A Theory of Authority

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Abstract

Within organizations, there are typically limits to leaders' authority. This paper explores how organizations are structured in the face of such constraints. Many organizational phenomena can be understood as due to leaders' desire to bolster the "legitimacy" of their authority. Examples include: above-market-clearing wages, merger decisions, bureaucratic organization, and rejection of overqualified workers. The concept of legitimacy is formalized in the context of a single-agent moral-hazard model. In the model, legitimacy is described as the limit to the orders workers feel they have a duty to carry out. The model develops the concept of an authority maintenance (AM) constraint.

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Disobedience to orders, organized or unorganized, frequently sets limits to authority.

Kenneth Arrow (1974)[1]

1 Introduction

Within organizations, there are typically limits to leaders' authority. Leaders are usually constrained by the possibility of disobedience even in organizations where orders are generally followed. This paper explores how organizations are structured in the face of such constraints on authority. In particular, many organizational phenomena can be understood as due to leaders' desire to bolster the "legitimacy" of their authority. Examples include: (i) above-market-clearing wages, (ii) merger decisions, (iii) bureaucratic organization, and (iv) rejection of overqualified workers.[2]

While authority derives in part from a leader's ability and willingness to punish disobedience, it also derives from a leader's legitimacy. Legitimacy is the sense among followers that there is a duty to obey. The social psychologists French and Raven describe it as follows: "Legitimate power [of O over P] is here defined as that power which stems from internalized values in P which dictate that O has a legitimate right to influence P and that P has an obligation to accept this influence."[3,4]

Legitimacy matters for two reasons. First, a sense that there is a duty to carry out orders motivates compliance. Second, it motivates followers to report on others' infractions, or to police the disobedient in other ways. Even a leader who is willing and able to punish disobedience may require legitimacy: without it, members of the organization may fail to report disobedience. The sociologist Peter Blau observes: "Coercive use of power engenders resistance...Stable organizing power requires legitimation."[5]

We formalize the concept of legitimacy by introducing it into a single-agent moral-hazard model. The principal will choose (i) monetary incentives for the agent (as is standard) as well as (ii) an order to give to the agent. The agent will choose (iii) how much effort to exert (as is standard)

[1] Arrow (1974), p. 75.

[2] The shunning of overqualified workers is documented by Bewley (1999).

[3] French and Raven (1959), p. 265.

[4] For further discussion of the topic of legitimacy, see Barker (1990), Beetham (1991), Lipset (1963), Simmons (1979), and Weber (1946,1947).

[5] Blau (1964), p. 199-200. The order of these two sentences has been reversed and some words have been omitted without change of meaning.

as well as (iv) whether to accept that there is a duty to follow the order given by the principal. The idea that (iv) is a choice of the agent is in line with a large body of work on legitimacy. For example, Chester Barnard writes: "The decision as to whether an order has authority or not lies with the persons to whom it is addressed and does not reside in 'persons of authority' or those who issue these orders."[6]

The model parameterizes the extent of the principal's legitimacy by L. L represents the most demanding order the principal can give before the agent decides that there is not a duty to comply. Initially, we assume that L is exogenous. But then we examine the case where the principal can bolster her legitimacy at a cost. The principal may find that cost worth incurring since this allows her to give the agent tougher orders.

In analyzing the model, we will develop the concept of an authority maintenance (AM) constraint. If the principal meets that constraint, the agent accepts that there is a duty to follow orders. In meeting the AM constraint the principal's orders incentivize the agent – giving the principal a better incentive compatibility constraint. The implications of the model for organization theory stem from the presence of the AM constraint.

The paper will proceed as follows. Section 2 discusses the related literature. Section 3 develops the basic model and analyzes the solution to the principal's problem (both when the principal can and cannot bolster her authority.) Section 4 discusses applications and extensions of the model. It considers numerous organizational phenomena that are explained by the model. Section 5 concludes.

2 Related Literature

While the focus of this paper on legitimacy is unique, other studies have considered environments where there are limits to authority.

Persuasion. Several papers consider persuasion as a tool for inducing followers to take an action (that is, affecting followers' beliefs). In these papers, the leader can potentially persuade followers at a cost that it is in their interest to take an action. In Hermalin (1998), for instance, "leading by example" is a way of signaling to followers at a cost that they should take some action. For

[6] Barnard (1938), p. 163.

example, a general putting his life at risk by fighting alongside his soldiers in battle may persuade the soldiers that it is worthwhile risking their own lives. In both Majumdar and Mukand (2004) and Prendergast and Stole (1996), leaders are reluctant to overturn policies that they learn were mistakes, because a change of policy would signal that the leader lacks superior information or superior intellect.[7,8]

These studies share with this paper the feature that a leader does something at a cost in order to induce compliance by followers. The key difference is that, in these papers, the leader incurs a cost in order to persuade followers, whereas here the leader incurs a cost in order to bolster the legitimacy of her authority. As a result, this paper explains an entirely distinct set of phenomena.

Ability and Willingness to Punish. Several studies have considered environments in which authority is limited by leaders' ability and willingness to punish disobedience. Van Den Steen (2010), for example, considers an environment in which a leader/firm potentially owns all of the assets relevant for production as a way of increasing the willingness to fire followers/workers. Marino, Matsusaka, and Zabojnik (2009) argue that in cases where workers are harder to replace, a manager will have less authority, and hence it is more important to select workers whose interests are aligned with those of the firm.

Shapiro and Stiglitz (1984) also fits into this strain: they assume a limited liability constraint for workers, which reduces the ability of the firm to punish workers. They obtain, in consequence, the result that above-market wages are paid, at a cost to the firm, so that firing is a more severe punishment. As mentioned earlier, efficiency wages may arise in this paper as well. But, they will arise even when a limited liability constraint is absent (and, hence, for an entirely different reason).

These studies also find that costly actions may be taken by leaders to increase their authority. But, in contrast, we assume in this paper that there are no limits on the ability or willingness of leaders to punish and hence the focus is on different issues.

[7] Bolton, Brunnermeier, and Veldkamp (2013) also find that it is valuable for a leader to be resolute. The action of their model arises, however, because followers are under-incentivized to coordinate. In their model, it makes sense for an organization to select a leader who is overly committed to executing certain goals in order to incentivize followers to coordinate.

[8] Also of interest is Van Den Steen (2009), which considers whether persuasion and authority are complements or substitutes. In his model, a principal can attempt to persuade an agent at a cost and can also increase her authority over the agent (the extent to which disobedience is punished) at a cost. Van Den Steen finds that sometimes they are complements and sometimes they are substitutes. This result is somewhat analogous to the finding in Section 3 of this paper that the amount of bolstering that takes place (b) is increasing in the principal's legitimacy (L_0) when L_0 is low but decreasing in L_0 when L_0 is high.

3 A Model

We will formalize the concept of legitimacy by introducing it into a single-agent moral-hazard model. The principal, in addition to choosing (i) monetary incentives for the agent (as is standard), will choose (ii) an order θ to give the agent. The agent, in addition to choosing (iii) how much effort to exert (as is standard), will also choose (iv) whether to accept that there is a duty to follow orders.

Regarding (iv), we will assume that it is optimal for the agent to accept that there is a duty to follow orders if the order is not too tough: $\theta \leq L$. We will refer to L as the principal's legitimacy. We will refer to this condition ($\theta \leq L$) as the authority maintenance (AM) constraint for the principal.

If the principal maintains authority over the agent, we might wish to think of the principal-agent relationship as corresponding to a relationship between a leader and follower within an organization. In particular, it might correspond to a manager and worker within a firm. On the other hand, if authority is not maintained and the agent is incentivized purely through monetary incentives, we might wish to think of this as a market relationship. In this sense, the model may have implications for when activity will take place within firms or within markets.

Initially, we will take the principal's legitimacy L to be exogenous. Later on, we will assume that the principal can bolster her authority: $L = L_0 + b$ where the principal chooses b (how much to bolster).

In this paper, we will not explicitly model the agent's preferences over (iv). As a result, we will not be able to provide a complete picture of why the principal's authority might be more or less legitimate, or why certain actions might serve to bolster the principal's authority. While it would be nice to be able to provide a complete characterization of the agent's preferences over (iv), doing so would (a) be a distraction from the main focus of the paper, and (b) seems to be separable from the questions addressed in this paper.

We will proceed as follows. Section 3.1 elaborates the setup of the model. Section 3.2 gives the solution to the principal's problem when L is fixed. Section 3.3 gives the solution to the principal's problem when the principal can bolster her authority. Section 3.4 discusses an alternative way of interpreting the model besides the main one offered.

3.1 The Setup

The principal observes a measure of output q which can be high or low ($q \in \{h, l\}$). The probability that measured output is high is increasing in the agent's effort at two tasks: $\Pr(q = h) = a_1 + \lambda a_2$ where a_1 and a_2 denote the agent's effort at tasks 1 and 2 respectively and $\lambda > 0$.[9,10]

We assume that the principal has two tools for incentivizing the agent. First, the principal pays a wage $w(q)$ based upon measured output. Second, the principal gives an order θ as to how much effort the agent should exert at task 1.

The principal is risk-neutral and, while the measure of output q depends upon effort at both tasks, actual output depends only upon the agent's effort at task 1, so that profits are: $\pi = a_1 - w(q)$.

We will see that paying the agent for high measured output (for $q = h$) has the problem that it incentivizes the agent to exert effort not only at task 1 but also at task 2, which the principal does not care about. To give a concrete example, imagine the principal owns a company. Task 1 might be activities that improve the profitability of the company and task 2 might be accounting manipulations that make the company look more profitable than it is. Paying a bonus for high measured profitability (for $q = h$) in this setting incentivizes the agent to spend part of her time engaging in accounting manipulations.[11]

Monetary incentives are less effective as a tool for incentivizing the agent when λ is greater, since a higher λ means that q is a worse measure of effort at task 1.

The timing of events is as follows:

Time 1: The principal offers a wage $w(q)$.

Time 2: The agent decides whether to accept the offer or take an outside option which gives her utility $\bar{U}$.

Time 3: The principal gives an order θ.

Time 4: The agent has another opportunity to take her outside option.[12]

[9] We assume a multi-task moral hazard setting as in Holmstrom and Milgrom (1991).

[10] The solution to the model never puts $\Pr(q = h) > 1$.

[11] Oyer (1998) documents one such context. Salespeople get a bonus if their sales exceed an annual quota. In consequence, they "pull in" business from next year of "push out" business until the following year depending upon whether they expect to be below or above the quota. While the model developed here assumes task 2 effort has no effect on the principal's profit, this is done largely for simplicity. The ideas of the paper are applicable in contexts where task 2 effort has both positive and negative effects on profit.

[12] The assumption that the agent can exit the relationship after observing the order constrains the order that a principal with a lot of authority will choose to give. It is surely worth considering the alternative assumption that the agent cannot take an outside option at Time 4. In that case, the agent is more concerned about the possibility

Time 5: The agent decides whether to accept that there is a duty to follow orders, and chooses effort at tasks 1 and 2.

Time 6: q is realized and the wage is paid.

Later on, we will consider the possibility that, at time 0, the principal can choose to bolster her authority at a cost $k(b)$.

3.1.1 The agent's problem

When the authority maintenance (AM) constraint ($\theta \leq L$) holds, it is optimal for the agent to accept that there is a duty to follow orders. We assume that when the AM constraint holds and the agent (as is optimal) accepts that there is a duty to follow orders, her utility is given by:

$$U^{AM} = w - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2 - d(a_1, \theta)$$

The agent's utility is increasing in the wage w received. The second and third terms reflect the cost associated with exerting effort at tasks 1 and 2 respectively. Having accepted the principal's authority (and hence that she has a duty to follow orders), the agent loses $d(a_1, \theta)$ from failing to follow orders.

For simplicity, we will assume that $d(a_1, \theta) = 0$ if $a_1 = \theta$ and $d(a_1, \theta) = \infty$ otherwise. Hence, when the principal has authority over the agent, the agent will follow the order exactly ($a_1 = \theta$). This assumption will simplify the analysis but is not crucial: all that really matters is that the agent loses utility from disobeying the order.

The agent's expected utility is:

$$E(U^{AM}) = [w(l) + (a_1 + \lambda a_2)(w(h) - w(l))] - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2 - d(a_1, \theta)$$

where the first term of this expression is the agent's expected wage.

The agent finds it optimal to choose:

$$\begin{aligned} a_1 &= \theta \qquad \text{(IC-AM)} \\ a_2 &= \lambda(w(h) - w(l)) \end{aligned}$$

of the principal abusing her authority at time 3.

We will refer to this as IC^{AM} (the incentive compatibility constraint of the agent when the authority maintenance constraint holds).

We observe from IC^{AM} that, when the principal maintains authority, paying a bonus for $q = h$ (setting $w(h) - w(l) > 0$) does not affect effort at task 1. It only leads to more effort at task 2 (the unproductive task). As a result, we will end up finding that, in instances where the principal chooses to maintain authority, she will choose not to pay a bonus.

The agent's participation constraint is:

$$[w(l) + (a_1 + \lambda a_2)(w(h) - w(l))] - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2 - d(a_1, \theta) \geq \bar{U}$$

Since the agent always chooses $a_1 = \theta$, in which case $d(a_1, \theta) = 0$, we can write the participation constraint alternatively as:

$$[w(l) + (a_1 + \lambda a_2)(w(h) - w(l))] - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2 \geq \bar{U} \quad \text{(PC-AM)}$$

We will refer to this as PC^{AM}.

Let us consider now what happens when the AM constraint does not hold and the agent (as is optimal) rejects that there is a duty to follow orders. We assume her utility is given by:

$$U^{noAM} = w - \frac{1}{2}a_1^2 - \frac{1}{2}(\bar{a} - a_2)^2$$

The only difference is that $d(a_1, \theta)$ is absent, reflecting that there is no sense of duty to follow orders in this case.

The agent's expected utility is:

$$E(U^{noAM}) = [w(l) + (a_1 + \lambda a_2)(w(h) - w(l))] - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2$$

This yields the following incentive compatibility constraint for the agent:

$$\begin{aligned} a_1 &= w(h) - w(l) \quad \text{(IC-noAM)} \\ a_2 &= \lambda(w(h) - w(l)) \end{aligned}$$

We will refer to this constraint as IC^{noAM}.

From IC^{noAM} we see that as λ increases, we get more task 2 effort relative to task 1 effort. The reason is that, as λ increases, q becomes a worse measure of task 1 effort.

The participation constraint for the agent is:

$$[w(l) + (a_1 + \lambda a_2)(w(h) - w(l))] - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2 \geq \bar{U} \tag{PC-noAM}$$

Observe that PC^{noAM} and PC^{AM} are identical. Hence, in the future we will simply write PC to refer to both participation constraints.

In fact, the model was constructed so that the participation constraints would be the same. We might imagine settings where the agent derives utility – positive or negative – from being a follower and accepting authority. In assuming $PC^{noAM} = PC^{AM}$, we eliminate this effect so that we can focus on the role authority plays as a tool for incentivizing agents.[13]

3.1.2 The principal's problem

The principal's profits are given by:

$$\pi = a_1 - w$$

Hence, the expected profits of the principal are:

$$E(\pi) = a_1 - [w(l) + (a_1 + \lambda a_2)(w(h) - w(l))]$$

where the second term is the agent's expected wage.

[13] Interestingly, Fehr, Herz, and Wilkening (2013) have found experimentally that authority is highly valued by principals. There may also be settings in which agents enjoy being followers.

The principal's problem can be stated as follows:

$$\max_{\theta, w(l), w(h)} E(\pi)$$

subject to

(1) PC, IC^{AM}, AM

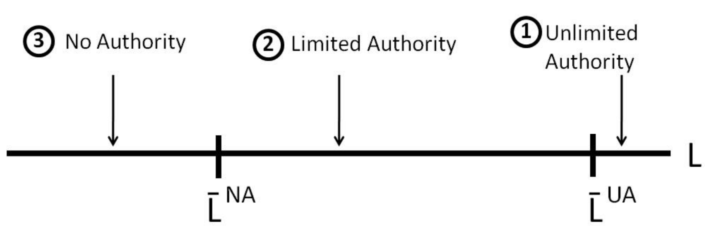
or, subject to

(2) PC, IC^{noAM}

We see that, if the principal meets the AM constraint, the principal faces a better incentive compatibility constraint (finds it easier to incentivize the agent since the principal can give the agent an order). The principal must decide whether to meet the AM constraint, which is costly if legitimacy L is low, in order to obtain a better IC constraint.

3.2 Solution to the principal's problem

We will now characterize the solution to the principal's problem as a function of the principal's legitimacy (L). This will serve as a baseline for comparison to the case where the principal can bolster her authority. We find that there are three regions. When L is large, the principal has "unlimited authority" and can give an order which achieves the first-best outcome. The AM constraint is nonbinding in this case. The principal pays a fixed wage since paying the agent a bonus when q is high simply serves to increase effort at task 2 (a_2), which is not desired.[14] Note that there is a limit on how much effort the principal orders the agent to exert ($\theta = 1$) since the principal must compensate the agent for her effort exertion (because of the participation constraint).



[14] In Akerlof and Kranton (2005) and Besley and Ghatak (2005), monetary incentives are also used less when workers have an intrinsic motivation to exert effort.

When the principal has a bit less authority ($\bar{L}^{UA} > L \geq \bar{L}^{NA}$), the principal finds her authority worth maintaining, but is unable to achieve the first-best. The AM constraint is binding in this region. The principal pays a fixed wage as she does when she has unlimited authority. Again, the reason is that paying a bonus increases task 2 effort without affecting task 1 effort.

Finally, when the principal has very little authority ($\bar{L}^{NA} > L$), the principal chooses to give it up and use monetary incentives exclusively. We might wish to think of this as a market relationship. In this region, the authority maintenance (AM) constraint is violated. The principal now does pay a bonus.

The following proposition states this more precisely:

Proposition 1 *The solution to the principal's problem is as follows.*

(1) Unlimited Authority Region ($L \geq \bar{L}^{UA}$)

The principal chooses: $\theta = 1$ *and* $w(h) = w(l) = \frac{1}{2} + \bar{U}$.

The agent chooses: $a_1 = 1$ *and* $a_2 = 0$.

The principal's profits are: $\pi = \frac{1}{2} - \bar{U}$

(2) Limited Authority Region ($\bar{L}^{UA} > L \geq \bar{L}^{NA}$)

The principal chooses: $\theta = L$ *and* $w(h) = w(l) = \frac{1}{2}L^2 + \bar{U}$

The agent chooses: $a_1 = L$ *and* $a_2 = 0$.

The principal's profits are: $\pi = L - \frac{1}{2}L^2 - \bar{U}$

$\frac{d\theta}{dL} = 1 > 0$, $\frac{da_1}{dL} = 1 > 0$, $\frac{d\pi}{dL} = 1 - L > 0$

(3) No Authority Region ($\bar{L}^{NA} > L$)

The principal chooses: θ *which violates AM (no order given)*

The principal chooses: $w(h) - w(l) = \frac{1}{1+\lambda^2}$, $w(l) = \bar{U} - \frac{1}{2(1+\lambda^2)}$

The agent chooses: $a_1 = \frac{1}{1+\lambda^2}$, $a_2 = \frac{\lambda}{1+\lambda^2}$

The principal's profits are: $\pi = \frac{1}{2(1+\lambda^2)} - \bar{U}$

$\frac{da_1}{d\lambda} = \frac{-2\lambda}{(1+\lambda^2)^2} < 0$, $\frac{da_2}{d\lambda} = \frac{1-\lambda^2}{(1+\lambda^2)^2}$ *(which is* > 0 *for* $\lambda < 1$ *and* < 0 *for* $\lambda > 1$*)*

$\frac{d\pi}{d\lambda} = \frac{-\lambda}{(1+\lambda^2)^2} < 0$

Proposition 2 characterizes the cutoff points defining the three regions, $\bar{L}^{UA}$and $\bar{L}^{NA}$.

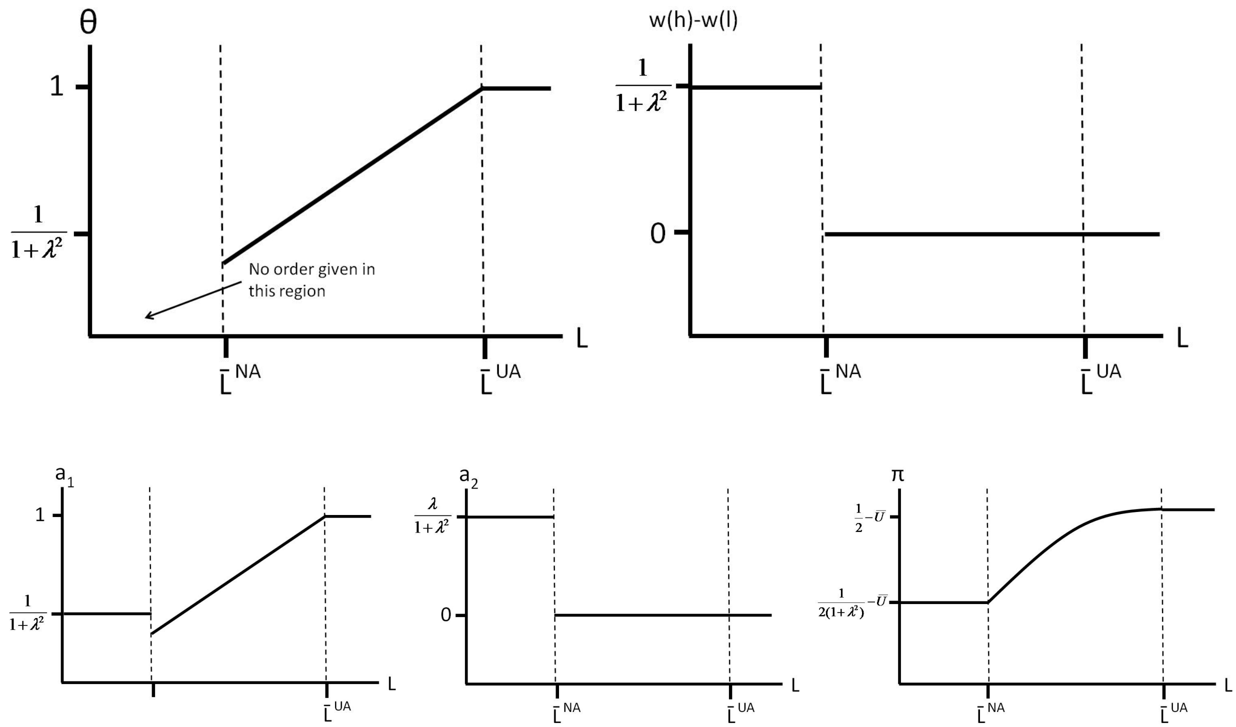
Proposition 2 *The values of* $\bar{L}^{UA}$*and* $\bar{L}^{NA}$ *(the cutoff points for the regions) are:*

(1) $\bar{L}^{UA} = 1$

(2) $\bar{L}^{NA} = 1 - \frac{\lambda}{\sqrt{1+\lambda^2}}$

The value of $\bar{L}^{NA}$ *is decreasing in* λ*:* $\frac{d\bar{L}^{NA}}{d\lambda} < 0$.

Proposition 2 shows that the no authority region in which monetary incentives are used becomes smaller as λ increases ($\frac{d\bar{L}^{NA}}{d\lambda} < 0$.) The reason for this finding is that, as λ increases, q becomes a worse measure of task 1 effort, so the principal is more inclined to hold on to authority.



3.3 Bolstering Authority

We turn now to the most interesting case, in which the principal can bolster her authority. We assume that the principal's legitimacy L depends upon how much the principal bolsters her authority: $L = L_0 + b$ where L_0 is given and $b \geq 0$ is how much the principal chooses to bolster. We assume b is chosen at time 1 when the wage offer $w(q)$ is made.

The principal bolsters her authority at a cost $k(b)$, so that her profits are given by:

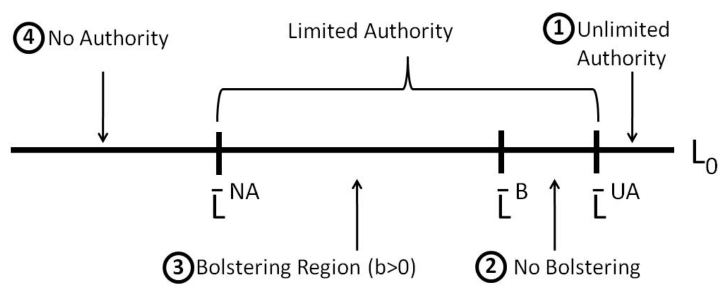
$$\pi = a_1 - w - k(b)$$

where the cost of bolstering is convex: $k', k'' \geq 0$.

We will consider what the solution to the principal's problem looks like depending upon the extent of the principal's legitimacy (L_0).

Solution to the principal's problem with bolstering

The solution to the principal's problem depends upon the legitimacy of the principal's authority (L_0). We find that there are four regions. The first region is an "unlimited authority" region ($L_0 \geq \bar{L}^{UA}$). In this region, the principal has sufficient legitimacy to order the agent to exert the first-best level of effort without bolstering authority at all ($b = 0$). AM is nonbinding in this region. The principal pays the agent a fixed wage. As before, we find that the principal pays a fixed wage unless she gives up her authority (AM is violated).



A second region is a "limited authority/no bolstering" region. In this region, the principal does not have sufficient authority to order the agent to exert the first-best level of effort without bolstering. Rather than bolster authority in order to give a tougher order, though, she chooses not to bolster ($b = 0$) and orders less than the first-best level of effort. AM is binding in this region.

A third region is a "limited authority/bolstering" region. In this region, the principal's legitimacy is now low enough that it makes sense to bolster authority ($b > 0$.) The principal finds it worthwhile to bolster authority so that she can give a tougher order to the agent. This is the case of greatest interest because it shows that limited authority on the part of the principal may lead her to take costly bolstering actions. AM is binding in this region and the first-best is not achieved.

The fourth region is a region in which the principal has very little legitimacy and hence chooses to eschew the use of authority and establish what we might wish to call a market relationship with the agent. AM is violated in this region and a bonus is paid when $q = h$. The agent is not motivated by the principal's order in this region–only by the desire to obtain a high wage.

The following proposition characterizes these regions.

Proposition 3 *The solution to the principal's problem when it is possible to bolster authority is as follows.*

(1) Unlimited Authority Region ($L_0 \geq \bar{L}^{UA}$)

The principal chooses: $\theta = 1$, $b = 0$, $w(h) = w(l) = \frac{1}{2} + \bar{U}$

The agent chooses: $a_1 = 1$, $a_2 = 0$

The principal's profits are: $\pi = \frac{1}{2} - \bar{U}$

(2) Limited Authority/No Bolstering Region ($\bar{L}^{UA} > L_0 \geq \bar{L}^{B}$)

The principal chooses: $\theta = L_0$, $b = 0$, $w(h) = w(l) = \frac{1}{2}(L_0)^2 + \bar{U}$

The agent chooses: $a_1 = L_0$, $a_2 = 0$

The principal's profits are: $\pi = L_0 - \frac{1}{2}(L_0)^2 - \bar{U}$

$\frac{d\theta}{dL_0} = 1 > 0$, $\frac{d\pi}{dL_0} = 1 - L_0 > 0$

(3) Limited Authority/Bolstering Region ($\bar{L}^{B} > L_0 \geq \bar{L}^{NA}$)

The principal chooses: θ *and* b *which solve the following two equations:*

(i) $k'(b) = 1 - (L_0 + b)$

(ii) $\theta = L_0 + b$

The principal chooses: $w(h) = w(l) = \frac{1}{2}\theta^2 + \bar{U}$

The agent chooses: $a_1 = \theta$, $a_2 = 0$

The principal's profits are: $\pi = \theta - \frac{1}{2}\theta^2 - k(b) - \bar{U}$

Bolstering increases as legitimacy falls: $\frac{db}{dL_0} < 0$

$\frac{d\theta}{dL_0} > 0$, $\frac{d\pi}{dL_0} = (1 - \theta)\frac{d\theta}{dL_0} > 0$

(4) No Authority Region ($\bar{L}^{NA} > L_0$)

The principal chooses: θ *which violates AM (no order is given),* $b = 0$

The principal chooses: $w(h) - w(l) = \frac{1}{1+\lambda^2}$, $w(l) = \bar{U} - \frac{1}{2(1+\lambda^2)}$

The agent chooses: $a_1 = \frac{1}{1+\lambda^2}$, $a_2 = \frac{\lambda}{1+\lambda^2}$

The principal's profits are: $\pi = \frac{1}{2(1+\lambda^2)} - \bar{U}$

$\frac{da_1}{d\lambda} = \frac{-2\lambda}{(1+\lambda^2)^2} < 0$, $\frac{da_2}{d\lambda} = \frac{1-\lambda^2}{(1+\lambda^2)^2}$ *(which is* > 0 *for* $\lambda < 1$ *and* < 0 *for* $\lambda > 1$*)*

$\frac{d\pi}{d\lambda} = \frac{-\lambda}{(1+\lambda^2)^2} < 0$

The following proposition characterizes the cutoff points for the four regions ($\bar{L}^{UA}$, $\bar{L}^{B}$, and $\bar{L}^{NA}$).

Proposition 4 *The following is a characterization of the cutoff points defining the four the regions ($\bar{L}^{UA}$, $\bar{L}^{B}$, and $\bar{L}^{NA}$):*

(1) $\bar{L}^{UA} = 1$

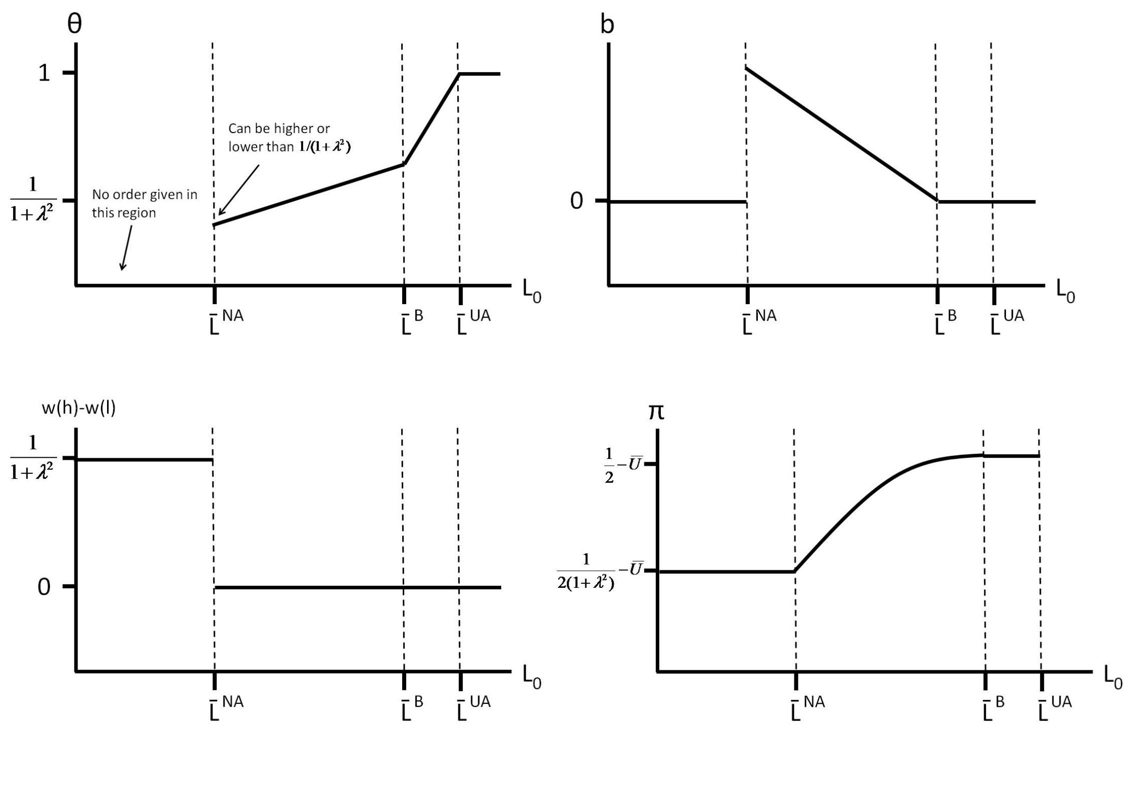
(2) $\bar{L}^{B} = 1 - k'(0)$

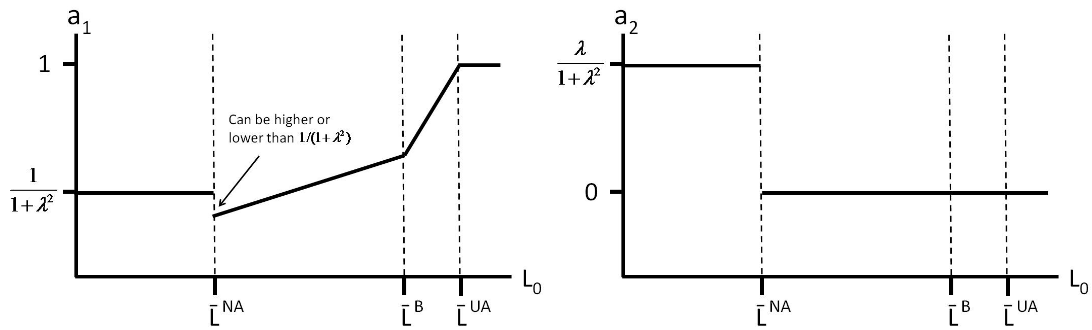
(3) $\frac{d\bar{L}^{NA}}{d\lambda} < 0$

It is possible that $\bar{L}^{B} \leq \bar{L}^{NA}$*, in which case region (3) does not exist.*

$\bar{L}^{UA} > \bar{L}^{NA}$*, an implication of which is that region (3) exists if* $k'(0)$ *is sufficiently low.*

Proposition 4 shows that, while a bolstering region need not exist, it will exist if $k'(0)$ is sufficiently low. That is, if a little bit of bolstering can be done cheaply, a region will exist where bolstering occurs. Proposition 4 also shows that, as in the previous case without bolstering, the size of the no authority region becomes smaller as λ increases. The reason is the same as before: monetary incentives work less well because q is a worse measure of output.





3.4 An Alternative Interpretation of the Model

In the introduction, we suggested that there are two reasons that legitimacy matters. A sense that there is a duty to carry out orders (i) motivates compliance, and (ii) motivates people to report on others' infractions or police the disobedient in other ways.

The model we have developed seems to be exclusively about (i). In this section, we will show that the model can be interpreted as being *either* about (i) *or* about (ii). We will suggest a different interpretation of the model in which only (ii) is at work.

Suppose, as before, that the principal only observes q (the noisy measure of output) but the agent has coworkers who observe a_1. Let us suppose, in contrast to before, that the agent does *not* feel a sense of duty to follow orders. However, the coworkers feel the agent has a duty to follow orders when the AM constraint holds. When AM holds, the coworkers get angry when the agent fails to follow orders and notify the principal if $a_1 \neq \theta$, allowing the principal to inflict a punishment p.[15] The agent's utility when AM holds thus changes to the following:

$$U^{AM-new} = w - \frac{1}{2}a_1^2 - \frac{1}{2}{a_2}^2 - p * 1\{a_1 \neq \theta\}$$

The $d(a_1, \theta)$ term is absent since the agent does not feel a sense of duty to follow orders but the term $p * 1\{a_1 \neq \theta\}$ is present reflecting that the principal inflicts a punishment p whenever $a_1 \neq \theta$.

To be a bit more concrete, consider the timing that corresponds to this alternative interpretation:

Time 1: The principal chooses how much to bolster authority b, and makes an offer to the agent of a wage $w(q)$ and a punishment p in the event that coworkers report orders were disobeyed

[15] Akerlof (2015) gives foundations for the assumption that coworkers will be angered by disobedience when they feel there is a duty to follow orders.

$(a_1 \neq \theta)$.

Time 2: The agent decides whether to accept the offer or take an outside option which gives her utility $\bar{U}$.

Time 3: The principal gives an order θ.

Time 4: The agent has another opportunity to take her outside option.

Time 5: The agent chooses effort at tasks 1 and 2.

Time 6: Coworkers observe the agent's effort a_1. If they accept that the principal has authority over the agent, which they do if AM holds, they will report if orders were disobeyed $(a_1 \neq \theta)$.

Time 7: q is realized, the wage $w(q)$ is paid, punishment p is inflicted if the coworkers reported disobedience.

Observe that it is clearly optimal for the principal to set $p = \infty$. As a result, $p{*}1\{a_1 \neq \theta\} = 0$ if orders are obeyed and ∞ otherwise. Hence, $p{*}1\{a_1 \neq \theta\} = d(a_1, \theta)$. As a result, $U^{AM-new} = U^{AM}$ and the solution to the principal's and agent's problems will be exactly the same as before.

4 Applications and Extensions of the Model

In this section, we will consider various applications and extensions of the model developed in Section 3. This section endeavors to show organizational phenomena can be explained by leaders' concern about the legitimacy of their authority. We will give explanations for: (i) above-market-clearing wages, (ii) merger decisions, (iii) bureaucratic organization, and (iv) rejection of overqualified workers.

4.1 Fair Wages

It may be important for a manager to treat workers in a manner they consider to be fair in order to maintain legitimacy. Typically, the wages workers consider to be fair are greater than their outside option–the market wage. Hence, paying an above-market wage may be one way of bolstering authority.

We might model this as follows: $L = L_0 + b$ where $b = \alpha(EU - \bar{U})$. That is, the principal bolsters authority by giving the agent more than her outside option $(EU > \bar{U})$. If the principal chooses $b > 0$, this means that the participation constraint is nonbinding and an above-market wage is paid to the agent.

While this case does not initially look like the model with bolstering analyzed in Section 3.3, with some translation, it can be shown to be the same. Rather than thinking of the principal as choosing $(\theta, b, w(s))$ to maximize profits, suppose we instead think of the principal as choosing $(\theta, b, \tilde{w}(s))$ to maximize profits where $\tilde{w}(s) = w(s) - (EU - \bar{U})$. If the principal's problem is stated in this way, it is equivalent to the principal's problem from section 3 with $k(b) = \frac{b}{\alpha}$ and $\tilde{w}(s)$ substituted for $w(s)$. This leads to the following corollary of Proposition 3.

Corollary 1 *Consider the case where the principal's legitimacy is given by:* $L = L_0 + b$ *where* $b = \alpha(EU - \bar{U})$. *In this case, the solution to the principal's problem is as follows.*

(1) Unlimited Authority Region $(L_0 \geq \bar{L}^{UA})$

The principal chooses: $\theta = 1$, $b = 0$, $w(h) = w(l) = \frac{1}{2} + \bar{U}$

The agent chooses: $a_1 = 1$, $a_2 = 0$

The principal's profits are: $\pi = \frac{1}{2} - \bar{U}$

(2) Limited Authority/No Bolstering Region $(\bar{L}^{UA} > L_0 \geq \bar{L}^{B})$

The principal chooses: $\theta = L_0$, $b = 0$, $w(h) = w(l) = \frac{1}{2}(L_0)^2 + \bar{U}$

The agent chooses: $a_1 = L_0$, $a_2 = 0$

The principal's profits are: $\pi = L_0 - \frac{1}{2}(L_0)^2 - \bar{U}$

(3) Limited Authority/Bolstering Region $(\bar{L}^{B} > L_0 \geq \bar{L}^{NA})$

This region will exist if α *is sufficiently large. PC is nonbinding in this region.*

The principal chooses: $\theta = \frac{\alpha-1}{\alpha}$, $b = \frac{\alpha-1}{\alpha} - L_0$, $w(h) = w(l) = \frac{1}{2}\left(\frac{\alpha-1}{\alpha}\right)^2 + \bar{U} + \frac{1}{\alpha}\left(\frac{\alpha-1}{\alpha} - L_0\right)$

The agent chooses: $a_1 = \left(\frac{\alpha-1}{\alpha}\right)$, $a_2 = 0$

The principal's profits are: $\pi = \left(\frac{\alpha-1}{\alpha}\right)^2 - \frac{L_0}{\alpha} - \bar{U}$

Bolstering increases as legitimacy falls: $\frac{db}{dL_0} < 0$

(4) No Authority Region $(\bar{L}^{NA} > L_0)$

The principal chooses: θ *which violates AM (no order is given),* $b = 0$

The principal chooses: $w(h) - w(l) = \frac{1}{1+\lambda^2}$, $w(l) = \bar{U} - \frac{1}{2(1+\lambda^2)}$

The agent chooses: $a_1 = \frac{1}{1+\lambda^2}$, $a_2 = \frac{\lambda}{1+\lambda^2}$

The principal's profits are: $\pi = \frac{1}{2(1+\lambda^2)} - \bar{U}$

The proposition shows that, if paying an above-market wage has a substantial effect on legitimacy (α is sufficiently large), there will be a region in which the principal will choose to bolster authority by paying an above-market wage. The participation constraint will be non-binding in this region.

As mentioned earlier, above-market wages arise in Shapiro and Stiglitz (1984) for a very different reason. In their model, the optimality of efficiency wages relies upon a limited liability assumption: $w(q) \geq 0$ for all q. Above-market wages arise here even without the assumption of limited liability.

Another reason for above-market wages is reciprocity: in these models, a manager gives a worker an above-market wage and the worker reciprocates by putting in more effort.[16] The reciprocity story is closer to the one told here, but there are three things which distinguish it. First, the reciprocity may be of a more complex type than has typically been assumed: the worker may reciprocate by being more willing to do what the manager tells her to do rather than by putting in more effort all of the time. Second (and perhaps more importantly), when a worker is well paid, coworkers are more likely to feel that it is inappropriate for that worker to be disobedient and shirk. The coworkers are more likely to report misbehavior to the manager or bring the worker into line themselves. This follows from the interpretation of the model given in Section 3.4. Finally, the manager is fully informed about how workers are behaving, which differs from other moral hazard models where managers are in the dark. If a worker disobey orders, this gets reported to the manager. Workers do not behave as the manager would ideally like when the manager has limited legitimacy, but the manager will nonetheless be fully informed as to how workers are behaving.

4.2 Merging firms with different cultures

The model says something about when activity will take place in a market and when activity will take place within a firm.

To illustrate, let us suppose there are two agents over whom the principal might have authority rather than just one. We might wish to think of a case where the principal maintains authority over both as a case where they form a single firm. In contrast, we might wish to think of a case where the principal maintains authority over just one and has a market relationship with the other as corresponding to a case where there are two firms.

[16] See, for example, Fehr and Gachter (2000) and Akerlof and Yellen (1990).

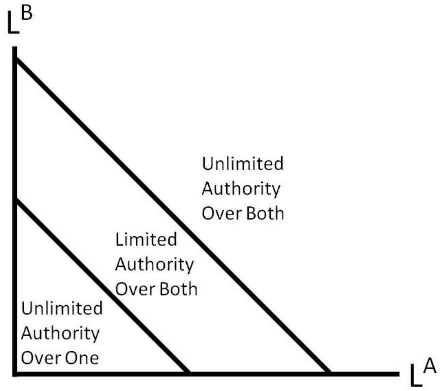
Suppose the legitimacy of the principal's authority over agent A is $L^A + b$ and the legitimacy of the principal's authority over agent B is $L^B + \gamma b$, where bolstering is costless ($k(b) = 0$).

In the event that $\gamma > 0$, we can think of agents A and B as coming from similar cultures in the following sense: what the principal needs to do to establish authority over agent A is the same as what the principal needs to do to establish authority over agent B (b should be large for both). Since it is assumed that $k(b) = 0$, it is clear what the solution to the principal's problem looks like: she will bolster authority over both agents at zero cost, order them to take the first-best action ($\theta^A = \theta^B = 1$), and pay them both a fixed wage.

So, the model implies that when agents come from similar cultures, it makes sense for them to be merged into a single firm.

Suppose instead that $\gamma < 0$. In this case, what the principal needs to do to establish authority over one agent differs markedly from what the principal needs to do to establish authority over the other (b should be high for one and low for the other). This situation reflects a case where there is a difference in culture between agents A and B. It is not clear in the case where A and B come from different cultures ($\gamma < 0$) whether it is best for them to merge into a single firm or remain separate and have a market relationship.

To illustrate what happens, let us consider the case where $\gamma = -1$. The solution to the principal's problem will depend upon the aggregate level of legitimacy ($L^A + L^B$). When her legitimacy is sufficiently high, she will be able to maintain authority over both agents and give them the first-best orders despite the cultural difference. Both AM constraints will be non-binding in this case. When she has an intermediate amount of legitimacy, she will maintain authority over both but neither will be given the first-best order. In this case, she struggles to maintain authority over both A and B, but finds it worthwhile to do so. When her authority is sufficiently weak, she will find it best to establish a market relationship with one of the agents (violate AM) so that she can give the first-best order to the other agent. We can think of this final case as one where the difference in culture between agents A and B is sufficiently great that it does not make sense for them to operate as a single firm.



Proposition 5 states the result more precisely.

Proposition 5 *Suppose the principal's legitimacy with agent A is $L^A + b$, the principal's legitimacy with agent B is $L^B - b$, the principal can choose any $b \in \mathbb{R}$, and bolstering is costless ($k(b) = 0$). The solution to the principal's problem is as follows.*

(1) Unlimited Authority Over Both Regions ($L^A + L^B > 2$)

The principal chooses: $\theta^A = \theta^B = 1$, $w^A(h) = w^A(l) = w^B(h) = w^B(l) = \frac{1}{2} + \bar{U}$, b such that $1 - L^A \leq b \leq L^B - 1$.

The agents choose: $a_1^A = a_1^B = 1$ and $a_2^A = a_2^B = 0$.

The principal's profits are: $\pi = 1 - 2\bar{U}$

(2) Limited Authority Over Both Regions ($2 \geq L^A + L^B \geq \bar{L}^{NA}$)

The principal chooses: $\theta^A = \theta^B = \frac{1}{2}(L^A + L^B)$, $w^A(h) = w^A(l) = w^B(h) = w^B(l) = \frac{1}{8}(L^A + L^B)^2 + \bar{U}$, $b = \frac{1}{2}(L^B - L^A)$.

The agents chooses: $a_1^A = a_1^B = \frac{1}{2}(L^A + L^B)$ and $a_2^A = a_2^B = 0$.

The principal's profits are: $\pi = (L^A + L^B) - \frac{1}{4}(L^A + L^B)^2 - 2\bar{U}$

(3) Unlimited Authority Over One Region ($\bar{L}^{NA} > L^A + L^B$)

The principal either chooses $b \geq 1 - L^A$ and maintains authority over just agent A or chooses $b \leq L^B - 1$ and maintains authority over just agent B. If the principal maintains authority over just agent A, the solution is as follows:

The principal chooses: $\theta^A = 1$, $w^A(h) = w^A(l) = \frac{1}{2} + \bar{U}$

Agent A chooses: $a_1^A = 1$ and $a_2^A = 0$.

The principal chooses θ^B which violates AM for agent B (no order given)

The principal chooses: $w^B(h) - w^B(l) = \frac{1}{1+\lambda^2}$, $w^B(l) = \bar{U} - \frac{1}{2(1+\lambda^2)}$

Agent B chooses: $a_1^B = \frac{1}{1+\lambda^2}$, $a_2^B = \frac{\lambda}{1+\lambda^2}$

The principal's profits are: $\pi = \frac{1}{2} + \frac{1}{2(1+\lambda^2)} - 2\bar{U}$

The solution looks identical in the case where the principal maintains authority over just agent B.

$\bar{L}^{NA} = 2\left(1 - \sqrt{\frac{1}{2}\left(1 - \frac{1}{1+\lambda^2}\right)}\right)$

Buono, Bowditch, and Lewis (1985) describe a case where these issues are at play. They examine a 1981 merger of two mutual savings banks of similar size. While the banks were in many ways similar, different cultures prevailed. In particular, the leadership style in Bank A was somewhat democratic and participative while the leadership style in Bank B was more authoritarian. According to Buono et al., both banks took pride in their cultures and, in each bank, the style of leadership prevailing prior to the merger was viewed favorably by employees. Bank A prided itself on being a place where people were kind whereas Bank B took pride in being "lean and mean."

The merger was a mutual decision of the CEOs of the two banks. Following the merger, the CEO of Bank A became the CEO of the merged bank and the CEO of Bank B became the COO. Despite this, it was actually the CEO of Bank B who played the key role in managing the merged bank while the CEO of Bank A was largely focused on external industry and environmental issues. It appears from Buono et al.'s analysis that the Bank B CEO had considerably less legitimacy within Bank A than the Bank A CEO had had prior to the merger. They find that there was considerable anger in Bank A post-merger and resistance to the authority of the Bank B CEO. Bank A had the impression that the Bank B CEO was attempting to impose a more authoritarian leadership style.

4.3 Bureaucracy

The model of limited authority we have developed allows us to formalize a theory of bureaucracy developed by Alvin Gouldner (1954) and also suggests another more original theory of bureaucracy.[17] Gouldner's theory was recognized by March and Simon (1958), but it has received relatively little attention since – most likely because a formal model has been lacking.

[17] For a discussion of theories of bureaucracy, see chapter 3 of March and Simon (1958). March and Simon discuss three theories of bureaucracy: Philip Selznick's, Alvin Gouldner's, and Robert Merton's. Prendergast (2007) develops another interesting theory of bureaucracy.

While it is hard to give a precise definition of bureaucracy, bureaucracy seems to refer to situations where rules are set, decisions are made, or orders are given that are not fully tailored to the situation at hand, ignore relevant information or, in the case of Prendergast's (2007) theory, are based on a somewhat biased reading of the information. Perhaps the reason people find bureaucracy so frustrating is the sense that information is being ignored or mishandled. Gouldner's theory and the other theory proposed in this section certainly accord with this definition.

4.3.1 Gouldner's Theory

Alvin Gouldner's theory of bureaucracy derives from his 1954 study of the General Gypsum Company and its Oscar Center plant. The company's main office had recently appointed Vincent Peele to replace the longtime plant manager, with a charge of making reforms. The plant workers were wary about Peele as a newcomer looking to shake things up. Gouldner observed that Peele adhered dogmatically to rules set by the central office. He writes that "[appeals to the rules] help make [Peele's] behavior more palatable to the plant. When Peele did something which he knew the workers would not like, he often justified it as due to main office requirements."[18] Although Peele's strict adherence to the letter of the main-office rules upsets the workers, Gouldner gives a reason for such "bureaucracy." With his low level of authority over the workers, Peele needed to rely on the authority of the main office.

We can formalize Gouldner's idea with a slightly amended version of the model without bolstering from Section 3.1. Suppose there is one agent but two principals (A and B), each of whom could potentially incentivize the agent. Principal A and principal B divide profits equally between them so they agree that whichever of them can generate the greater expected profit should be the one to incentivize the agent. Principal A, with legitimacy L^A, will correspond to the main office in Gouldner's example and principal B, with legitimacy $L^B < L^A$ will correspond to Vincent Peele.

While principal A has greater legitimacy than principal B, principal B has superior information. We suppose there are two states of the world $s \in \{-1, 1\}$ with $\Pr(s = 1) = p > \frac{1}{2}$. Principal B, corresponding to Peele, knows the state of the world while principal A does not.

In order to give a context in which information has value, we need to make a few further

[18] Gouldner (1954), p. 95.

amendments. We will assume that the agent's effort at task 1 (a_1) can take on positive or negative values and that $\Pr(q = h) = |a_1| + \lambda a_2$. Recall that the cost to the agent of exerting effort at task 1 is $\frac{1}{2}a_1^2$, so that the agent faces the same effort cost if she chooses $a_1 = a > 0$ or $a_1 = -a < 0$. While the agent is equally willing to choose $a_1 = a$ or $-a$, we assume the principal is not indifferent due to the following change to the principal's profit function. Rather than assuming as we did before that $\pi = a_1 - w(q)$, we will now assume that $\pi = sa_1 - w(q)$. The principal prefers that the agent choose $a_1 = a$ when $s = 1$ and $a_1 = -a$ when $s = -1$.

Consider the case where both principals have an intermediate amount of legitimacy, so that the AM constraints for both will be binding. Principal A, who is uninformed, will give an order to the agent of $\theta^A = L^A$ (this is the optimal order since $\Pr(s = 1) = p > \frac{1}{2}$). Principal B, who is informed, will give an order to the agent of $\theta^B = sL^B$.

Their expected profits will be as follows:

$\pi_A = L^A(2p - 1) - \frac{1}{2}\left(L^A\right)^2 - \bar{U}$

$\pi_B = L^B - \frac{1}{2}\left(L^B\right)^2 - \bar{U}$

Potentially principal B can generate a greater profit than principal A because of her superior information. B's profits will be higher relative to A's when p is low: a low value of p means that $s = -1$ occurs relatively frequently and hence principal B's information is somewhat valuable. But, it is also possible that principal A will be able to generate a greater profit due to the greater legitimacy of her authority ($L^A > L^B$). Principal A will not give orders that are as well tailored to the situation (θ^A does not depend upon s) but she may be able to make up for this by getting the agent to exert more effort. Hence, there is a rationale in the Gypsum plant for a strict reliance on rules set by the main office despite the fact that those rules may frequently deviate from what both Peele and the workers think would be best.

4.3.2 Another theory of bureaucracy

The model of legitimacy developed in Section 3 suggests another theory of bureaucracy besides Gouldner's. To illustrate the idea, suppose a manager faces a choice between setting a clear rule (such as "always arrive at work by 8am") and one which is more complicated (such as "always arrive at work by 8am unless x, y, or z has happened"). The complicated rule may be more efficient since it can be tailored to the circumstance. But there seems to be a reason for choosing a clearer, *more* *bureaucratic* rule: it is probably easier to achieve compliance when the rule is simple.

In order to capture this idea, consider the same setting as before where $s \in \{-1, 1\}$ and $\pi = sa_1 - w(q)$. We will suppose there is just a single principal this time. The principal does not know the state s, but the agent does know the state. Furthermore, we allow the principal to give state-contingent orders to the agent: $\theta(s)$. In other words, the principal can give an order to do $\theta(1)$ when $s = 1$ and $\theta(-1)$ when $s = -1$.

Clearly, there is a value in giving orders that are tailored to the state ($\theta(-1) \neq \theta(1)$). However, we assume that giving a more complicated, tailored order reduces the principal's legitimacy. If a simple order is given ($\theta(-1) = \theta(1)$), the AM constraint is $\theta(s) \leq L^H$ for all s. If a complicated order is given ($\theta(-1) \neq \theta(1)$), the AM constraint is $\theta(s) \leq L^L$ for all s, with $L^L < L^H$.

First, consider the optimal simple order to give. If L^H takes an intermediate value, so that AM is binding, the optimal order is $\theta(s) = L^H$. If L^L takes an intermediate value, the optimal complicated order to give will be $\theta(s) = sL^L$. Let us compare the principal's expected profits.

The principal's expected profits from giving a simple, bureaucratic order are:

$\pi_B = L^H(2p - 1) - \frac{1}{2}\left(L^H\right)^2 - \bar{U}$

The principal's expected profits from giving a tailored, non-bureaucratic order are:

$\pi_{NB} = L^L - \frac{1}{2}\left(L^L\right)^2 - \bar{U}$

It makes sense to be bureaucratic ($\pi_B > \pi_{NB}$) if (i) it has a large effect on legitimacy (L^H is sufficiently large relative to L^L) and (ii) the benefit of having tailored orders is relatively low (p is large enough that $s = -1$ only rarely).

Why might the principal's legitimacy depend upon the complexity of the order given? One rationale derives from the interpretation of the model given in Section 3.4. While a worker might know a state of the world s, her coworkers might not. As a result, it might be difficult for coworkers to determine whether a worker is following a complex state-contingent order or not. If it is difficult for the coworkers to tell whether orders are being followed, they will not be able to report disobedience to the principal. In contrast, when a simple order is given ("always arrive at work by 8am") it is easy for coworkers to determine whether it has been obeyed.

4.4 Failing to Hire Overqualified Workers

Bewley (1999) has observed that firms typically dislike hiring workers who seem "overqualified" for a job. In interviews Bewley conducted with personnel managers, he has documented their reasoning. One personnel manager said the following: "Overqualification is a problem, just as is underqualification. You cannot fulfill the needs of an overqualified person. They will be unhappy and will be a problem."[19]

It would seem that a large part of what is going on is that it is difficult to manage such workers (AM is tight). Let us make a very small amendment to the model from Section 3 without bolstering to formalize what seems to be going on.[20]

Instead of assuming the principal's profits are given by $\pi = a_1 - w(q)$, suppose $\pi = \rho a_1 - w(q)$ where ρ is assumed to be higher for a more qualified agent. We will also assume that the principal's legitimacy depends upon how qualified the agent is $L(\rho)$, with L decreasing in ρ to reflect the idea that it might be difficult to maintain authority over more qualified agents.[21] With the assumption that $L(\rho)$ takes an intermediate value, so that the AM constraint is binding, the principal's expected profits will be:

$$\pi(\rho) = \rho \cdot L(\rho) - \frac{1}{2}(L(\rho))^2 - \bar{U}$$

If $L(\rho)$ where constant, $\pi(\rho)$ would be increasing in ρ due to the fact that more qualified workers are more productive. But, since legitimacy falls as ρ increases, profits may actually fall as ρ increases. It is indeed possible, as the personnel manager states, that both overqualification and underqualification pose a problem.

There is another problem with hiring overqualified workers, though, which may be even more

[19] Bewley (1999), p. 284.

[20] An alternative story would be that, in applying for a job for which one seems to be overqualified, one signals some other kind of defect. While this story may explain part of what is going on, there seem to be instances where this signaling effect is absent. Consider, for example, an economy in recession in which many highly qualified workers get laid off. One would imagine that it would not be an especially negative signal about oneself to apply for a job for which one is overqualified in such an economy. However, at least anecdotally, highly qualified workers who get laid off in recessions find it difficult to find new jobs and frequently get told that they are overqualified.

[21] Perhaps a key reason why legitimacy might be lower is as follows. An overqualified worker finds it difficult, threatening to her self esteem, to imagine that with all of her experience she is just supposed to be a servile and unquestioning follower of a manager. In questioning orders, she is engaging in a process to protect her self esteem.

There is a case analogous to an overqualified worker in the classroom. Consider individuals who, after working for a period of time or raising a family, return to school to obtain a degree. These individuals, somewhat older than other students, often feel that they should know things that the other students do not know and often have a desire to assert equality with the professor. It is common for such students to speak up frequently in class and question the assertions of the professor. A professor may find it difficult to deal with such a student.

important. Workers who are difficult to manage and fail to respect authority have a bad attitude which may be infectious. Teachers, similarly, always worry when one student is determined to play the role of class clown. They know that, if they are not careful, other students will join the class clown in her tomfoolery.

We might capture this second effect as follows. Suppose there are two agents: A and B. The principal's authority over agent A may depend upon both ρ_A and ρ_B: $L^A(\rho_A, \rho_B)$. Similarly, the principal's authority over agent B may depend upon both ρ_A and ρ_B: $L^B(\rho_A, \rho_B)$. In this event, in choosing to hire an overqualified worker A, a manager needs to think not only about whether worker A will be difficult to manage but also about how this will affect her ability to manage B.

5 Conclusion

This paper has argued that limited legitimacy of authority plays a significant role in determining organizational behavior and organizational structure. We formalized the concept of legitimacy in a single-agent moral hazard model. The model explains numerous organizational phenomena: above-market-clearing wages, merger decisions, bureaucratic organization, and the rejection of overqualified workers.

The paper suggests many topics for further research. The first is exploration of further applications and extensions of the model for organization theory and political economy.

Second, this paper has considered environments where decreases in legitimacy reduce welfare. Another avenue for future research would be to explore reasons why low legitimacy might be beneficial. For example, it might prevent abuse of authority or allow for better information aggregation.[22]

Finally, developing a more complete understanding of what confers legitimacy is an important topic for future study.

[22] See Landier, Sraer, and Thesmar (2009) for one approach to this topic.

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6 Appendix

Proof of Proposition 1. There are three cases to consider: (1) AM holds and is non-binding, (2) AM holds and is binding, and (3) AM does not hold. The PC and IC constraint will always be binding. We will consider each in turn. Each corresponds to one of the three regions.

Case (1): The principal's expected profits are $E(\pi) = a_1 - [w(l) + (a_1 + \lambda a_2)(w(h) - w(l))]$. In this case, it is clear that it is optimal to set $w(h) - w(l) = 0$ since $w(h) - w(l) > 0$ increases a_2 without increasing a_1. A higher a_2 is a pure cost for the principal since it is unproductive and, through the participation constraint, means paying the agent more to compensate the agent for additional effort exertion. If we assume that $w(h) - w(l) = 0$, and substitute in IC-AM and PC to the profit function, we obtain: $E(\pi) = \theta - \frac{1}{2}\theta^2 - \bar{U}$. The principal chooses θ to maximize profits and hence $\theta = 1$.

Case (2): Again, the principal finds it optimal to choose $w(h) - w(l) = 0$ and maximizes $E(\pi) = \theta - \frac{1}{2}\theta^2 - \bar{U}$, but in this case, subject to a binding AM constraint: $\theta = L$.

Case (3): In this case, IC-noAM and PC allow us to write the principal's profits solely in terms of a_1: $E(\pi) = a_1 - \frac{1}{2}a_1^2(1 + \lambda^2) - \bar{U}$. The maximizing a_1 is hence $a_1 = \frac{1}{1+\lambda^2}$. The IC-noAM and participation constraints imply that $w(h) - w(l) = a_1 = \frac{1}{1+\lambda^2}$, $a_2 = \lambda(w(h) - w(l)) = \frac{\lambda}{1+\lambda^2}$, and $w(l) = \bar{U} - \frac{1}{2}a_1^2(1 + \lambda^2) = \bar{U} - \frac{1}{2(1+\lambda^2)}$. ■

Proof of Proposition 2. The boundary between the unlimited authority region and the limited authority region is given by the value of L for which AM becomes binding, which is clearly $L = 1$. Hence, $\bar{L}^{UA} = 1$. The boundary between the limited authority region and the no authority region is given by the value of L for which profits are the same with and without authority. $\pi^{auth} = L - \frac{1}{2}L^2 - \bar{U}$ and $\pi^{no-auth} = \frac{1}{2(1+\lambda^2)} - \bar{U}$, so $\bar{L}^{NA}$ solves: $\bar{L}^{NA} - \frac{1}{2}\left(\bar{L}^{NA}\right)^2 - \bar{U} = \frac{1}{2(1+\lambda^2)} - \bar{U}$. This yields: $\bar{L}^{NA} = 1 - \frac{\lambda}{\sqrt{1+\lambda^2}}$, which is decreasing in λ. ■

Proof of Proposition 3. Again, there are three cases to consider: (1) AM holds and is non-binding, (2) AM holds and is binding, and (3) AM does not hold. The PC and IC constraint will always be binding. Clearly, it would not make sense to engage in bolstering (set $b > 0$) in case (1) where AM is non-binding. Since case (1) involves no bolstering, the solution looks identical to the solution in the case where L is exogenous. In case (3), similarly, it would not make sense to bolster. Hence, the solution in case (3) looks identical to the solution in the case where L is exogenous. This leaves case (2) to consider. As in the case where L is exogenous, it does not makes sense to pay a bonus in case (2): $w(h) - w(l) = 0$. From our analysis in the proof of Proposition 1, we know that the principal's expected profits in this case will be: $E(\pi) = L - \frac{1}{2}L^2 - \bar{U} - k(b)$ with $L = L_0 + b$ and $\theta = L = a_1$. The first-order condition for b is: $k'(b) = 1 - (L_0 + b)$. The first order condition only has a solution if $L_0 \leq 1 - k'(0)$. In the event that $L_0 > 1 - k'(0)$, $b = 0$ maximizes expected profits. ■

Proof of Proposition 4. $\bar{L}^{UA} = 1$ for the same reason as in Proposition 2. From the proof of Proposition 3, we see that the boundary between the limited authority/bolstering region and the limited authority/no bolstering region is given by $\bar{L}^B = 1 - k'(0)$. The boundary between the limited authority region and the no authority region is given by the value of L for which $\pi^{auth} = \pi^{no-auth}$. Hence, $\bar{L}^{NA}$ solves $\pi^{auth} = \pi^{no-auth}$, with $\pi^{no-auth} = \frac{1}{2(1+\lambda^2)} - \bar{U}$ and $\pi^{auth} = (\bar{L}^{NA} + b) - \frac{1}{2}(\bar{L}^{NA} + b)^2 - \bar{U}$, where b maximizes π^{auth}. It is thus clear that an increase in λ decreases the value of $\bar{L}^{NA}$ ($\frac{d\bar{L}^{NA}}{d\lambda} < 0$). It is also clear that $\bar{L}^{UA} > \bar{L}^{NA}$. ■

Proof of Proposition 5. First, observe that it will always make sense to maintain authority over at least one of the agents. Without loss of generality, let us assume that the principal always maintains authority over agent B. There are three cases we need to consider: (1) AM is non-binding for agent A, (2) AM is binding for agent A, and (3) AM is violated for agent A. Let us consider each case in turn.

Case (1): If AM is non-binding for agent A, it must be the case that AM is non-binding for agent B. Suppose not: then the principal should have chosen a lower value of b which serves to tighten the AM constraint on agent A (which has no effect on profits since AM is non-binding) and serves to loosen the AM constraint on agent B (which increases profits since AM is binding). Hence, Case (1) arises if and only if there exists a b for which both AM constraints are non-binding (or, $L^A + b > 1$ and $L^B - b > 1$). Hence, case (1) occurs when $L^A + L^B > 2$. Since both AM constraints are non-binding, the solution is given by case (1) of Proposition 1.

Case (2): by the argument just given, if AM is binding for agent A, AM must also be binding for agent B. Hence, the solution is given by case (2) of Proposition 1. Expected profits in this case will be: $E(\pi) = \left[\theta^A - \frac{1}{2}(\theta^A)^2 - \bar{U}\right] + \left[\theta^B - \frac{1}{2}(\theta^B)^2 - \bar{U}\right]$ with $\theta^A = L^A + b$ and $\theta^B = L^B - b$. Expected profits are maximized when $b = \frac{1}{2}(L^B - L^A)$ and $\theta^A = \theta^B = \frac{1}{2}(L^A + L^B)$. Expected profits when b is chosen optimally will be $\pi^{AuthBoth-Lim} = (L^A + L^B) - \frac{1}{4}(L^A + L^B)^2 - 2\bar{U}$.

Case (3): when AM is violated for agent A, it is clear that b should be chosen to be very negative so that the principal has unlimited authority over agent B. The solution to the principal's problem is given by case (1) of Proposition 1 for agent B and case (3) of Proposition 1 for agent A. This yields the following expected profit: $\pi^{AuthOne} = \frac{1}{2} + \frac{1}{2(1+\lambda^2)} - 2\bar{U}$

The threshold between cases (2) and (3), $\bar{L}^{NA}$, is given by the value of $L^A + L^B$ for which $\pi^{AuthBoth-Lim} = \pi^{AuthOne}$. This implies that: $\bar{L}^{NA} = 2\left(1 - \sqrt{\frac{1}{2}\left(1 - \frac{1}{1+\lambda^2}\right)}\right)$. ■