influence activities a party engages in is greater the greater is (a) his concern for the decisions being made, (b) the degree of ex post disagreement, (c) the effectiveness with which beliefs can be manipulated, and (d) the number of decisions not under his control. The last point implies that, all else equal, dividing control reduces the costs of influence activities: divided control leads both parties to crowd out mundane activities, whereas concentrated control leads one party to essentially specialize in influence activities, crowding out potentially important

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<sup>2</sup>Aghion and Tirole (1997), Alonso, Dessein, and Matouschek (2008), Rantakari (2008), and to a lesser extent, Hart and Moore (2008), Hart (2009), Hart and Holmstrom (2010), feature ex-post noncontractibility.

tasks. Parties operating in volatile environments in which beliefs are highly sensitive to manipulable information should thus perhaps become non-integrated.

On the other hand, there may be benefits to concentrating control: coordinating the two decisions could be important, or one party might simply have more to lose from not having his ideal decision implemented. The parties may thus opt for integration and choose to reduce influence activities using alternative instruments, such as closed-door policies or restrictions on the discretion of the decision maker. Influence-cost theory can thus help shed light on why certain puzzling management practices persist (as documented by Bloom and Van Reenen (2007)) and can provide a selection-based, rather than causal, explanation for their finding of a positive correlation between the quality of management practices and plant-level performance. Further, the theory predicts interactions between boundaries and organizational practices: rigid organizational practices and integration are complementary. Non-integrated relationships should be governed by less restrictive rules than relationships within integrated firms.

While the analysis above pertains to the boundaries of the firm, similar insights apply to control structures within firms. In the framework of the recent papers by Alonso, Dessein, and Matouschek (2008) and Rantakari (2008) emphasizing coordination versus local adaptation, I derive a similar trade-off. Centralizing control with a third-party headquarters facilitates coordination, but it does so at the expense of high levels of influence activities. Decentralization hampers coordination and reduces influence activities. Centralization and rigid organizational are thus complementary. This is consistent with the (Bloom, Sadun, and Van Reenen (2011)) findings of positive correlations between decentralization and the quality of management practices and between decentralization and firm performance.

My analysis assumes that information-gathering activities are separable from influence activities, which I define to be (weakly) information degrading. All else equal, an organization may like to incentivize information acquisition and discourage influence activities. But the two need not be separable, and thus I am ruling out potentially beneficial effects of influence activities—since an individual must be credible to be persuasive, he must gather useful information in order to influence a decision maker (see Laux (2008) for recent work along these lines).

This paper is related to the literature on influence activities in organizations (Milgrom (1988), Milgrom and Roberts (1988, 1990, 1992), Schaefer (1998), Scharfstein and Stein (2000), Laux (2008), Wulf (2009), Friebel and Raith (2010), Lachowski (2011)) but is closest in spirit to Meyer, Milgrom, and Roberts (1992) who explore the idea that the boundaries of the firm can serve as design variables to mitigate influence activities. In their model, divestiture of a division amounts to a the choice of a decision rule that cannot depend on the

information the division possesses, whereas in my model, divestiture of a division amounts to divided control. I view informational restrictions on decision rules as an additional instrument (as in Milgrom and Roberts (1988)) and analyze the interaction between the two. The analysis is closest to Gibbons (2005) who explores the role of the allocation of a single decision right on equilibrium influence activities. This paper goes farther in that it analyzes the simultaneous choice of boundaries and organizational practices. In doing so, it provides a theory of the firm based on ex post inefficiencies (Matouschek (2004) and Hart and Holmstrom (2010)) that is related to Williamson's classic "haggling" versus "fiat" argument. My treatment of rigid organizational practices is also related to the literature on endogenous bureaucracy (e.g. Prendergast (2003)).

Section 2 develops a simple model of influence activities. Section 3 defines and characterizes the equilibrium of this influence-activity model for a given allocation of control (control structure) and set of organizational practices (practices). Section 4 analyzes the optimal control structure for a fixed set of practices, section 5 fixes the control structure and analyzes optimal practices, and section 6 examines the optimal choice of both. Section 7 shows that similar logic can also provide a theory of the internal structure of decision making rather than boundaries, and section 8 concludes.

## 2 The Model

There are two managers, denoted by  $L$  and  $R$  and two decisions that must be made,  $d_1$  and  $d_2$ . The payoffs to the managers for a particular decision depend on an underlying state of the world, denoted by  $s \in S$ . The state of the world is unobserved; however, the two managers can commonly observe an informative signal,  $\sigma$ . But, as Milgrom and Roberts (1988) point out, information regarding the ideal decision typically originates with the parties who care about the ultimate decisions taken and have the means to misrepresent the information. As a result, the signal can be manipulated by both managers in a way that will be made precise shortly.<sup>3</sup>

For example, the two managers may make use of a common asset such as the reputation of the final product that emerges from their production process. The upstream manager may prefer that the reputation be geared toward showcasing the durability of the inputs. The downstream manager may prefer that it emphasize novelty. Decisions must be made regarding the direction to emphasize. Both managers want the final product to succeed, and

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<sup>3</sup>Throughout, I assume the two parties are "locked in" with each other, regardless of the allocation of control, and thus each directly care about both decisions. A richer model might allow for endogenous dependence between the two players. How this interacts with firm boundaries is an interesting question for future research.

success largely depends on consumers' preferences, which are uncertain. Depending on who is making these decisions, one or both managers may have the incentive to try to change the other's beliefs by, say, alter the phrasing of certain questions that are asked in consumer focus groups.

Formally, assume that the two managers bargain over a **control structure**  $g \in G = \{I_L, I_R, NI, RNI\}$ , where under  $I_j$ , manager  $j$  controls both decisions, under  $NI$ ,  $L$  controls  $d_1$  and  $R$  controls  $d_2$ , and conversely under  $RNI$ .<sup>4</sup> After the control structure has been chosen, assume that each manager can choose a level of "influence activities," denoted by  $\lambda^i$  at private cost  $k(\lambda^i)$ . The private cost represents the opportunity cost of time wasted manipulating the signal. As such, the costs of influence activities are increasing and convex. Throughout, I assume that the influence activities are chosen prior to the observation of the public signal and without any private knowledge of the state of the world,<sup>5</sup> and they affect the conditional distribution of  $\sigma$  given  $s$ . Further, I assume that this effect is linear.<sup>6</sup> After the signal has been observed, the party(ies) with control of the decision rights must immediately choose a decision. There is neither time nor opportunity for the two parties to get together and bargain over the decision to be made.<sup>7</sup> Further, I assume that the parties cannot bargain over a signal-contingent decision rule ex ante.<sup>8</sup>

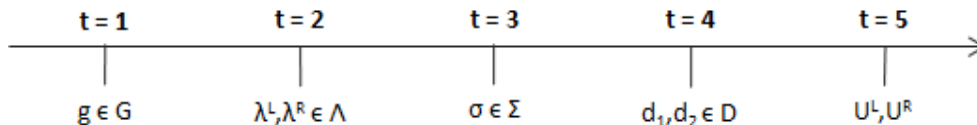


Figure 1: Timing

The timing of the model (shown in figure 1 above) is as follows: (1)  $L$  and  $R$  bargain over a control structure  $g \in G$ , which I will describe soon; (2)  $L$  and  $R$  simultaneously choose (unobservable) influence activities  $\lambda^L, \lambda^R \in \Lambda \subset \mathbb{R}$  at cost  $k(\lambda^i)$ , where  $k$  is convex

<sup>4</sup>At this point, I do not consider the possibility of allocating control to a third party. Section 7 considers this possibility.

<sup>5</sup>I show in Appendix B that the qualitative results of this model can also be generated as a separating equilibrium in a noisy signaling game. However, the multiplicity of equilibria in signaling games makes such an approach relatively unappealing.

<sup>6</sup>The assumption that  $\lambda^A$  and  $\lambda^B$  do not affect the conditional variance of  $\sigma|s$  rules out the Milgrom and Roberts (1988) observation that "when... underlying information is so complex that unscrambling is impossible, decision makers will have to rely on information they know is incomplete or inaccurate." I explore this idea in more detail in Appendix C.

<sup>7</sup>Ex post noncontractibility is a central feature of many recent papers in organizational economics. See footnote 1 for a list of several such papers.

<sup>8</sup>Appendix C explores related issues of optimal rule design.

and symmetric around zero, with  $k'(0) = k(0) = 0$ ; (3)  $i$  and  $j$  publicly observe the signal  $\sigma = s + \lambda^i + \lambda^j + \varepsilon$ ; (4) The manager with control chooses decision  $d \in \mathbb{R}$ ; (5) Payoffs are realized.

Throughout, assume that all random variables are normally distributed ( $s \sim N(0, h^{-1})$ ,  $\varepsilon \sim N(0, h_\varepsilon^{-1})$ ) and independent, and managers have quadratic costs of influence,  $k(\lambda^i) = \frac{1}{2}(\lambda^i)^2$ , and gross payoffs

$$U^i(s, d) = \sum_{\ell=1}^2 \left[ -\frac{\alpha^i}{2} (d_\ell - s - \beta^i)^2 \right], \alpha^i > 0, \beta^i \in \mathbb{R}.$$

Manager  $i$  prefers that  $d_1 = d_2 = s + \beta^i$ , and hence the two managers disagree on their ideal decision conditional on the state of the world. The problem is not interesting if  $\beta^L = \beta^R$ , so without loss of generality, assume  $\beta^L - \beta^R = \Delta > 0$ . Two aspects of symmetry have been assumed here. First, the amount by which manager  $i$  cares about how close the decision is to his ideal decision is assumed to be the same across decisions.<sup>9</sup> That is, the  $\alpha^i$  coefficient on the loss functions for both decisions is the same. Secondly, the amount by which the two managers disagree about the ideal decision is equal across decisions.<sup>10</sup> Throughout, assume that  $\alpha^L \geq \alpha^R$ . Consistent with many theories of the firm (i.e. the "IO" view, Transaction Cost Economics, and Property Rights Theory), divided control will be referred to as *non-integration* (and will be denote by  $g = NI$ ) and unified control as *integration* ( $g = I$ ).<sup>11</sup>

### 3 Equilibrium

Suppose manager  $i$  has control of a decision. Manager  $j$  cares about the decision to be taken and recognizes that this decision depends on  $i$ 's beliefs. Thus, manager  $j$  has a direct interest in what manager  $i$  believes and will do whatever is in his power to change  $i$ 's beliefs. But, as Cyert and March (1963: p. 85) argue, "We cannot reasonably introduce the concept of communication bias without introducing its obvious corollary - 'interpretive adjustment.'" That is, manager  $i$  recognizes that manager  $j$  has the incentive to influence the signal, and he will correct for this in his beliefs. As in career-concerns/signal-jamming games, this

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<sup>9</sup>What is important in generating the trade-off in this model is that the same party who cares more about one decision also cares more about the other. Section 7 explores alternative foundations for the optimality of concentrated control.

<sup>10</sup>Relaxing this does not qualitatively change any results. Allowing for different  $\Delta$ 's across decisions simply adjusts the weights that are placed on each decision in the optimal governance-structure choice.

<sup>11</sup>Though there are four potential allocations of control, only two will ever be optimal: unifying control with manager  $L$  or dividing control by giving decision 1 to  $L$  and decision 2 to  $R$ . This eliminates the need for additional notation for the remaining control structures:  $R$ -control and reverse non-integration.

"interpretive adjustment" does not eliminate the incentives to carry out influence activities, for if the decision maker expected no influence activities, then the influencer would have a strong incentive to engage in them. Thus, conditional on a control structure,  $g$ , the solution concept is perfect Bayesian equilibrium, as in career-concerns/signal-jamming games. Denote manager  $i$ 's beliefs about the vector of influence activities by  $\hat{\lambda}(i)$ .

**Definition 1** *Given a control structure,  $g$ , a **Perfect Bayesian Equilibrium** of the resulting game consists of choices of influence activities,  $\lambda^{*L}$  and  $\lambda^{*R}$ , and a decision function  $d^{*g}(\sigma; \hat{\lambda})$ , such that: (1) each component of  $d^{*g}(\sigma; \hat{\lambda})$  is chosen optimally by the manager who controls that decision under  $g$ , given his beliefs about the state of the world; which depend on conjectures about the level of influence activities,  $s | \sigma, \hat{\lambda}(i)$ ; (2) influence activities are chosen optimally given the allocation of the decision right; and (3) beliefs are correct:  $\hat{\lambda}(i) = \lambda^*$ .*

Let us begin by solving for an equilibrium for an arbitrary control structure  $g$ . Suppose manager  $i$  has control of decision  $\ell$  under governance structure  $g$ . Let  $\lambda^*$  denote the equilibrium level of influence activities. Manager  $i$  will choose  $d_\ell^*$  to minimize his expected loss given his beliefs. Since he faces a quadratic loss function, his decision will be equal to his conditional expectation of the state of the world, given the signal and his equilibrium conjecture about influence activities, plus his bias term,  $\beta^i$ . That is,

$$d_\ell^{*g}(\sigma; \lambda^*) = E_s \left[ s | \sigma, \hat{\lambda}(i) \right] + \beta^i.$$

The decision manager  $i$  chooses differs from the decision manager  $j \neq i$  would choose if he had the decision right for two reasons. First,  $\beta^i \neq \beta^j$ , so for a given set of beliefs, manager  $i$  prefers a different level of  $d_\ell$  than manager  $j$  does. Secondly, it may be that, out of equilibrium, beliefs are incorrect. That is, manager  $i$  knows  $\lambda^i$  but only has a conjecture about  $\lambda^j$ . The updating rule for normal distributions implies that the conditional expectation of the state of the world from the perspective of individual  $i$  is a convex combination of two estimators of the state of the world. The first is the prior mean, 0, and the second is a modified signal,  $\hat{s}(i) = \sigma - \hat{\lambda}^L(i) - \hat{\lambda}^R(i)$ , which must of course satisfy  $\hat{\lambda}^i(i) = \lambda^i$ . The weight that  $i$ 's preferred decision rule attaches to the signal is given by the signal-to-noise ratio,  $\varphi = \frac{h_\varepsilon}{h+h_\varepsilon}$ . That is,

$$E_s \left[ s | \sigma, \hat{\lambda}(i) \right] = (1 - \varphi) \cdot 0 + \varphi \cdot \hat{s}(i).$$

Given decision rules  $d_\ell^{*g}(\sigma; \lambda^*)$  for  $\ell = 1, 2$ , we can now compute the equilibrium level of influence activities that each manager will engage in. Influence activities for manager  $j$  are more privately beneficial (out of equilibrium) the greater is the difference between the

equilibrium decision rule and manager  $j$ 's decision rule, the more manager  $j$  cares about his loss from having a suboptimal decision rule, and the more weight the decision maker places on the manipulable signal. Manager  $j$ 's level of influence activities will solve

$$k'(\lambda^{j*}) = E_{s,\varepsilon} \left[ \sum_{\ell=1}^2 -\alpha^j (d_\ell^{*g}(\sigma; \lambda^*) - s - \beta^j) \frac{\partial d_\ell^{*g}}{\partial \sigma} \frac{\partial \sigma}{\partial \lambda^{j*}} \right] = N^{-j} \alpha^j \Delta \varphi, \quad (1)$$

where  $N^{-j}$  is the number of decisions that manager  $j$  does not control under governance structure  $g$ . Further, since given any beliefs about  $\lambda^j$ , the unique optimal decision rule of manager  $i$  is a pure strategy, and given that manager  $i$  chooses a pure strategy decision rule, there is a unique value of  $\lambda^{j*}$  satisfying (1). Thus, the pure strategy equilibrium characterized in this section is the unique equilibrium of this game.<sup>12</sup> These results are captured in the following proposition.

**Proposition 1** *For a given control structure, there exists a unique Perfect Bayesian Equilibrium of the game that follows. Further, in that Perfect Bayesian Equilibrium, the levels of influence activities are given by*

$$|\lambda^{j*}| = |\Delta| N^{-j} \alpha^j \varphi,$$

where  $N^{-j}$  is the number of decisions player  $j$  does not control and  $\varphi = \frac{h_\varepsilon}{h+h_\varepsilon}$  is the signal-to-noise ratio.

All else equal, manager  $j$  will choose a higher level of influence activities the more disagreement ( $\Delta$ ) there is, the more he cares about the decision ( $\alpha^j$ ), and the more informative the signal is ( $\varphi$ ). This last comparative static can be decomposed further.  $\varphi$  is high the larger is  $h_\varepsilon$  (ie. when the signal is more precise) and the smaller is  $h$  (i.e. when there is more ex ante uncertainty). The rest of this paper will concern itself with alternative methods of mitigating these influence activities.

## 4 The Coasian Program

Property Rights Theory (Grossman and Hart (1986), Hart and Moore (1990), and Hart (1995), hereafter PRT) advanced the methodology for studying the boundaries of the firm

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<sup>12</sup>If higher levels of influence activities increases the precision of the signal, there could be multiple pure strategy equilibria. In this case, if the decision-maker believes that high (low) levels of influence activities have been chosen, he will place much (little) weight on the signal. This in turn will induce the other manager to choose high (low) levels of influence activities. This is analogous to the multiplicity argument in Dewatripont, Jewitt, and Tirole (1999).

by specifying a common contractual environment across prospective control-right allocations, providing a unified description of the costs and benefits of integration. However, PRT assumes ex post efficiency (via Coasian bargaining), instead focusing on how the allocation of control affects managers' bargaining positions and hence the sensitivity of their expected split of the surplus to their ex ante investments. While the approach has proven fruitful in a variety of fields, ex post inefficiencies are also commonly viewed as important determinants of firm boundaries, and thus as Hart (2008) points out, "in order to make progress on the Coasian agenda, we must move away from Coase (1960) and back in the direction of Coase (1937). We need to bring back haggling costs!" But a satisfactory formalization of Williamson (1971)'s appealing argument that non-integration may produce "haggling," so that decision-making by "fiat" under integration may be more efficient has been elusive.<sup>13</sup> This section will develop a framework for analyzing a version of the "haggling" versus "fiat" trade-off, but a more complete analysis is deferred until section 6.

From the perspective of period 1, before  $\lambda^L$  and  $\lambda^R$  are chosen, the two managers bargain over a control structure,  $g^*$ , correctly anticipating its effects on equilibrium influence activities (which are unique, conditional on  $g$ ) as well as on the equilibrium decision rules. I assume that the managers can freely make transfers at this stage, so that the control structure  $g^*$  will be the solution to the following Coasian program

$$\max_{g \in G} \{W(g)\} = \max_{g \in G} \left\{ E_{s,\varepsilon} \left[ \sum_{i \in \{L,R\}} U^i(s, d^g(\sigma; \lambda^*)) \right] - \sum_{i \in \{L,R\}} k(\lambda^{*i}) \right\}.$$

Because managers' payoff functions are quadratic, we can use a mean-variance decomposition of the first term in  $W(g)$ , which gives us

$$W(g) = - (ADAP + ALIGN(g) + INFL(g)).$$

That is, ex-ante expected welfare can be decomposed into the sum of three costs: (1) an adaptation cost that arises from basing decisions on a noisy signal rather than directly on the state of the world; (2) an alignment cost that is due to the fact that for each decision, one manager will not be able to implement his ideal decision rule; and (3) an influence-cost component, which can be interpreted as "haggling costs." The exact expressions for these terms are derived in proposition 7 in the appendix.

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<sup>13</sup>Masten (1986) develops a model based on Tullock (1980) to highlight the costs of divided control but it is silent on the costs of unified control. Recent work by Hart and Holmstrom (2010) adapts several behavioral elements from Hart and Moore (2008) and Hart (2009) to argue that different control structures create different feelings of entitlement and hence different risks that parties will feel "aggrieved" and thus "shade" by supplying only perfunctory effort on noncontractible tasks.

The *ADAP* term does not depend on the control structure, so  $g$  is chosen to minimize the sum of *ALIGN* ( $g$ ) and *INFL* ( $g$ ). Two polar cases help identify the relevant trade-off. First, let us look at a "pure adaptation" model in which  $k(\lambda) = \infty$  for all  $\lambda \neq 0$ , so that influence activities are impossible by assumption. To minimize alignment costs, the managers want to allocate control of both decisions to the manager who has more to lose from not having his ideal decision rule implemented. Since  $\alpha^L \geq \alpha^R$ , the optimal control structure involves unifying control with manager  $L$  ( $g^* = I_L$ ).

Next, let us look at a "pure influence" model in which  $k(\lambda) = \frac{1}{2}\lambda^2$  and  $\alpha^L = \alpha^R$ . Under any control structure, each decision will be  $\Delta$  away from one of the manager's ideal decisions. Since  $\alpha^L = \alpha^R$ , both managers care equally about the resulting loss. That is, *ALIGN* ( $g$ ) does not depend on  $g$  and thus the control structure will be chosen to minimize influence costs. Here, the managers will optimally choose to divide control. To see why, notice that by proposition 1, the total amount of time wasted on influence activities ( $\sum_j \lambda^j$ ) is independent of  $g$ . Since influence costs are convex, *INFL* ( $g$ ) is minimized under divided control.<sup>14</sup> That is,  $g^* = NI$  is optimal.

In the richer model in which  $\Lambda = \mathbb{R}$  and  $\alpha^L > \alpha^R$ , these opposing forces lead to a non-trivial trade off, provided  $\alpha^L$  is not too large relative to  $\alpha^R$ . There is a critical value of the signal-to-noise ratio  $\varphi^*$  such that if  $\varphi < \varphi^*$ , control will optimally be concentrated and if  $\varphi > \varphi^*$ , control will optimally be divided. This leads to the following proposition.

**Proposition 2** *Assume  $\alpha^R < \alpha^L < \sqrt{3}\alpha^R$ . Divided control is optimal if and only if*

$$\varphi^2 \geq \frac{\alpha^L - \alpha^R}{3(\alpha^R)^2 - (\alpha^L)^2}. \quad (2)$$

The condition that the manager  $L$  cares more about the decision than manager  $R$  but not too much more (i.e.  $\alpha^L < \sqrt{3}\alpha^R$ ) is best understood by considering the case in which manager  $R$  is essentially indifferent about both decisions ( $\alpha^R \approx 0$ ) but manager  $L$  is not. Then it is clear that control should be concentrated with manager  $L$ . Also, note that the level of disagreement,  $\Delta$ , does not matter for the optimal control structure. The reason for this is that with quadratic preferences and quadratic influence costs, both *ALIGN* and *INFL* are proportional to  $\Delta^2$  and thus differences in  $\Delta^2$  do not affect the relative trade-off between minimizing alignment costs and influence costs.<sup>15</sup>

When are influence costs large relative to alignment costs? Condition (2) implies that

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<sup>14</sup>More generally, with an arbitrary increasing and convex cost function  $k$ , we need that  $k''/k' > k'''/k''$ . This is satisfied for  $k(\lambda) = c\lambda^\xi$  for all  $\xi$ .

<sup>15</sup>More generally, an increase in  $\Delta$  makes integration relatively less appealing if  $k''' > 0$  and makes integration relatively more appealing if  $k''' < 0$ .

whenever the signal-to-noise ratio is large, the costs of integration exceed the costs of non-integration. Further unpacking  $\varphi$  (which is equal to  $\frac{h_\varepsilon}{h+h_\varepsilon}$ ), non-integration is preferred whenever the level of ex ante uncertainty is high (i.e.  $h$  small) or the signal is very informative (i.e.  $h_\varepsilon$  large) and thus will be relied heavily upon. Influence-activity mitigation therefore provides a basis for a theory of the optimal control structure.

This section began by arguing that this model would provide a framework for thinking about the "haggling" versus "fiat" trade-off. In what sense is this the case? Interpreting the opportunity costs of influence activities as the costs of "haggling,"<sup>16</sup> this model generates the prediction that such costs should be *greater* under integration than under non-integration. Put differently, the model in this section suggests that the *cost* of "fiat" (interpreted here as unified control) is increased "haggling," and thus the current model does not deliver the Williamson (1971) trade-off. This will be resolved in section 6, which allows for integration to be coupled with organizational practices aimed at reducing "haggling."

## 5 Rigid Organizational Practices

Recall that under a control structure in which party  $i$  controls  $N^{-j}$  decision rights, manager  $j$ 's equilibrium influence activities are  $|\lambda^j| = |\Delta| N^{-j} \alpha^j \varphi$  (Proposition 1). The previous section emphasized the scope for using  $N^{-j}$  as an instrument for mitigating influence activities (Proposition 2). However, as Milgrom and Roberts (1988, 1992) highlight, there are many other methods available for mitigating influence activities. These include rigid decision-making rules, flat incentive schemes, defensive information acquisition, closed-door policies, etc.. While the adoption of many of these organizational practices would otherwise seem inefficient, they begin to make sense when one considers the effect they may have on the incentives for influence activities.

In the context of this model, any institution that reduces  $\alpha$ ,  $\Delta$ , or  $\varphi$  will reduce equilibrium influence activities. For example, adopting closed-door policies in which decision makers are effectively insulated from relevant information could correspond to a decrease in  $h_\varepsilon$  (and hence in  $\varphi$ ). Such a policy will reduce the private return to influence activities and will thus discourage them. This would not be costless, since it would also effectively reduce the amount of information the decision maker has available to make a decision. Similarly, putting into place incentive schemes that effectively make a manager indifferent about the decision being taken (which could correspond to a decrease in that manager's  $\alpha$ ) would have

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<sup>16</sup>Because influence activities do not affect the conditional variance of  $\sigma$  given  $s$ , they have no equilibrium effect on the quality of ex post decisions. The model thus focuses only on the opportunity costs of influence activities. A richer model could allow for both opportunity costs and degradation in decision quality.

such an effect as well. The costs of low-powered incentive schemes, of course, is diminished motivation for putting in (here unmodeled) effort. The decision makers could hire outside consultants to acquire information about the state of the world. This "defensive information acquisition" would lead to an increase in  $h$ , a reduction in  $\varphi$ , and thus a reduced incentive to influence. However, hiring an outsider who, by definition, is not an insider and thus not privy to the relevant information, is costly.

For the purposes of the present section, I analyze a fairly blunt instrument with costs that are endogenous to the model. Assume party  $L$  has both decision rights. The model is as above, except that in the first period, instead of bargaining over the control structure,  $L$  and  $R$  bargain over whether or not to carry out their relationship under an open or closed door policy. They may trim out personnel whose job it is to gather relevant information, they may purposefully load up their schedules and keep themselves too busy to pay attention to everything that crosses their desks, or they may limit the frequency and length of meetings with each other. Let  $\theta \in \Theta = \{0, 1\}$  denote this choice. Under an open door policy (denoted by  $\theta = 0$ ), the rest of the game proceeds as usual. Under a closed door policy (denoted by  $\theta = 1$ ), no public signal is realized in period 3.<sup>17</sup> Let  $W(\theta)$  denote the expected ex ante equilibrium welfare under organizational practice  $\theta$ . The Coasian program is

$$\max_{\theta \in G} \{W(\theta)\}.$$

If no public signal is realized, neither manager will have the incentive to exert any influence over it, and thus  $\lambda^L = \lambda^R = 0$ . This is potentially worthwhile if manager  $R$  would otherwise have a strong incentive to influence the signal (i.e. if  $\varphi$  is large). Since there is no additional information on which to base his decisions,  $L$  will set both decisions equal to the prior mean. If the prior is very imprecise (i.e.  $h$  is small), this is potentially very costly, but if there is already a wealth of information (i.e.  $h$  is large) about the decision to be made, then it might not be very costly to have a closed door policy. This is captured in the following proposition.

**Proposition 3** *When control is unified, a closed door policy ( $\theta = 1$ ) is preferred to an open door policy ( $\theta = 0$ ) whenever  $\varphi h > \Phi(\Delta^2, \alpha^L, \alpha^R)$ , where  $\Phi$  is increasing in  $\alpha^L$  and decreasing in  $\alpha^R$  and  $\Delta^2$ .*

The logic of influence-activity mitigation can help shed light on why certain rigid orga-

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<sup>17</sup>I can instead allow for a more convex set of policies. For example, if  $\varphi$  denotes the signal-to-noise ratio, the players could bargain over a level of "noise" they could put into the signal, which reduces  $h_\varepsilon$  up to the point where the effective signal-to-noise ratio is given by  $(1 - \theta)\varphi$ . This can be interpreted as shutting off certain lines of communication. The rest of the analysis would proceed similarly. Proposition 7 in Appendix A analyzes this case.

nizational practices persist. A recent series of papers starting with Bloom and Van Reenen (2007) documents substantial dispersion in management practices across firms, and in particular, highlights the prevalence of firms with puzzling ("bad") management practices. They conduct a survey inquiring about eighteen specific management practices of individual manufacturing plants (e.g. about whether or not the firm adopts continuous improvement initiatives, the criteria the firm uses for promotions, and so on). Each response is scored on a 1 – 5 scale, with 1 being considered a "bad" management practice and a 5 being considered "good." They construct a firm's management score by taking a normalized average of the scores for each individual practice and find that firms with higher management scores perform better (have higher sales, higher profitability, are less likely to exit, and have greater sales growth) than firms with lower management scores.

The negative correlation between "bad" management practices and firm performance is consistent with selection, as the following figure illustrates.

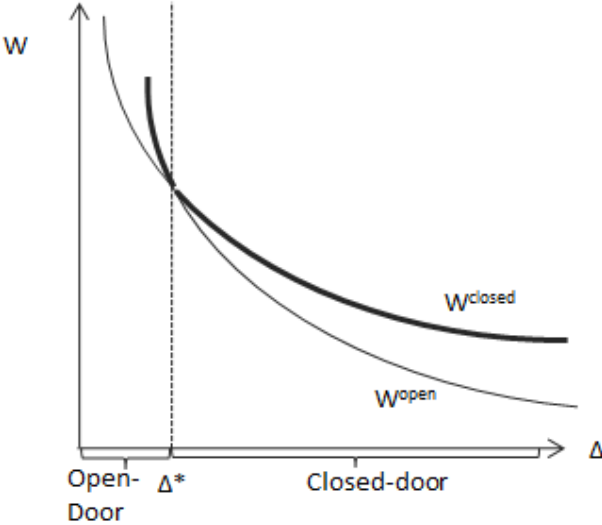


Figure 2: Endogenous Practice Selection

A firm operating in an environment with greater levels of disagreement (i.e. with a higher  $\Delta$ ) will, all else equal, perform worse than a firm with a lower  $\Delta$ . Further, such a firm will be plagued by greater influence activities (since  $\lambda^j$  is increasing in  $\Delta$ ) and thus will find that adopting a closed-door policy is relatively more appealing. There will be some cutoff value  $\Delta^*$  such that firms with  $\Delta < \Delta^*$  will have open door policies *and better performance* and firms with  $\Delta > \Delta^*$  will have closed door policies and worse performance. Thus, a simple selection story along these lines could account for a negative correlation between

closed-door policies ("bad" management practices) and firm performance. Further, since firms choose their management practices optimally, any outside intervention resulting in a change in management practices would lead to a decrease in firm efficiency. In particular, an intervention aimed at altering management practices for poorly performing firms would lead to a decrease in the performance of such firms.<sup>18</sup>

## 6 Practices and Control

If integration is viewed as a concentration of control bundled with inefficient bureaucracy, this naturally begs the question of why can we not concentrate control without the concomitant inefficient bureaucracy, perhaps through contractual allocation of control rights? In this section, I will show that the rigid organizational practices actually *improve* the efficiency of concentrated control: "inefficient bureaucracy" is not the problem, it is a solution to the underlying problem of influence activities. For continued simplicity, I will focus on the stark instrument of closed/open door policies. The model is similar to the previous section, except now  $L$  and  $R$  bargain over the control structure in addition to the (closed/open door policy). That is, in the first period,  $L$  and  $R$  bargain over  $(g, \theta) \in G \times \Theta = \{I, NI\} \times \{0, 1\}$ . The rest of the analysis proceeds as above.

In order to draw a parallel to the "haggling" versus "fiat" argument of Williamson (1971), I first introduce some terminology. A choice of  $g$  is referred to as a **control structure**, and a choice of  $\theta$  is referred to as an **organizational practice**. A **governance structure** is the joint choice of a pair  $(g, \theta)$ , as it forms a complete description of how the transaction is to be governed. Only three governance structures will be chosen in equilibrium:  $(I, 0)$ ,  $(I, 1)$ , and  $(NI, 0)$ . I refer to these, respectively, as **directed transaction**, **hierarchy**, and **market**. In a directed transaction, control is unified and there are flexible organizational practices. Markets are characterized by divided control and flexible organizational practices. The defining feature of hierarchy is that decision making is carried out by *fiat*, in the following two senses: (1) all relevant decisions are made by a single decision maker (control is unified) and (2) rigid organizational practices are adopted.

Under either control structure, setting  $\theta = 1$  eliminates the incentive for (and hence the presence of) influence activities. Given that the costs of influence activities is zero when  $\theta = 1$  for both  $g = I$  and  $g = NI$ , it is clear that  $g = I$  will be preferred whenever  $\theta = 1$ . Closed-door policies are thus inconsistent with non-integration. Fixing  $\theta = 0$ , Proposition

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<sup>18</sup>This, of course, assumes that management practices are chosen optimally. To the extent that certain practices are not adopted due to managerial unawareness or mistakes, such interventions could potentially improve the performance of firms (see Bloom, et. al., 2011).

2 implies that there will be some  $\hat{\varphi}$  such that non-integration is preferred if and only if  $\varphi > \hat{\varphi}$ . Let  $W(g, \theta)$  denote the expected equilibrium welfare under control structure  $g$  and organizational practice  $\theta$ . It can be shown that

$$W(g, \theta) = - (ADAP(\theta) + ALIGN(g) + INFL(g, \theta)),$$

where the exact expressions for these three components are given in Appendix A. The Coasian program is therefore

$$\max_{(g, \theta) \in G} \{W(g, \theta)\}.$$

It is worth noting that the only term that depends both on the control structure and the organizational practices is  $INFL(g, \theta)$ . The intuition described above suggests that  $INFL(I, \theta) - INFL(NI, \theta)$  is decreasing in  $\theta$ .<sup>19</sup> Let  $\chi$  denote a vector of parameters of the model. The complementarity between  $g$  and  $\theta$  gives us the following proposition.

**Proposition 4** *Let  $\alpha^R < \alpha^L < \sqrt{3}\alpha^R$ . Then  $W(I, \theta) - W(NI, \theta)$  is increasing in  $\theta$ . Further,  $\min_{\chi} \theta^*(I, \chi) \geq \max_{\chi} \theta^*(NI, \chi)$ .*

This implies the empirical proposition that transactions within firms are more rule-driven and rigid than transactions carried out in the market, which has been discussed by Williamson, "*Interorganizational conflict can be settled by fiat only rarely, if at all... intraorganizational settlements by fiat are common... .*" (1971, emphasis in the original) The following figure describes the solution to the model for different regions of the parameter

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<sup>19</sup>In fact, this holds even if  $\theta$  is a continuous variable between 0 and 1, where a choice of  $\theta$  affects the noise of the signal such that the signal-to-noise ratio becomes  $(1 - \theta) \frac{h_e}{h + h_e}$ .

space.

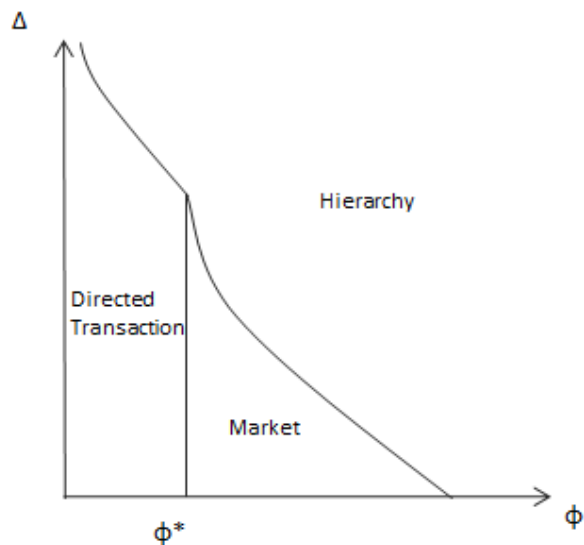


Figure 3: Optimal Governance Structures

There are three boundaries of note in this figure. I refer to the vertical boundary between "Directed Transaction" and "Market" as the "Meyer, Milgrom, and Roberts boundary": a firm rife with politics should perhaps disintegrate.<sup>20</sup> The diagonal boundary between "Directed Transaction" and "Hierarchy" is the "Milgrom and Roberts boundary": rigid decision-making rules should sometimes be adopted within firms. The presence of these two boundaries highlights the idea that non-integration and bureaucratization are substitute mechanisms: sometimes a firm will prefer to control influence activities with the former and sometimes with the latter.

The third boundary is the "Williamson boundary" (Williamson (1975)). Sometimes, the market mechanism, with its high-powered incentives and open lines of communication invites such high levels of influence activities ("haggling") that it should be superseded by a hierarchy (unified control) *coupled* with rigid organizational practices. This becomes increasingly true the greater is the level of ex post disagreement between the parties ( $\Delta$ ) and the greater is the level of ex ante uncertainty (as measured by a small value of  $h$  or a large value of  $\varphi$ ). The latter is consistent with many of the classical empirical papers in support of Transaction Cost Economics (see, for example, Masten (1984), Masten, Meehan, and Snyder (1991), Lieberman (1991), Hanson (1995)), where measures of the uncertainty

<sup>20</sup>This is consistent with Forbes and Lederman (2009)'s argument that the principal obstacle to integration between major airlines and regional carriers is that integration invites the regional carrier's work force (which is comparatively less well-compensated than the major's) to lobby for higher pay.

or complexity of the environment a firm operates in serves as the empirical proxy for the level of contractual incompleteness, which is the actual object of interest in TCE.

Figure 4 below depicts the relationship between the level of uncertainty surrounding a transaction and the potential "haggling" costs under each of the three potential governance structures. The bolded segments depict the actual "haggling" costs under the optimal governance structure. In section 4, I argued that the cost of unified control was an increase in "haggling." Holding organizational practices fixed, this is indeed the case, as shown by the difference between the  $Infl(NI, \theta = 0)$  and  $Infl(I, \theta = 0)$  lines. However, changing organizational practices in addition to the control structure completely eliminates "haggling," as shown by the difference between the  $Infl(NI, \theta = 0)$  and  $Infl(I, \theta = 1)$  lines. A firm with  $\varphi > \varphi^{**}$  that decides to integrate will adopt rigid organizational practices, opting for unresponsive decision making by "fiat" rather than responsive decision making and "haggling."

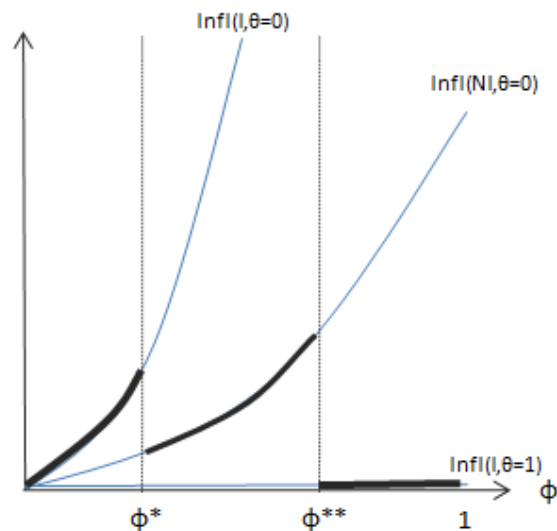


Figure 4: Equilibrium influence costs

Whereas Williamson views "bureaucratic costs of hierarchy... [as] a deterrent to integration," this model views the bureaucratic costs of hierarchy as the lesser of two evils, the alternative to which is high levels of influence activities. This view cautions against the popular advice that one should "bring the market inside the firm" as a way of strengthening incentives - doing so will often create more problems than it solves. Rather, this model underscores the importance of aligning these instruments with each other and with the environment the organization operates in.

## 7 Internal Structure of a Multidivisional Firm

I interpret the model in the previous sections as a model of the boundaries of the firm. However, the same logic that determines firm boundaries and organizational practices in the previous sections can also be used to explain the internal structure of firms. Should control within an organization reside with headquarters or with division managers? Should the organization adopt rigid or flexible practices? The model in this section is related to a pair of recent papers (Alonso, Dessein, and Matouschek (2008), hereafter ADM, and Rantakari (2008)) exploring the performance implications of various control structures on a firm's ability to adapt to local circumstances and to coordinate decisions across divisions. These papers emphasize the role of strategic communication in transmitting soft information within the organization, whereas this section will instead emphasize the role of influence activities in affecting the transmission of hard information. These two complementary approaches differ substantially in their implications.

There are two division managers and a headquarters, denoted by  $L$ ,  $R$ , and  $HQ$  respectively, and one decision to be made for each division:  $d_L$  and  $d_R$ . Each decision is ideally tailored to the local state of the division,  $s_i \sim N(E[s_i], h^{-1})$ ,  $i \in \{L, R\}$ , where  $E[s_L] - E[s_R] = \Delta > 0$ , but information directly relevant to the state of the world is unobserved. Instead, an informative (but manipulable) signal relevant to each division is commonly observed. This signal is linear in the division's local state,  $s_i$ , the level of influence activities the manager of that division engages in,  $\lambda^i$ , and a noise term,  $\varepsilon_i \sim N(0, h_\varepsilon^{-1})$ . That is,  $\sigma_i = s_i + \lambda^i + \varepsilon_i$  for  $i \in \{L, R\}$ . However, coordination across divisions is also important. There are two possible control structures: control can either be unified and held by the headquarters ( $g = cent$ ) or divided and held by the respective division managers ( $g = dec$ ).<sup>21</sup> Additionally, as in the previous section, the organization can adopt a closed-door policy ( $\theta = 1$ ) or an open door policy ( $\theta = 0$ ). Under the closed door policy, no signals are realized.<sup>22</sup>

The timing of the model is as follows: (1)  $L$  and  $R$  bargain over a governance structure  $(g, \theta) \in \{cent, dec\} \times \{0, 1\}$ ;<sup>23</sup> (2)  $L$  and  $R$  simultaneously choose (unobservable) influence activities  $\lambda^L, \lambda^R \in \Lambda \subset \mathbb{R}$  at cost  $k(\lambda^i) = \frac{1}{2}(\lambda^i)^2$ ; (3)  $L$ ,  $R$ , and  $HQ$  commonly observe two

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<sup>21</sup>As in ADM, I explore only centralization and decentralization. I do not examine the asymmetric control structures of Rantakari. I can show that each asymmetric control structure is always dominated by at least one symmetric control structure. Rantakari derives similar results when divisions are symmetric.

<sup>22</sup>A richer model would allow for only one signal to be realized. Allowing for this could potentially make an asymmetric control structure optimal, even though the divisions are symmetric. I leave this for future research.

<sup>23</sup>Alternatively, if one permits the headquarters to take into account the anticipated private costs of influence activities by the managers (say because the headquarters has to attract them to work for the firm), one can think of the headquarters as unilaterally choosing a governance structure.

signals  $\sigma_i = s_i + \lambda^i + \varepsilon_i$ ,  $i = L, R$ ; (4) the party(ies) with control choose decisions; (5) payoffs are realized. The key differences between the present model and the model in the previous section are (a) the presence of division-specific signals, (b) the prospect of allocating control to a third party, and (c) the payoff structure, to which I now turn. Division manager  $i$  has gross payoffs

$$U^i(s_i, s_j, d_i, d_j) = -\frac{1}{2}(d_i - s_i)^2 - \frac{r}{2}(d_i - d_j)^2,$$

and the headquarters has a gross payoff  $U^{HQ} = U^L + U^R$ .

Both managers desire to match their decisions to their local states and the decisions of the other division. The key source of friction is that, on average, manager  $L$  wants a higher decision than manager  $R$  does, and he only partially internalizes the coordination losses this imposes. The headquarters fully internalizes the coordination externalities, and absent influence activities, it would always be optimal to centralize control with the headquarters.<sup>24</sup>

As before, given a governance structure, the solution concept will be pure strategy perfect Bayesian equilibrium. Under any governance structure, the equilibrium decision rule  $d_i^g$  is a convex combination of estimators  $s_i$  and  $s_j$ . When  $\theta = 0$ , the equilibrium decision rules are given by

$$\begin{aligned} d_i^{g,\theta=0} = & C^g(r) \left( (1 - \varphi) E[s_i] + \varphi \left( \sigma_i - \hat{\lambda}^i(g) \right) \right) \\ & + (1 - C^g(r)) \left( (1 - \varphi) E[s_j] + \varphi \left( \sigma_j - \hat{\lambda}^j(g) \right) \right), \end{aligned}$$

where  $C^g(r) \in [0, 1]$  is an endogenous weight, and when  $\theta = 1$ , no public signals are available, and thus the equilibrium decision rules are given by

$$d_i^{g,\theta=1} = C^g(r) E[s_i] + (1 - C^g(r)) E[s_j].$$

The control structure affects the equilibrium decision rules in two ways. First, it can be shown that  $1 > C^{dec}(r) > C^{cent}(r) > \frac{1}{2}$ , and both are decreasing in  $r$ . That is, under decentralized decision making, decision rules exhibit more of an own-division bias. This is because under decentralization, the division managers do not fully internalize the coordination externalities they impose on the other division. Secondly, the control structure determines who makes decisions and hence determines whose information about influence activities is used to make decisions. Under centralization, the headquarters makes decisions based on conjectures about influence activities. Under decentralization, division managers know their own influence activities but not the influence activities of the other division manager.

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<sup>24</sup>The coordination motive for unified control was absent in the previous model, since the ideal decisions were independent from each other.

Given a governance structure  $(g, \theta)$  and a decision rule  $d^{g,\theta}$ , in period 2, player  $i$  chooses his level of influence activities to solve

$$k'(\lambda^i) = E_s \underbrace{\left[ (s_i - d_i^{g,\theta}) \frac{\partial d_i^{g,\theta}}{\partial \sigma_i} \right]}_{\text{influence for adaptation}} + r E_s \underbrace{\left[ (d_R^g - d_L^g) \frac{\partial (d_R^g - d_L^g)}{\partial \sigma_i} \right]}_{\text{influence for coordination}}. \quad (3)$$

Under decentralization, manager  $L$  influences the signal upward in an attempt to convince manager  $R$  that he will take a higher decision than he actually will. Out of equilibrium, this will induce  $R$  to take a higher decision in order to coordinate with him, which is preferable on average for  $L$ . Manager  $R$  will influence the signal downward for the same reason. I refer to this as the "influence for coordination" motive. Because of the additive signal structure, these attempts at manipulating each others' decisions will have no effect on the equilibrium decision, however.

Under centralization, the motivation for influence activities is different. Since the headquarters always chooses to coordinate decisions more than is privately optimal for each manager, each manager will attempt to influence the signal in order to bias the decision in their division's direction. I refer to this as the "influence for adaptation" motive. When  $\theta = 1$ , neither manager has any incentive to influence their division's signal. Equilibrium influence activities under each governance structure are then.

$$\begin{array}{cc} \lambda^{L*} & \lambda^{R*} \\ \hline \text{dec} & \left(\frac{r}{1+2r}\right)^2 \Delta\varphi(1-\theta) \quad - \left(\frac{r}{1+2r}\right)^2 \Delta\varphi(1-\theta) \\ \text{cent} & \frac{r}{1+4r} \Delta\varphi(1-\theta) \quad - \frac{r}{1+4r} \Delta\varphi(1-\theta) \end{array}$$

Under an open door policy, the level of influence activities is greater under centralization than under decentralization, leading to a non-trivial trade-off. Centralization leads to more coordinated decisions, but it does so at the cost of greater influence activities. This is described in the following proposition (which is proven in the appendix).

**Proposition 5** *Fix  $\theta = 0$ . Then decentralization is preferred to centralization whenever  $\left(\varphi q(r) - \frac{1}{\varphi}\right) h \Delta^2 > 2$ , where  $q(r), q'(r) > 0$ . As  $r, h_\varepsilon, h$ , and  $\Delta^2$  increase, decentralization becomes relatively more appealing.*

Decentralization reduces the costs of influence activities. As  $h_\varepsilon, \Delta^2$ , and  $r$  increase, influence activities become relatively more appealing and hence so does a control structure that mitigates them. The last of these is perhaps surprising, given the widespread intuition that as coordination becomes more important, an organization should become more centralized.

This is a feature of ADM and Rantakari. In the present model, an increase in  $r$  increases the "influence for adaptation" motive significantly, since under centralization, the increase in  $r$  moves each division's decision farther away from its manager's ideal. In ADM and Rantakari, however, an increase in  $r$  improves the quality of communication of soft information, since it actually increases the alignment of preferences within the firm.

Closed door policies eliminate the incentives for influence activities. Absent influence activities, centralization is always preferred. Thus, as in the model of firm boundaries, closed door policies are inconsistent with decentralization. Conditional on centralization, when should an organization opt for closed door policies?

**Proposition 6** *Fix  $g = cent$ . If  $\varphi > \tilde{\varphi}(r)$ , then  $\theta = 1$  is preferred to  $\theta = 0$  whenever  $H(r, \Delta^2, \varphi, h) > \tilde{H}(r)$ , where  $H$  is increasing in  $\Delta^2, \varphi$ , and  $h$ .*

I derive the exact expressions of  $\tilde{\varphi}$ ,  $H$ , and  $\tilde{H}$  in the appendix. The intuition for this proposition is relatively similar. An increase in  $\Delta^2$  and  $\varphi$  increases influence activities and thus increases the benefits of adopting organizational practices aimed at mitigating them.

Finally, as in the previous section, organizational practices and control structures interact: the returns to rigid organizational practices are greater when control is concentrated (and thus influence activities would otherwise be high). If we refer to  $(cent, 0)$ ,  $(cent, 1)$ , and  $(dec, 0)$  as "Centralization," "Centralized Bureaucracy," and "Decentralization," respectively, this can be seen in the following diagram.

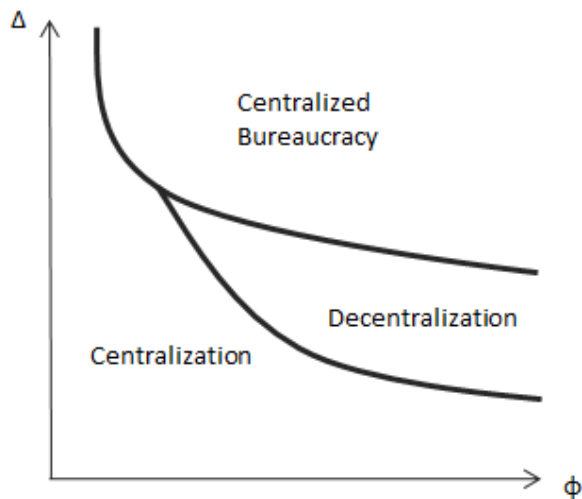


Figure 5: Optimal Governance Structures

Thus, rigid organizational practices are expected to positively covary with centralized deci-

sion making. Further, for  $\Delta$  and  $\varphi$  sufficiently large (so that Centralization is not optimal), a further increase in  $\Delta$  simultaneously increases the relative attractiveness of Centralized Bureaucracy and decreases the performance of the firm across all governance structures. This leads to the possibility of a selection-based, rather than causal, story for a positive correlation between decentralization and firm performance.

Bloom, Sadun, and Van Reenen (2011) conduct a survey to collect data on measures of decentralization of key decisions within firms (asking questions such as "Who has the authority to hire new full-time workers?" and "How much capital investment can a plant manager make without authorization from headquarters?"). In addition, for each of the surveyed firms, they also collect data on management practices (as in Bloom and Van Reenen (2007)). Among their findings are a positive correlation between their measure of decentralization and their measure of management practices (table 4, column 2) and a positive correlation between decentralization and firm performance (table 5), both of which are consistent with the model in this section.

## 8 Conclusion

I develop a unified theory of the costs and benefits of integration based on the logic of influence-cost mitigation. Managers waste time persuading decision makers, and firm boundaries and organizational practices are determined on account of this. I provide an interpretation of haggling costs—the opportunity cost of time spent attempting to persuade decision makers—and unpack what it means to make decisions by fiat into (1) unified control and (2) decision making that is carried out under rigid organizational practices. In doing so, I show that decision making by fiat in the first sense exacerbates haggling costs: if one of two parties specializes in making decisions, the other will specialize in trying to convince him that they should be made in one way rather than another. On the other hand, fiat in the second sense implies that influence activities fall on deaf ears, thus eliminating haggling altogether.

When does the cost of decision making by fiat involve only an increase in haggling (so that there is no trade-off per se between haggling and fiat), and when does it involve unresponsive decisions (so that one must choose between haggling and unresponsive decision making)? I show that when transactions are sufficiently complicated (i.e. there is much ex ante uncertainty, disagreement, or parties have a large stake in the decisions), optimal decision making by fiat always involves the latter. Complementarities between unified control and rigid organizational practices thus lead to a notion of "Williamsonian integration" in which there is a trade-off between decision making by fiat and rigid organizational practices

under "hierarchy" and haggling costs under "markets". The extent of the costs of each of these components is related to the level of uncertainty in the environment and hence this explanation is consistent with the Williamson (1973) idea that "substantially the same factors that are ultimately responsible for market failures also explain failures of internal organization."

Influence-activity mitigation also provides the foundations for a theory of the internal organization of a multidivisional firm. Centralized control structures aid in coordinating decisions but can lead division managers to lobby the headquarters to bias decisions in favor of their division. In order to reduce influence activities, a firm can either decentralize decision making or adopt rigid organizational practices ("bureaucratize"). This approach justifies a wide range of policies present in firms, and its empirical implications are consistent with correlations found in recent papers by Bloom and Van Reenen (2007) and Bloom, Sadun, and Van Reenen (2011). These include the positive correlations between good management practices and firm performance, good management practices and decentralization, and decentralization and performance.

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## Appendix A: Omitted Proofs and Computations

**Proposition 7** *In the full model of section 6, ex ante expected equilibrium welfare as a function of the allocation of decision rights  $g \in \{I, NI\}$ , the organizational practices  $\theta \in [0, 1]$ ,<sup>25</sup> and a vector  $\chi$  of parameters, is given by*

$$W(g, \theta, \chi) = -(ADAP(\theta, \chi) + ALIGN(g, \chi) + INFL(g, \theta, \chi)).$$

Further, these three components can be expressed as

$$\begin{aligned} ADAP(\theta, \chi) &= \frac{\alpha^L + \alpha^R}{h + h_\varepsilon} + \theta\varphi \frac{\alpha^L + \alpha^R}{h} \\ ALIGN(g, \chi) &= \begin{cases} \alpha^R \Delta^2 & g = I \\ \frac{\alpha^L + \alpha^R}{2} \Delta^2 & g = NI \end{cases} \\ INFL(g, \theta, \chi) &= \begin{cases} (1 - \theta)^2 2 (\alpha^R)^2 \Delta^2 \varphi^2 & g = I \\ (1 - \theta)^2 \frac{1}{2} \left( (\alpha^R)^2 + (\alpha^L)^2 \right) \Delta^2 \varphi^2 & g = NI \end{cases} \end{aligned}$$

**Proof.** Suppose the managers have agreed upon a control structure  $g$  and a level of organizational practices  $\theta \in [0, 1]$ . The variance of the signal is then given by  $\tilde{h}_\varepsilon = (1 - \theta) \frac{h_\varepsilon h}{h + \theta h_\varepsilon}$ , which reduces the signal-to-noise ratio in the updating formula to  $(1 - \theta) \varphi$ . Condition (1) then implies that

$$\lambda^{j*} = (1 - \theta) N^{-j} \alpha^j \Delta \varphi,$$

so that  $INFL(g, \theta, \chi) = \sum_{j \in \{L, R\}} \frac{1}{2} (\lambda^{j*})^2$ , which is equal to the expression given in the statement of the proposition. We know from section 3 that

$$d_\ell^{*g}(\sigma; \lambda^*) = E_s[s | \sigma, \lambda^*] + \beta^i = (1 - \theta) \varphi (s + \tilde{\varepsilon}) + \beta^i,$$

---

<sup>25</sup>As defined in footnote 15.

where  $\tilde{\varepsilon} \sim N(0, \tilde{h}_\varepsilon)$ . Substituting this into the definition of  $W(g, \theta, \chi)$  gives us

$$W(g, \theta, \chi) = - \sum_{i \in \{L, R\}} \frac{\alpha^i}{2} E_{s, \varepsilon} \left[ (d_\ell^{*g}(\sigma; \lambda^*) - s - \beta^i)^2 \right] - INFL(g, \theta, \chi).$$

The bracketed term can be decomposed into sum of the a variance and a bias term. Since the for decision  $\ell$  is 0 if  $i$  controls  $\ell$  under  $g$ , the bias term is equal to  $ALIGN(g, \chi)$  given above. The variance term is given by

$$\begin{aligned} ADAP(\theta, \chi) &= \sum_{\ell=1}^2 \sum_{i \in \{L, R\}} \frac{\alpha^i}{2} Var(d_\ell^{*g}(\sigma; \lambda^*) - s) \\ &= (\alpha^L + \alpha^R) Var(d_\ell^{*g}(\sigma; \lambda^*) - s) = \frac{\alpha^L + \alpha^R}{h + h_\varepsilon} \left( 1 + \theta \frac{h_\varepsilon}{h} \right), \end{aligned}$$

which is the desired result. ■

**Proposition 8** *In this model, when control is unified, a closed door policy ( $\theta = 1$ ) is preferred to an open door policy ( $\theta = 0$ ) whenever  $\varphi h > \Phi(\Delta^2, \alpha^L, \alpha^R)$ , where  $\Phi(\Delta^2, \alpha^L, \alpha^R)$  is increasing in  $\alpha^L$  and decreasing in  $\alpha^R$  and  $\Delta^2$ .*

**Proof.** Applying proposition 7,  $W(I, 1, \chi) > W(I, 0, \chi)$  whenever

$$\varphi h > \frac{1}{2} \frac{(\alpha^L + \alpha^R)}{(\alpha^R)^2 \Delta^2} \equiv \Phi(\Delta^2, \alpha^L, \alpha^R),$$

and  $\Phi$  clearly satisfies the described comparative statics. ■

**Proposition 9** *For a general increasing convex cost function  $k$ , in the pure influence model in which  $\alpha^L = \alpha^R = \alpha$ , divided control is optimal if  $k''/k' > k'''/k''$ . This condition is satisfied for  $k(\lambda) = c\lambda^\xi$  for all  $\xi > 0$ .*

**Proof.** Under non-integration,  $|k'(\lambda^j)| = |\Delta| \alpha \varphi$  and under integration,  $\lambda^L = 0$  and  $k'(\lambda^R) = 2|\Delta| \alpha \varphi$ . Total influence costs are  $2k(k'^{-1}(|\Delta| \alpha \varphi))$  under non-integration and  $k(k'^{-1}(2|\Delta| \alpha \varphi))$  under integration. A sufficient condition for the latter to be larger is that the function  $k(k'^{-1}(x))$  is convex in  $x$ . Let  $h(x) = k'^{-1}(x)$ . Then

$$\begin{aligned} \frac{d^2}{dx} k(h(x)) &= k''(h(x)) (h'(x))^2 + k'(h(x)) h''(x) \\ &= \frac{k'(h(x))}{[k''(h(x))]^2} \left( \frac{k''(h(x))}{k'(h(x))} - \frac{k'''(h(x))}{k''(h(x))} \right). \end{aligned}$$

This is positive for all  $\lambda$  if the parenthetical term is positive for all  $\lambda$ . Finally, note that if  $k(\lambda) = c\lambda^\xi$ , then the parenthetical term is  $\frac{1}{\lambda} > 0$ , so this is satisfied. ■

**Proposition 10** *Given a governance structure  $(g, \theta)$ , there exists a pure-strategy PBE of the multidivisional firm model with*

$$d_i^{g, \theta} = C^g(r) \left( (1 - (1 - \theta) \varphi) E[s_i] + (1 - \theta) \varphi \left( \sigma_i - \hat{\lambda}^i(g) \right) \right) \\ + (1 - C^g(r)) \left( (1 - (1 - \theta) \varphi) E[s_j] + (1 - \theta) \varphi \left( \sigma_j - \hat{\lambda}^j(g) \right) \right),$$

and influence activities given by

$$\frac{\lambda^{L*}}{\text{dec}} \quad \left( \frac{r}{1+2r} \right)^2 \Delta \varphi (1 - \theta) \quad - \left( \frac{r}{1+2r} \right)^2 \Delta \varphi (1 - \theta) \\ \text{cent} \quad \frac{r}{1+4r} \Delta \varphi (1 - \theta) \quad - \frac{r}{1+4r} \Delta \varphi (1 - \theta)$$

**Proof.** To see this, plug in the decision rules to verify that they indeed form an equilibrium given beliefs about influence activities. Influence activities then solve (3). ■

**Corollary 1** *Under the multidivisional firm model, welfare can be decomposed as follows*

$$W(g, \theta) = - (Adap(g, \theta) + Coord(g, \theta) + Infl(g, \theta)),$$

where

|                    | $Adap(g, \theta)$  | $Coord(g, \theta)$  | $Infl(g, \theta)$                                    |
|--------------------|--|---|--|
| $dec, \theta = 0$  | $r^2 \left( \frac{1}{1+2r} \right)^2 \left( 2 \frac{\varphi}{h} + \Delta^2 \right) + \frac{\varphi}{h_\varepsilon}$  | $r \left( \frac{1}{1+2r} \right)^2 \left( 2 \frac{\varphi}{h} + \Delta^2 \right)$ | $\varphi^2 \Delta^2 \left( \frac{r}{1+2r} \right)^4$ |
| $cent, \theta = 0$ | $4r^2 \left( \frac{1}{1+4r} \right)^2 \left( 2 \frac{\varphi}{h} + \Delta^2 \right) + \frac{\varphi}{h_\varepsilon}$ | $r \left( \frac{1}{1+4r} \right)^2 \left( 2 \frac{\varphi}{h} + \Delta^2 \right)$ | $\varphi^2 \Delta^2 \left( \frac{r}{1+4r} \right)^2$ |
| $cent, \theta = 1$ | $r^2 \left( \frac{1}{1+2r} \right)^2 \Delta^2 + \frac{1}{h}$   | $r \left( \frac{1}{1+2r} \right)^2 \Delta^2$                                      | 0  |

**Proposition 11** *The following are true.  $W(dec, 0) > W(cent, 0)$  if  $\left( \varphi q(r) - \frac{1}{\varphi} \right) h \Delta^2 > 2$  where  $q(r) = \frac{(1+5r+8r^2)(1+3r)}{(1+2r)^2(1+4r)} > 1$  and  $q'(r) > 0$ . Thus,  $(dec, 0)$  becomes more appealing relative to  $(cent, 0)$  when  $\varphi, r, h$ , and  $\Delta^2$  increase.  $W(cent, 1) > W(dec, 0)$  if  $\tilde{q}(r) \varphi h \Delta^2 > 1$ , where  $\tilde{q}(r) = \frac{r^4}{(1+2r)^2(1+2r+2r^2)} < 1$  and  $\tilde{q}'(r) > 0$ . Thus,  $(cent, 1)$  becomes more appealing relative to  $(dec, 0)$  when  $\varphi, r, h$ , and  $\Delta^2$  increase.  $W(cent, 0) > W(cent, 1)$  if  $\varphi^2 > \frac{1+4r}{(1+2r)^2}$  and  $r^2 \Delta^2 < \frac{\frac{\varphi}{h} (1+2r)^3 (1+4r)}{\varphi^2 (1+2r)^2 - (1+4r)}$  and  $\varphi^2 > \frac{1+4r}{(1+2r)^2}$ . The rhs of the first inequality is decreasing in  $\varphi$  and  $h$ , and thus  $(cent, 0)$  becomes more appealing relative to  $(cent, 1)$  when  $\varphi, r, h$ , and  $\Delta^2$  decrease.*

**Proof.** These are relatively straightforward by noting that

$$\begin{aligned}
W(\text{dec}, 0) - W(\text{cent}, 0) &= \frac{r^2}{(2r+1)^2(4r+1)} \left[ \left( \varphi^2 \frac{(5r+8r^2+1)(3r+1)}{(2r+1)^2(4r+1)} - 1 \right) \Delta^2 - 2\frac{\varphi}{h} \right] \\
&\propto \left( \varphi q(r) - \frac{1}{\varphi} \right) \Delta^2 h - 2 \\
W(\text{dec}, 0) - W(\text{cent}, 1) &= \varphi \left( \frac{1+2r+2r^2}{(1+2r)^2} \right) \frac{1}{h} \left( 1 - \frac{r^4}{(1+2r)^2(1+2r+2r^2)} \varphi h \Delta^2 \right) \\
&\propto 1 - \tilde{q}(r) \varphi h \Delta^2 \\
W(\text{cent}, 0) - W(\text{cent}, 1) &= \frac{1}{(1+4r)^2} \left[ \varphi^2 - \frac{(1+4r)}{(1+2r)^2} \right] \left( \frac{(1+4r)(1+2r)^3 \frac{\varphi}{h}}{\varphi^2(1+2r)^2 - (1+4r)} - r^2 \Delta^2 \right)
\end{aligned}$$

The comparative statics for the relative welfare computations are straightforward. ■

## Appendix B: Interim Signaling Version

Suppose there are two decision rights. Consider the game with the following timing: (1)  $L$  and  $R$  bargain over a control structure  $g \in G$ ; (2)  $s^L \in S$  is drawn and observed by  $L$  (but not  $R$ ) and  $s^R \in S$  is drawn and observed by  $R$  (but not  $L$ ); (3)  $L$  and  $R$  simultaneously choose influence activities  $\lambda^L, \lambda^R$  at costs  $\frac{1}{2}\lambda^2$ . Public signals  $\sigma^i = s^i + \lambda^i$  are publicly observed; (4) whoever has control chooses decisions  $d$ ; (5) parties receive gross payoffs (letting  $s = s^L + s^R$ )

$$U^i(s, d) = - \sum_{\ell=1}^2 \frac{\alpha^\ell}{2} (d_\ell - s - \beta^\ell)^2.$$

Suppose  $L$  has control of  $N^{-R}$  decisions, and suppose  $L$  conjectures the equilibrium strategy  $\lambda^{R*}(s^R)$  of  $R$ . He chooses each decision  $d$  to solve

$$\max_d E_s \left[ -\frac{\alpha^L}{2} (d - s - \beta^L)^2 \middle| s^L, \sigma^R \right]$$

or

$$d^*(s^L, \sigma^R) = E[s | s^L, \sigma^R] + \beta^L = s^L + (\sigma^R - E[\lambda^{R*}(s^R) | \sigma^R]) + \beta^L.$$

Given this decision rule,  $R$  chooses  $\lambda^{R*}(s^R)$  to solve

$$\max_{\lambda^R} N^{-R} E_s \left[ -\frac{\alpha^R}{2} (d^*(s^L, \sigma^R) - s - \beta^R)^2 \middle| s^R \right] - \frac{1}{2} (\lambda^R)^2$$

Taking first-order conditions (and imposing the equilibrium restriction that  $\lambda^{L*}(s^L) = 0$ )

$$\lambda^{R*}(s^R) = N^{-R} \alpha^R (\Delta + E[\lambda^{R*}(s^R) | \sigma^R] - \lambda^{R*}(s^R)).$$

Taking expectations of both sides,  $E[\lambda^{R*}(s^R) | \sigma^R] = N^{-R} \alpha^R \Delta$ , and therefore  $\lambda^{R*}(s^R) =$

$N^{-R}\alpha^R\Delta$ . The incentives to influence the signal are thus the same in this model as in the baseline model with  $\varphi = 1$ .

## Appendix C: Organizational Rules

This appendix outlines a simple model of endogenous organizational rules. If managers can commit ex ante to a decision rule (as a function of an informative, but manipulable signal), when will they prefer a responsive decision rule that takes the signal into account, and when will they prefer to make decisions "in the dark"? There is a natural trade-off that parallels the haggling versus fiat argument of section 6: a responsive decision rule makes use of potentially valuable information, but it also invites influence activities.

In order to make progress on this question, I depart from the model in section 2 and analyze a binary-state, binary-signal model. Since influence activities by definition affect the conditional distribution of the signal (given the state of the world), in this binary case, they necessarily also affect the conditional variance of the signal and thus its information content. This leads to the additional Milgrom and Roberts (1988) effect, absent in the model in section 2, that "when... underlying information is so complex that unscrambling is impossible, decision makers will have to rely on information they know is incomplete or inaccurate." Optimal decision rules may thus also be unresponsive on account of this.

There are two managers,  $L$  and  $R$ , a single decision to be made  $d \in \{L, R\}$ , and two potential states of the world  $s \in \{L, R\}$ . A signal  $\sigma \in \{L, R\}$  is commonly observed, and the parties can specify a decision rule ex ante that depends on it. Absent influence activities, the signal is informative. Denote  $q_k^0 = \Pr[\sigma = s = k]$ ,  $k \in \{L, R\}$ . Then  $q_k^0 > \frac{1}{2}$ . The prior is given by a scalar  $p_0 = \Pr[s = R]$ .

When the state of the world is perfectly known, both managers agree on the optimal decision. However, the managers disagree on what decision should be taken when there is uncertainty about the state of the world. That is, preferences are given by

|                  |            |            |
|------------------|------------|------------|
| $s \backslash d$ | $L$        | $R$        |
| $L$              | $1, \beta$ | $0, 0$     |
| $R$              | $0, 0$     | $\beta, 1$ |

When the state of the world is  $L$ , manager  $L$  receives 1 and manager  $R$  receives  $\beta < 1$  if  $d = L$ . When the state of the world is  $R$ , both managers receive 0 if  $d = R$ . Without any additional information about the state of the world, manager  $L$  prefers  $d = L$  iff  $p_0 < \frac{1}{1+\beta}$

and  $R$  prefers  $d = L$  iff  $p_0 < \frac{\beta}{1+\beta}$ .

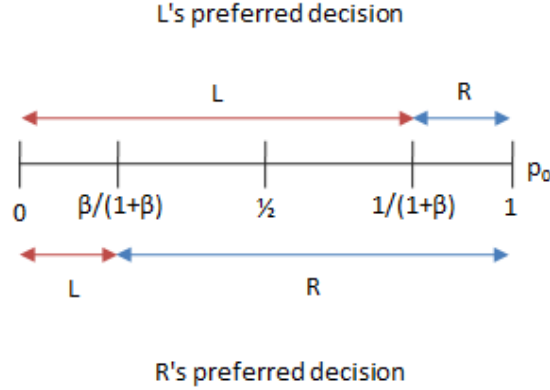


Figure 6: Preferred Decisions

As in the previous models, the timing is as follows: (1)  $L$  and  $R$  bargain over a decision rule  $d(\sigma)$ ; (2)  $L$  and  $R$  simultaneously decide whether or not to influence the signal at cost  $K$ ; (3) the signal is commonly observed; (4)  $d(\sigma)$  is taken; (5) payoffs are realized. The key difference here are that the "governance structure" the managers choose is an autonomous decision rule that depends directly on the signal. For the purposes of this model, think of  $K$  small but positive to break indifference.

Before describing the mechanics of influence activities in this model, let us first characterize the first-best decision rule (i.e. the joint surplus maximizing decision rule in a world in which there is no scope for influence activities). When the decision is a "slam dunk," (i.e.  $p_0$  is close to either 0 or 1), the first-best decision rule is not responsive. Only when there is substantial uncertainty about the state of the world should the decision rule be responsive to the signal. That is, there exists cutoffs  $\underline{p}_0$  and  $\bar{p}_0$  such that

$$d^{FB}(\sigma) = \begin{cases} L & 0 \leq p_0 \leq \underline{p}_0 \\ \sigma & \underline{p}_0 < p_0 \leq \bar{p}_0 \\ R & \bar{p}_0 < p_0 \leq 1 \end{cases}$$

Influence takes a simple form. The signal is drawn from division  $L$  with probability  $\frac{1}{2}$  (i.e.  $\sigma = \sigma^L$ ) and drawn from division  $R$  with probability  $\frac{1}{2}$  (i.e.  $\sigma = \sigma^R$ ). At cost  $K$ , manager  $i$  can ensure that  $\sigma_i = i$  with probability 1 (without regard to the true state of the world). When influence takes this form, when does manager  $L$  want to influence the signal? This, of course, depends on the decision rule the players have agreed to ex ante. If they agree upon an unresponsive decision rule, then neither player has any incentive to influence the signal.

If, however, they agree upon a responsive decision rule (i.e.  $d(\sigma) = \sigma$ ), then if manager  $L$  does not influence the signal, he receives  $(1 - p_0)q_L^0 + p_0q_R^0\beta$ . If he does influence the signal, he receives  $1 - p_0$ . He thus wants to influence the signal whenever  $p_0 < p_0^L(\beta) \equiv \frac{1 - q_L^0}{1 - q_L^0 + q_R^0\beta}$ . Similarly,  $R$  will prefer to influence the signal whenever  $p_0 > p_0^R(\beta) = \frac{q_L^0\beta}{1 - q_R^0 + q_L^0\beta}$ . It can

be shown that, for  $\beta$  sufficiently close to 1,  $p_0^L(\beta) < \underline{p}_0$  and  $p_0^R(\beta) > \bar{p}_0$ , so that managers only want to manipulate the signal when the decision rule in fact should not have depended on the signal to begin with. For  $\beta$  sufficiently small,  $p_0^L(\beta) > \bar{p}_0$  and  $p_0^R(\beta) < \underline{p}_0$ , so that for any  $p_0$  for which the first-best decision rule should be responsive, equilibrium influence activities ensure that the signal is completely uninformative. In this case, since  $K > 0$ , the optimal decision rule should in fact be unresponsive.

For the intermediate case,  $\bar{p}_0 > p_0^L(\beta) > \frac{1}{2}$  and  $\frac{1}{2} > p_0^R(\beta) > \underline{p}_0$ . Here, for any value of  $p_0 \in [\underline{p}_0, p_0^R(\beta)] \cup [p_0^L(\beta), \bar{p}_0]$ , the first-best decision rule is responsive and only one manager will influence the signal. In this case, the signal will be informative with probability  $\frac{1}{2}$  (and uninformative with probability  $\frac{1}{2}$ ), and thus it may be optimal to choose a responsive decision rule (provided that  $K$  is sufficiently small). For  $p_0 \in [p_0^R(\beta), p_0^L(\beta)]$ , the optimal decision rule is unresponsive, because the signal will be completely uninformative. The optimal decision rule thus unravels from the middle as  $\beta$  decreases. These are captured in the following diagram.

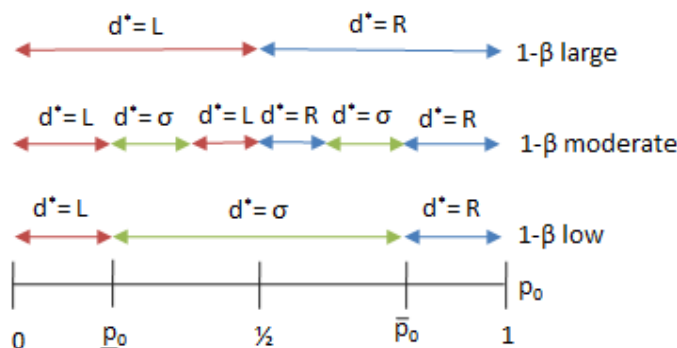


Figure 7: Optimal Decision Rules

Thus, equilibrium influence activities can lead to overly rigid decision rules if there is sufficient disagreement between the two managers.

Throughout, I have assumed that parties can commit ex ante to a decision rule. What if the managers are unable to commit: after all, *someone* must actually make the decision. In this case, there is a time-inconsistency problem. The managers might prefer an unresponsive rule in order to eliminate the incentives for influence activities, but if neither manager has manipulated the signal, it contains useful information for decision making, and thus optimally should be taken into account by the decision maker. If he cannot commit to ignoring the signal, then in equilibrium someone will manipulate it.

This opens up the possibility of using relational contracts (e.g. Baker, Gibbons, and Murphy (1994), Levin (2003)) to partially commit a decision maker to a rigid decision rule. Such a rule must explicitly be based on *something* (otherwise, how will other members of an organization know it was followed?) The relational contracting view would generate predictions on the types of rigid decision rules organizations would use. For instance, a rigid promotion rule should be based explicitly on public information like seniority rather

than something like a randomization device (unless the actual randomization is carried out publicly). Basing such rules on variables that are not commonly observable can potentially undermine relational enforcement and thus, by unravelling, lead to influence activities. Relational commitment to rigid decision rules is a potentially interesting direction for future research.