

The Design of Institutions

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Abstract

This paper considers the consequences of human morals and unofficial/corrupt activities on the design of public and private institutions. The provision of incentives and the regulation of unofficial activities are two major determinants of the design of institutions. The paper presents a phenomenon-driven model of an institution that simultaneously accounts for some of the complexity of its structure and some of the complexity of the behaviors of its members. Investigating the functioning of a hierarchical multi-layer institution where a principal delegates the monitoring of an agent to a supervisor, we notably show that the optimal contracts and policy to deal with unofficial activities depend on the supervisor's morals. The supervisor may be trustworthy or not. An untrustworthy supervisor harasses the agent or engages in corruption with her if it is advantageous for him to do so, whereas a trustworthy supervisor systematically avoids unofficial activities. We show how harassment discourages agents and may increase the cost of incentivizing them. The analysis determines when an institution optimally tolerates unofficial activities, the condition under which it offers a low-powered incentive contract to its agents, and who benefits from unofficial activities. In addition to these results, we prove that the poorer the supervision technology of an institution, the more harassment is tolerated.

Keywords: Institutions; Morals; Unofficial activities; Permissiveness.

JEL Classification: D02; H11; L20.

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1 Introduction

This paper considers the consequences of human morals and unofficial/corrupt activities on the design of public and private institutions. The provision of incentives and the regulation of unofficial activities are two central constituents of the design of institutions. We investigate how institutions are designed to manage their members by motivating them and coping with their unofficial activities. The principal-supervisor-agent paradigm has become an essential tool for the investigation of the agency consequences of the separation of ownership and management. Building on the seminal works of Antle (1984) and Tirole (1986), a large literature has studied optimal contracting in such a structure.¹ The models of this literature are, however, based on unconvincing behavioral and organizational assumptions. Indeed, in these models the supervisor is always untrustworthy and may only engage in a specific form of unofficial activity, namely corruption with the agent.

While the theoretical institution studied by a large economic literature is one with a supervisor with a single type of morals (untrustworthiness) who may only engage in a single form of unofficial activity (corruption), institutions in the “real world” are obviously more complex.

Experimental and empirical studies find that institutions are populated by both trustworthy and untrustworthy supervisors (e.g., Murphy 1993; Evans III et al. 2001). Contracts have then to depend on the supervisors’ morals.

Empirical investigations also show both that the reliance of institutions on supervisors to gather information about their agents opens the door to minor as well as serious forms of harassment and that institutions do not consistently adopt a preventive policy against this form of unofficial activity (e.g., Klitgaard 1988; Peirce et al. 1998; Campos and Pradhan 2007). Corruption is therefore not the only possible form of unofficial activity in institutions and prevention is not the exclusive policy

¹Non-exhaustive surveys of this literature can be found in Tirole (1992) and Cont (2004).

to cope with unofficial activities. While investigations worldwide find that more than a third of women and a significant part of men have been sexually harassed on their workplace, they also reveal that even the threat of such a severe form of harassment very seldom leads institutions to adopt effective preventive policies. The possibility of harassment is thus often tolerated in institutions. We develop a model of unofficial activities in institutions that investigates the optimal policy to cope with corruption and harassment and that, notably, provides an explanation for this empirical evidence.²

Finally, empirical investigations reveal that institutions offer much less often high-powered incentives to their agents than predicted by agency models (e.g., Baker et al. 1988; Brown 1990).

In addition to having empirical shortcomings, the current principal-supervisor-agent model of institutions has also important theoretical weaknesses. One such weakness is the harmfulness of corruption. This theoretical issue has been challenged by recent works. A growing body of work proves that corruption between a supervisor and an agent is often harmless for the principal or even beneficial (e.g., Vafai 2002; Cont 2004, and references in these papers). In the light of this result, the relevance of the literature on corruption in three-layer hierarchical institutions has been questioned.

How does a hierarchical institution with the above-mentioned empirical, behavioral, and theoretical characteristics work? This is the subject of our paper. We examine the consequences of human morals and unofficial activities on the design of institutions. The paper investigates the working of a hierarchical institution with the characteristics discussed above and determines, among other findings, when harassment should be tolerated, a high-powered incentive contract should be offered to an agent, and who benefits from unofficial activities. More generally, our model fits and explains the empirical evidence on institutions presented above.

²While various forms of undesired behavior inside institutions have been studied by economists - such as sabotage (Lazear 1989) and influence exertion (Milgrom and Roberts 1998) -, we consider undesired activities taking place in hierarchical agency institutions with hard information.

We study a multi-layer institution where a principal employs a supervisor to monitor and incentivize an agent. The supervisor's role is to produce a report with hard/verifiable information/evidence, about the level of effort exerted by the agent. The supervisor operates an inefficient monitoring technology that does not systematically reveal the agent's effort. The supervisor is thus either informed or not. Since the supervisor's information is hard, this information can only be hidden but not falsified. An informed supervisor may then hide information and provide the principal with an empty report. Information concealment will however not systematically occur. Indeed, if the supervisor is trustworthy, he will not hide information, while if he is untrustworthy, he will hide information whenever doing so is profitable. In the case where an untrustworthy supervisor gathers information that the agent has selected a low effort, and hence has been neglectful, he may engage in corruption and accept a bribe from the agent to hide this information. In the alternative case where an untrustworthy supervisor gathers information that the agent has been diligent, he may harass her by threatening to hide this information if she refuses to pay him a tribute.

We find that in the ideal/benchmark case where it is common knowledge that the supervisor is trustworthy with certainty, the agent is offered a high-powered incentive contract and receives no rent. In the alternative case where a hierarchical institution is vulnerable to corruption and harassment, the analysis shows that, unlike corruption, harassment can never be - either when tolerated or when deterred - costlessly coped with. This finding is in harmony with the empirical result that the possibility of harassment harms the competitiveness of institutions (e.g., Campos and Pradhan 2007).

The policy to deal with harassment depends on the supervisor's morals. The principal may optimally decide to tolerate harassment. The agent then knows that if she is diligent and her effort level is observed by an untrustworthy supervisor, she will have to pay him a tribute out of her

wage for a sincere report. Her wage will thus be reduced by the amount of this tribute. This will discourage her and the principal will have to pay a larger wage to incentivize her. To incentivize the agent when harassment is tolerated, the principal will thus have to make the agent's wage increase with the probability of the occurrence of harassment and the payment of a tribute, that is, with the probability of the supervisor being untrustworthy. There exists then an untrustworthiness threshold above which the tolerance of harassment becomes more costly than its prevention.

Concerning the incentive power of the agent's contract, the paper shows that when the principal optimally chooses to tolerate harassment, the agent is offered a high-powered incentive contract and receives no rent. The tolerance of harassment however benefits the supervisor who then captures an informational rent. As explained, above an untrustworthiness threshold, the principal optimally deters harassment. Unlike in the case where this form of unofficial activity is tolerated, the agent is offered a low-powered incentive contract and is the player who captures an informational rent. Both low-powered and high-powered incentive contracts thus generate informational rents. A low-powered incentive contract is a safeguard against information concealment in the case where it is sufficiently likely that the supervisor is untrustworthy. Dealing with harassment - that is, tolerating or preventing this form of unofficial activity - therefore reduces the efficiency of institutions.

The analysis also reveals that whereas the cost of preventing information concealment by a supervisor increases with the inefficiency of the monitoring technology, the expected cost of the institution is unaffected by the quality of this technology when harassment is instead tolerated. Another result of the model is that institutions with a relatively inefficient supervision technology more often decide not to use a preventive solution against harassment than those with a relatively efficient one.

Although institutions are populated by monitors with more than a single form of morals who may engage in more than a single form of unofficial activity, this complexity has been ignored by

the literature on institutions. There is, however, a small set of papers that investigates optimal contracting under the threat of corruption inside three-layer hierarchies with a supervisor that may be either trustworthy or untrustworthy (Tirole 1992, and references therein). While this literature drops the assumption of a supervisor with a single type of morals, it maintains the assumption that an institution is vulnerable only to corruption. Similarly, there are also few papers that study optimal contracting in multi-level institutions vulnerable to more than a single form of unofficial activity (Vafai 2002, 2010). In the models of these papers, the supervisor is untrustworthy and thus harassment is systematically prevented.³ These models, hence, cannot explain the above-mentioned empirical evidence.

It is important to observe that our goal is not to consider the impact of a population of supervisors with mixed morals on optimal contracting in an institution vulnerable exclusively to corruption. As just noted, there exists a small literature that investigates this issue. To our knowledge, this paper is the first to present a model of a hierarchical institution with simultaneously multiple types of supervisors' morals and multiple forms of unofficial activity.

The remainder of the paper is organized as follows. In Section 2 we present the model set-up. In Sections 3 and 4 we characterize the optimal incentive contracts respectively in the ideal/benchmark case where an institution is not vulnerable to unofficial activities and in the case where it is. The last section concludes. An appendix contains the proofs of the propositions.

2 The model

A hierarchical institution is composed of a principal (it), a supervisor (he) and an agent (she). The agent may either be neglectful, in which case her effort level is $e = 0$, or diligent by providing the effort level $e = 1$. Diligence results in a high output $x_1 > 0$ being produced while negligence results

³As shown in Vafai (2010), institutions may also be vulnerable to other forms of unofficial activity.

in the production of a low output $x_0 \equiv 0$. The agent's utility function writes $U^A(w, e) = w - \xi e$, where w and $\xi > 0$ are her wage and disutility of effort.

The principal depends on the supervisor to have access to hard/verifiable information/evidence about the agent's effort level. The supervisor's task is thus to provide a verifiable report on this effort level. The hard information gathered by the supervisor can be checked only by the person(s) to whom he reveals it. This information becomes public exclusively when the supervisor makes his report. The supervisor operates a supervision technology which is not completely efficient, and hence produces hard private evidence about the agent's effort level only with probability $p \in (0, 1)$. Denoting the supervisor's report by r , we thus have that this report can be 1, \emptyset or 0, where the neutral report $r = \emptyset$ indicates that supervision has not been conclusive. As the private information/evidence gathered by the manager is verifiable, the only way to manipulate it is to hide it. Formally, in the case where the supervisor has gathered information proving that $e = 0$, his report can be $r = 0$ or $r = \emptyset$. Similarly, in the case where the supervisor has gathered information proving that $e = 1$, his report can be $r = 1$ or $r = \emptyset$.

The inefficiency of the supervision technology thus exposes the institution to unofficial activities in the form of information concealment. In line with the empirical evidence presented in the introduction, we assume that only an untrustworthy supervisor may decide to engage in unofficial activities. An untrustworthy supervisor will engage in an unofficial activity if doing so brings him a higher utility than not doing so. The supervisor is trustworthy with probability $h \in [0, 1)$. For simplicity, and without loss of generality, we assume that the supervisor does not incur a cost of supervision. The supervisor's utility function writes $U^S(s) = s$, where s is his wage.

The agent's and the supervisor's reservation utilities are normalized to 0.

As only the supervisor's report is verifiable, contracts are contingent on this report. The agent's contract (w_0, w_\emptyset, w_1) specifies a low wage, w_0 , for a report that is unfavorable to her, a

medium wage, w_\emptyset , for a neutral report, and a high wage, w_1 , for a report that is favorable to her. Analogously, the supervisor's contract (s_0, s_\emptyset, s_1) specifies higher wages s_0 and s_1 for him when his report is not neutral. The supervisor and his subordinate are protected by limited liability, and hence the principal cannot make negative transfers to them.

Since the agent always receives $w_0 = 0$ when supervision reveals that she has been neglectful, a contract with $w_1 > w_\emptyset \geq 0$ will be referred to as a *high-powered incentive contract*, whereas a contract with $w_1 = w_\emptyset > 0$ will instead be referred to as a *low-powered incentive contract*.

The output x_1 is sufficiently large so that it is profitable to the principal to engage in production, and hence incentivize the agent to pick the effort level $e = 1$. The principal's concern is thus to design an optimal control system, that is, to design an institution that achieves the goals of incentivizing the agent to be diligent and coping with unofficial activities at the least expected cost.

The chronology of the agency relationship is the following: First, contracts (w_0, w_\emptyset, w_1) and (s_0, s_\emptyset, s_1) are offered by the principal respectively to the agent and the supervisor. Second, the agent picks her effort level and supervision occurs. Third, if supervision is conclusive and the supervisor is (i) trustworthy, he does not engage in unofficial activities/information concealment; (ii) untrustworthy, he decides whether or not to engage in unofficial activities/information concealment. Fourth, the supervisor makes a report on the agent's effort level. Fifth, transfers take place. Sixth, in the case the supervisor is untrustworthy and engages in an unofficial activity, the agent makes a side transfer to him.

3 An ideal institution

This section considers the ideal environment where the supervisor is trustworthy for certain, that is, where $h = 1$.

Limited liability requires that

$$w_0 \geq 0, w_\emptyset \geq 0, w_1 \geq 0, s_0 \geq 0, s_\emptyset \geq 0, s_1 \geq 0. \quad (1)$$

The contract offered to the agent must verify both her participation constraint, $pw_1 + (1 - p)w_\emptyset - \xi \geq 0$, and her incentive constraint, $pw_1 + (1 - p)w_\emptyset - \xi \geq pw_0 + (1 - p)w_\emptyset$.⁴ As the agent is protected by limited liability, her incentive constraint is more restrictive than her participation constraint, and hence this latter constraint will not be considered in what follows.

The agent's incentive constraint rewrites

$$w_1 - w_0 \geq \frac{\xi}{p}. \quad (2)$$

The supervisor operates a cost-free monitoring device, and thus any contract $(s_0, s_\emptyset, s_1) \in \mathbb{R}_+^3$ will guarantee the participation of the supervisor in the agency relationship.

Note that to ensure truth-telling by the supervisor, the principal has to offer him a contract with $s_0 \geq s_\emptyset$ and $s_1 \geq s_\emptyset$.⁵ These constraints will however be ignored. This is because the optimal contract offered to the supervisor in this ideal environment and in the ensuing environments verifies these constraints.

In a hierarchical institution with no unofficial activity the principal therefore solves the following program:

$$\begin{aligned} [P_0] \quad & \min \quad p(w_1 + s_1) + (1 - p)(w_\emptyset + s_\emptyset) \\ & w_0, w_\emptyset, w_1, s_0, s_\emptyset, s_1 \\ & \text{s.t. (1) and (2).} \end{aligned}$$

We then have:

⁴We make the standard assumption that the agent chooses to be diligent when indifferent.

⁵The supervisor makes a truthful report when indifferent.

PROPOSITION 1. *The design of an ideal institution safe from unofficial activities has these features: the agent is offered a high-powered incentive contract, $(w_0, w_\emptyset, w_1) = (0, 0, \frac{\xi}{p})$. The supervisor is offered an incentive contract with $s_0 \geq 0$, $s_\emptyset = s_1 = 0$. No rent is captured by employees. The expected cost of the institution, $C_0 \equiv \xi$, is unaffected by the quality of the supervision technology.*

In the ideal/benchmark case where it is common knowledge that the supervisor is trustworthy with certainty, the agent is offered a high-powered incentive contract and receives no rent. Indeed, in the absence of unofficial activities, the principal keeps both the supervisor and the agent at their reservation utility levels, and thus no informational rent has to be left to employees.

4 A vulnerable institution

The inefficiency of the supervision technology makes a three-level hierarchical institution vulnerable to two forms of unofficial activity, namely corruption and harassment. We are concerned with ex-post unofficial activities that may take place when the supervisor has gathered hard evidence about the agent's effort level.

When a supervisor decides to act unofficially, he divulges (without giving) the hard evidence gathered to the agent. Unofficial activities hence occur under symmetric information between the supervisor and the agent. However, only an untrustworthy supervisor may decide to engage in unofficial activities. We have noted previously that an untrustworthy supervisor will engage in an unofficial activity if doing so brings him a higher utility than not doing so. The supervisor is assumed to be trustworthy with probability $h \in [0, 1]$. The case where $h = 1$ was considered in the previous section.

In the case where the hard evidence gathered through supervision divulges that the agent's effort level is $e = 0$, an untrustworthy supervisor may engage in corruption and accept a bribe

from the agent to report $r = \emptyset$ instead of $r = 0$. If corruption occurs, the agent therefore receives a wage w_\emptyset and pays a bribe to the supervisor according to their agreement. In the alternative case where the hard evidence gathered through supervision divulges that $e = 1$, an untrustworthy supervisor may harass the agent by threatening her with reporting $r = \emptyset$ instead of $r = 1$ if she refuses to comply and to pay the demanded tribute. The informed untrustworthy supervisor therefore produces a report $r = \emptyset$ if the agent does not accept to comply. If alternately the agent accepts to comply, the informed untrustworthy supervisor makes a report $r = 1$, the principal then transfers w_1 to the agent and the agent pays the agreed tribute to the supervisor.

Regarding unofficial activities, we make the subsequent usual assumptions: 1. an untrustworthy supervisor has all the bargaining power when acting corruptly or harassing the agent. 2. only an untrustworthy supervisor and the agent observe unofficial activities. 3. because unofficial activities are costly to organize, they generate transaction costs. Formally, z currency units unofficially paid by his subordinate to an untrustworthy supervisor only worth mz to him, where $m \in (0, 1)$. The transaction costs connected to unofficial activities are thus $1 - m$. The case $m = 0$ where unofficial activities are prohibitively costly to organize and there is therefore no room for these activities has been presented in the previous section.

4.1 Threat of corruption among employees

When an untrustworthy supervisor gathers hard information proving that the agent has selected $e = 0$, and hence has been neglectful, he may act corruptly and accept a bribe, b , from her to hide this information from the principal and report $r = \emptyset$. In this case the agent's utility is $w_\emptyset - b$. In the alternative case where corruption does not take place and the untrustworthy supervisor reports $r = 0$, the agent's utility is w_0 . Offering a bribe for corruption is then the agent's best choice as long as $w_\emptyset - b \geq w_0$, that is, $b \leq w_\emptyset - w_0$. The maximum bribe, b^{\max} , the

agent is thus ready to offer for information concealment is $b^{\max} \equiv w_\emptyset - w_0$. This amount is the stake of corruption. As noted above, an untrustworthy supervisor has all the bargaining power when engaging in unofficial activities, and hence may take b^{\max} from the agent. We have made the standard assumption that an untrustworthy supervisor refrains from engaging in unofficial activities when indifferent. To prevent corruption, the principal must then design the optimal contracts such that an untrustworthy supervisor's utility from not engaging in corruption, s_0 , exceeds his utility from doing so, $s_\emptyset + mb^{\max}$, that is, such that

$$s_0 \geq s_\emptyset + m(w_\emptyset - w_0). \quad (3)$$

This constraint is the no-corruption constraint.

The principal may also decide to tolerate corruption. An institution's optimal policy regarding corruption will then depend on the expected costs associated with the preventive and the permissive policies. However, we do not need to consider the permissive policy since, as explained below, corruption can be costlessly deterred.

4.2 Threat of harassment by an untrustworthy supervisor

In the case where an untrustworthy supervisor gathers hard information showing that the agent has selected $e = 1$, and hence has been diligent, he may harass her by threatening to report $r = \emptyset$ in case of noncompliance. Thus, if the agent accepts to comply and to pay the demanded tribute, t , her utility is $w_1 - t - \xi$. Otherwise, her utility is $w_\emptyset - \xi$. Complying is the agent's best choice whenever $w_1 - t - \xi \geq w_\emptyset - \xi$, that is, whenever $t \leq w_1 - w_\emptyset$. As in the case of corruption, an untrustworthy supervisor has all the bargaining power, and hence can take the maximum amount of $t^{\max} \equiv w_1 - w_\emptyset$ from the agent. This amount is the stake of harassment. The supervisor's utilities associated respectively with harassing or not the agent are then $s_1 + mt^{\max}$ and s_1 . Harassment is thus profitable for an untrustworthy supervisor when $t^{\max} > 0$, that is, when he has a stake in

it. Recalling that we will show that corruption can be costlessly prevented, and therefore when the agent picks $e = 0$ the informed supervisor reports truthfully, the right-hand side of the agent's incentive constraint writes $pw_0 + (1 - p)w_\emptyset$.

The possibility of harassment modifies the agent's incentive constraint which becomes

$p[hw_1 + (1 - h)(w_1 - t^{\max})] + (1 - p)w_\emptyset - \xi \geq pw_0 + (1 - p)w_\emptyset$, that is, after substituting t^{\max} for $w_1 - w_\emptyset$,

$$hw_1 + (1 - h)w_\emptyset - w_0 \geq \frac{\xi}{p}. \quad (4)$$

Note that in the two polar cases where it is common knowledge that the supervisor is trustworthy with certainty, that is, when $h = 1$, and where it is common knowledge that the supervisor is untrustworthy with certainty, that is, when $h = 0$, this constraint respectively writes $w_1 - w_0 \geq \frac{\xi}{p}$ and $w_\emptyset - w_0 \geq \frac{\xi}{p}$.

Given that the supervisor engages in harassment whenever $t^{\max} > 0$, this form of unofficial activity imposes the following additional constraint on a hierarchical institution,

$$w_1 - w_\emptyset \geq 0. \quad (5)$$

The principal has thus the choice between tolerating and preventing harassment. Tolerating harassment requires that the principal fixes w_1 and w_\emptyset so as to preserve the stake of this form of unofficial activity, that is formally, so as $t^{\max} \equiv w_1 - w_\emptyset > 0$. It is important to observe that choosing the tolerance option does not imply that harassment will certainly occur. As just stressed, it means that the principal does not destroy its stake, and hence harassment may take place only if the supervisor is untrustworthy and supervision reveals that the agent has been diligent. Preventing harassment, on the other hand, requires that the principal fixes w_1 and w_\emptyset so as to eliminate the stake of this form of unofficial activity, that is formally, so as $t^{\max} \equiv w_1 - w_\emptyset = 0$.

4.3 The working of a hierarchical institution

This subsection characterizes the optimal policy to incentivize the agent and cope with unofficial activities in a hierarchical institution which program is

$$\begin{aligned}
 [P_1] \quad & \min_{w_0, w_\emptyset, w_1, s_0, s_\emptyset, s_1} p(w_1 + s_1) + (1 - p)(w_\emptyset + s_\emptyset) \\
 & \text{s.t. (1), (3), (4) and (5).}
 \end{aligned}$$

We have:

PROPOSITION 2. *The design of an institution vulnerable to unofficial activities has these features:*

1. *The agent is offered a low-powered incentive contract, $(w_0, w_\emptyset, w_1) = (0, \frac{\xi}{p}, \frac{\xi}{p})$ when $h \in [0, p]$. The supervisor is offered an incentive contract with $s_0 \geq \frac{m\xi}{p}$, $s_\emptyset = s_1 = 0$. Harassment is prevented. The expected cost of the institution, $C_1 \equiv \frac{\xi}{p}$, increases with the inefficiency of the supervision technology.*
2. *The agent is offered a high-powered incentive contract, $(w_0, w_\emptyset, w_1) = (0, 0, \frac{\xi}{ph})$ when $h \in (p, 1)$. The agent's incentive contract becomes more high-powered as h decreases. The supervisor is offered an incentive contract with $s_0 \geq 0$, $s_\emptyset = s_1 = 0$. Harassment is tolerated. The expected cost of the institution, $C_2 \equiv \frac{\xi}{h}$, is unaffected by the inefficiency of the supervision technology but increases with the likelihood of the supervisor being untrustworthy.*
3. *Corruption is harmless.*
4. *Harassment, whether deterred or tolerated, is harmful.*
5. *The incentive power of the agent's contract depends on the supervisor's morals.*

6. *Harassment discourages the agent to be diligent.*

7. *The prevention of harassment, paradoxically, benefits the agent (its potential victim) and the tolerance of harassment benefits the supervisor (its instigator).*

8. *The poorer the supervision technology, the more harassment is tolerated.*

Unofficial activities and the performance of institutions

It may easily be seen that corruption can be costlessly prevented. Indeed, since s_0 does not enter the objective function, the principal can always set s_0 so as to verify the no-corruption constraint without affecting the expected cost of the hierarchical institution. As discussed in Vafaï (2002) and Cont (2004), a growing body of literature shows that supervisor/agent corruption is harmless in most environments. A slight modification of Tirole's (1986, 1992) standard models may make corruption harmless or even beneficial. In the light of these results the relevance of the literature on corruption has been questioned. In line with the empirical finding that the possibility of harassment harms the competitiveness of institutions (e.g., Campos and Pradhan 2007), we show that while corruption may be harmless, harassment, whether deterred or tolerated, reduces the efficiency of an institution. Indeed, as will be further discussed below, compared with the case where $h = 1$, when $h \in [0, 1)$, deterring harassment increases the expected cost of an institution from $C_0 \equiv \xi$ to $C_1 \equiv \frac{\xi}{p}$, and tolerating this form of unofficial activity increases this cost from $C_0 \equiv \xi$ to $C_2 \equiv \frac{\xi}{h}$.

Tolerating or preventing unofficial activities

As observed, the principal has two options to cope with the possibility of harassment. The preventive option requires to offer the agent the same wage whether supervision reveals hard working or is inconclusive. This option thus consists in setting $w_1 = w_0 > 0$ and eliminating the stake of harassment. The agent is then offered a low-powered incentive contract. This form

of contract is a safeguard against the occurrence of harassment. The prevention of harassment raises the expected cost of an institution to $C_1 \equiv \frac{\xi}{p}$, and hence harms its functioning. The permissive option, instead, consists in preserving the stake of this form of unofficial activity by setting $w_1 > w_0 \geq 0$. The agent is then offered a high-powered incentive contract. The tolerance of harassment raises the expected cost of an institution to $C_2 \equiv \frac{\xi}{h}$, and therefore also harms its working.

Human morals and the form and incentive power of contracts

The principal's choice between preventing and tolerating harassment - and hence the incentive power of the agent's contract - depends on the supervisor's morals. When the principal opts for a permissive policy, the agent anticipates that if she is diligent an untrustworthy supervisor will ask her a tribute to reveal her effort level. Her wage will then be reduced by the amount of the tribute paid to the supervisor. The possibility of an untrustworthy supervisor harassing her will thus discourage the agent to be diligent and the principal will have to pay her a higher wage to incentivize her. Tolerating harassment will make the agent's wage increase with the probability of the supervisor being untrustworthy. Above an untrustworthiness threshold it then becomes optimal to switch to a preventive policy.

Formally, in the special subcase of case 1 of Proposition 2 where the supervisor is untrustworthy with certainty, and thus $h = 0$, it is in the principal's interest to prevent harassment. This is because the agent has then less incentive to choose $e = 1$ than in the absence of harassment. Indeed, as established above, when a hierarchical institution is with certainty vulnerable to harassment, the agent's incentive constraint is $w_0 - w_0 \geq \frac{\xi}{p}$ and not anymore $w_1 - w_0 \geq \frac{\xi}{p}$. Hence, given that optimally $w_0 = 0$, to be incentivized to choose $e = 1$ the agent must receive $w_0 = \frac{\xi}{p}$ in place of $w_1 = \frac{\xi}{p}$. Since the expected cost of a hierarchical institution is increasing in w_1 , it is then in the principal's interest to deter harassment by setting $w_1 = w_0 = \frac{\xi}{p}$ than to tolerate it by setting

$w_1 > w_0$.

While deterrence is the principal's optimal option when the supervisor is untrustworthy with certainty, the tolerance option becomes sometimes optimal when instead $h \in (0, 1)$. In this case, the principal's optimal choice between preventing and tolerating harassment trades off, respectively, a contract that specifies a higher wage $w_0 (= \frac{\xi}{p})$ and a lower wage $w_1 (= \frac{\xi}{ph})$ against a contract that specifies a lower wage $w_0 (= 0)$ and a higher wage $w_1 (= \frac{\xi}{ph})$. The principal's optimal choice between prevention and tolerance then depends on the morals of the supervisor. Below a trustworthiness threshold, that is, if $h \in [0, p]$, it is likely that harassment occurs, and hence the principal optimally chooses to deter it, whereas above that threshold tolerating harassment becomes optimal. As noted above, tolerating harassment does not imply that this form of unofficial activity will surely take place. When adopting the tolerance option the principal decides not to destroy the stake of harassment, and therefore this form of unofficial activity remains possible in the specific case where the supervisor is untrustworthy.

To whom are unofficial activities profitable?

Following our explanations, when harassment is optimally prevented, only the agent receives a rent. This rent is $p[hw_1 + (1-h)w_0] + (1-p)w_0 - \xi$, that is after substituting w_1 and w_0 for $\frac{\xi}{p}$, $\frac{(1-p)\xi}{p}$. The prevention of harassment therefore paradoxically benefits the agent who is *a priori* the potential victim of this form of unofficial activity. Since the expected cost of an institution where harassment is prevented is $C_1 \equiv \frac{\xi}{p}$, when $h \in [0, p]$, this cost increases with the inefficiency of the supervision technology. This is because deterring harassment has a higher cost in a hierarchical institution with a poorer supervision technology. Indeed, the more inefficient the supervision technology (i.e., p small) - due to geographically distant locations or high complexity of the supervised activity - the more costly it is to induce the agent to pick $e = 1$ (w_1 decreases with p), and thus, given that to deter harassment the principal must set $w_0 = w_1$, the more costly

it is to prevent information concealment. Expressed differently, because crucial information may be hidden, the poorer the supervision technology, the higher the expected cost of an institution.

When instead the principal optimally tolerates harassment, only an untrustworthy supervisor - the instigator of this form of unofficial activity - captures a rent. An untrustworthy supervisor then extracts a rent pmt^{\max} or, equivalently, $pm(\frac{\xi}{ph})$, that is, $\frac{m\xi}{h}$, from the agent, and hence from the principal. Both low-powered and high-powered incentive contracts generate informational rents. Unlike in the case where harassment is optimally prevented, when this form of unofficial activity is tolerated, the expected cost of an institution is unaffected by the inefficiency of the supervision technology. This cost, however, increases with the likelihood of the supervisor being untrustworthy. As explained above, this is because the more it is likely that the supervisor is untrustworthy (i.e., h small), the more it is costly to incentivize the agent to pick $e = 1$. Indeed, the agent then knows that if she is diligent and supervision is conclusive, the supervisor will harass her and ask a tribute to make an unbiased report. In this case, a portion of the agent's wage w_1 will be extracted by the supervisor. When choosing to optimally tolerate harassment the principal takes into account this possible unofficial transfer between the agent and an untrustworthy supervisor, and thus sets the agent's wage w_1 such that it increases with the likelihood of the supervisor's untrustworthiness. The agent's incentive contract then becomes more high-powered as h decreases.

Supervision and tolerance of harassment

As straightforward to see, the range of parameter h values for which it becomes optimal to prevent harassment becomes larger as p increases. In other words:

COROLLARY. Institutions with a relatively efficient supervision technology less often tolerate harassment than those with a relatively inefficient supervision technology.

Or, equivalently, the poorer the supervision technology, the more harassment is tolerated. This

is because the above-mentioned trade-off is influenced by the quality of the supervision technology. Indeed, the more the supervision technology is efficient, that is, p is large, the less it is likely that the supervisor does not obtain hard information about the agent's effort level, and hence the less it is likely that the principal has to pay the wage $w_0 = \frac{\xi}{p}$ to the agent when preventing harassment. Recalling the trade-off exposed above, we have that since the likelihood of having to pay the wage $w_0 = \frac{\xi}{p}$ to the agent decreases with the quality of the supervision technology, the preventive option becomes less disadvantageous. Combined to the fact that the wage w_1 paid to the agent is lower under prevention of harassment than under tolerance, we then have that the more the supervision technology is efficient, the more the preventive solution is appealing.

5 Conclusion

Designing institutions is a multifaceted process. Although institutions are populated by supervisors with various morals who may engage in various forms of unofficial activity, this complexity has been ignored by the literature on institutions. We have investigated a model of an institution that accounts for this complexity and notably have explained how harassment may discourage agents and increase the cost of incentivizing them, when it becomes optimal not to adopt a preventive policy against harassment, and when a low-powered incentive contract is offered to members. We have determined the identity of the member of the institution to whom unofficial activities are profitable. The analysis has also revealed that dealing (preventing or tolerating) with harassment always reduces the efficiency of a hierarchical institution and that institutions more often decide to deter harassment as the quality of their supervision technology increases.

Appendix

Proof of Proposition 1

Given that w_0 does not enter into the expected cost of the institution and lowering this wage does not harden constraints (more specifically, it relaxes the agent's incentive constraint), it is optimal to fix $w_0 = 0$. The expected cost of the institution is increasing in w_0 , s_1 and s_0 , and from the same argument as above, $w_0 = s_1 = s_0 = 0$. The wage w_1 is then fixed as low as allowed by the agent's incentive constraint, that is, $w_1 = \frac{\xi}{p}$ (since optimally $w_0 = 0$). The wage s_0 does not enter the objective function, and hence any $s_0 \geq 0$ is optimal. The expected cost of an institution unexposed to unofficial activities is then $C_0 \equiv \xi$.

Proof of Proposition 2

It is straightforward to see that the objective function of program $[P_1]$ is increasing in s_1 , s_0 , and that diminishing these wages does not harden constraints. We thus optimally have $s_1 = s_0 = 0$. It may also be easily verified that $w_0 = 0$. The agent's incentive constraint in program $[P_1]$ may be rewritten as $w_1 \geq \frac{\xi - p(1-h)w_0}{ph}$. We then have the three following constraints on w_1 : $w_1 \geq \frac{\xi - p(1-h)w_0}{ph}$, $w_1 \geq w_0$ and $w_1 \geq 0$. However, constraints $w_1 \geq w_0$ and $w_0 \geq 0$ makes the limited liability constraint $w_1 \geq 0$ redundant. It then remains to find the relevant constraint between the agent's incentive constraint and constraint $w_1 \geq w_0$. The agent's incentive constraint is more restrictive when $\frac{\xi - p(1-h)w_0}{ph} \geq w_0$, that is, when $w_0 \leq \frac{\xi}{p}$ and the converse is true when $w_0 \geq \frac{\xi}{p}$. We thus have to consider two cases.

$$(1) w_0 \in \left[0, \frac{\xi}{p}\right]$$

Given that the objective function is increasing in w_1 and that the more restrictive constraint on w_1 is in this case the agent's incentive constraint, this constraint binds, that is, $w_1 = \frac{\xi - p(1-h)w_0}{ph}$. Leaving aside constraint (3), since s_0 does not enter the objective function, substituting $w_1 =$

$\frac{\xi - p(1-h)w_\emptyset}{ph}$ into the objective function of program $[P_1]$ and expressing this function with respect to w_\emptyset , this program becomes:

$$\begin{aligned} \min \quad & \frac{\xi}{h} + \frac{h-p}{h}w_\emptyset \\ & w_\emptyset \\ \text{s.t.} \quad & w_\emptyset \in \left[0, \frac{\xi}{p}\right]. \end{aligned}$$

If $h - p > 0$, that is, if $h \in (p, 1)$, the objective function is increasing in w_\emptyset , and we optimally have $w_\emptyset = 0$, and hence $w_1 = \frac{\xi}{ph}$. Harassment is then optimally tolerated. We also optimally have $s_0 \geq 0$. The expected cost of the institution is $C_2 \equiv \frac{\xi}{h}$. If instead $h - p \leq 0$, that is, if $h \in [0, p]$, the objective function is decreasing in w_\emptyset and this wage should be set as high as allowed by constraint $w_\emptyset \in \left[0, \frac{\xi}{p}\right]$, that is, $w_\emptyset = \frac{\xi}{p}$, and hence $w_1 = \frac{\xi}{p}$. Harassment is then optimally deterred. We also optimally have $s_0 \geq \frac{m\xi}{p}$. The expected cost of the institution is $C_1 \equiv \frac{\xi}{p}$.

$$(2) \quad w_\emptyset \geq \frac{\xi}{p}$$

Given that diminishing w_1 reduces the expected cost of the institution without hardening constraints and that the more restrictive constraint on w_1 is in this case $w_1 \geq w_\emptyset$, this constraint binds, that is, $w_1 = w_\emptyset$. Again leaving aside constraint (3), since s_0 does not enter the objective function, substituting $w_1 = w_\emptyset$ into the objective function of program $[P_1]$ and expressing this function with respect to w_\emptyset , this program becomes:

$$\begin{aligned} \min \quad & w_\emptyset \\ & w_\emptyset \\ \text{s.t.} \quad & w_\emptyset \geq \frac{\xi}{p}. \end{aligned}$$

The objective function of this program is increasing in w_\emptyset . We then optimally have $w_\emptyset = \frac{\xi}{p}$, and hence $w_1 = \frac{\xi}{p}$. As above, harassment is then optimally prevented, $s_0 \geq \frac{m\xi}{p}$ and the expected cost of the institution is C_1 .

Cases (1) and (2) differ in that when $h \in (p, 1)$ the principal sets $w_\emptyset = 0$ in case (1) and $w_\emptyset = \frac{\xi}{p}$ in case (2). Given that for $h \in (p, 1)$, $C_2 < C_1$, it is optimal to set $w_\emptyset = 0$.

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