***Contemporary Issues and Ideas in Social Sciences***
***August 2008***

# Delegating Authority to a Dishonest Agent

Priyodorshi Banerjee

Planning Unit, Indian Statistical Institute
banpriyo@gmail.com

Abstract

A citizen and a bureaucrat implement a project jointly, with the bureaucrat holding executive authority. The citizen's investment yields information, which raises output, and also has supervision benefits. We show that a higher degree of dishonesty increases the citizen's incentive to invest, which in turn enhances the bureaucrat's investment incentive. The gain from joint investment can more than offset the loss from dishonesty, and so the citizen may prefer a corrupt bureaucrat to an honest one. When the citizen also decides task assignment, he may choose to introduce a conflict of interest by ceding authority to a dishonest bureaucrat.

Keywords: Conflicts of interest, delegation, authority, participatory governance
JEL Classification codes: D23, D73, L33

---

A previous version of this paper has circulated under the title 'Corruption and the Delegation of Authority'. I thank Sumon Ghosh as well as Kadir Dogan, Serdar Sayan and other participants at the $6^{th}$ CSSM meeting, Montecatini Terme, 2005 for helpful comments. All errors are mine alone.

# 1 Introduction

To what extent should a citizenry be directly involved in its own governance? Numerous movements promoting participatory governance have emerged in recent times. Various states, multilateral bodies, non-governmental organisations and citizen groups have argued that inadequate citizen involvement is inimical to good governance and facilitates dishonesty and corruption, and have suggested that direct citizen engagement can have ameliorative effects through enhanced supervision, and catalyse better policy selection and implementation.[1] While the argument that the citizen should be involved in governance seems reasonable, the critical issue is the extent of involvement. Should the citizenry be empowered, and so possess executive or discretionary authority, or should its role be more of an advisory or supervisory nature? Does corruption in administration necessitate the transfer of authority to the citizenry, or can the citizenry actually benefit from the presence of dishonesty?[2]

We consider these questions in a joint production model with a citizen and a bureaucrat with imperfect alignment of interest between them. Both benefit from successful completion of a project, with the project cost borne by the citizen. Each party performs a privately costly task; the bureaucrat's effort increases expected project output, while the citizen's investment generates information on a state variable, which is correlated with project cost. When the bureaucrat possesses executive authority, she is also responsible for project cost reporting, and has discretion over the project execution technique. There is some commonality of interests between the parties, as they have aligned preferences over the choice of technique, with the optimal technique depending on the realisation of the state variable. A conflict of interest may also exist, however, if the bureaucrat can misreport cost for personal benefit, given she has executive authority.

We show in this model that the citizen may prefer a less honest bureaucrat. Specifically, if $\gamma$ is the probability that the bureaucrat has an opportunity to misreport cost for private benefit (i.e., the bureaucrat is dishonest), a higher $\gamma$ may raise the citizen's payoff.

The intuition is as follows. When joint production is characterised by positive externalities, an underinvestment problem can emerge. The citizen may then like to commit to investing if, by doing so, he can induce the bureaucrat to invest as well. Now, increased corruption exposes the citizen to a greater loss from cost misreporting, which raises his

[1] A significant literature exists on the benefits of citizen empowerment and participatory governance; see, for example, Reich (1990), Schneider (1999) and Organisation for Economic Cooperation and Development (2001). The centrality of empowerment and participation in governance in the development agenda has also been stressed recently; see, for example, United Nations (2000) and African Union (2003).

[2] We use the words 'dishonest', 'corrupt' and 'corruptible' interchangeably.

incentive to supervise. While direct information on the true cost realisation is unavailable to him, he is still able to supervise by acquiring information on the state variable through private investment, since it is correlated with the project cost. Information on the state variable improves the chosen technique, and so is beneficial. Thus, a lower degree of honesty raises the marginal benefit from investment to the citizen. With positive externalitites, the increased investment incentive of the citizen can induce the bureaucrat to invest as well. Hence, the net effect of a rise in corruption on the citizen's payoff depends on the trade-off between the loss from misreporting, and the gain from joint investment. We show in Section 4 that the latter effect can dominate. The framework may be useful in understanding aspects of delegated and participatory governance in environments where citizens make substantial resource investments, while executive authority lies in large part with public officials, such as the interaction between a citizenry and its government, or the residents of a town and a highway authority building a road in it, etc.

The beneficial impact of dishonesty raises the possibility that the citizen may choose to cede discretionary authority to the bureaucrat, even when the players have symmetric ability with respect to executive task performance. In such situations, the holder of control rights (the citizen) has to decide on task assignment. Although the citizen has the choice of retaining executive authority, thereby preventing corruption from emerging, we show that he may choose to delegate executive authority to the bureaucrat.[3]

Such incentive delegation may be beneficial because a reassignment of tasks changes both players' investment behaviour. This is because the citizen's incentive to invest when the bureaucrat has executive authority is higher than when he himself is empowered. Delegation in the presence of dishonesty therefore forces the citizen to invest in generating project information which limits the bureaucrat's opportunity to act dishonestly and in turn induces private investment by the latter. However, this commitment role of incentive delegation is credible only if the likelihood that the bureaucrat is honest is sufficiently low.

The theory offered in this paper therefore argues that delegation arises when the conflict of interest (and hence the need for supervision) it engenders is sufficiently severe. In our framework, if the citizen delegates, his investment generates information which serves two direct purposes. It aids in the choice of project execution technique, and also performs a supervisory role as high cost reports may be incompatible with acquired information.[4] For the presence of dishonesty to induce delegation, therefore, it is critical that cost realisations

[3]In our framework, dishonesty is possible only if the bureaucrat possesses executive authority, and has an opportunity to misreport. Thus dishonesty can be present only if the citizen chooses to delegate.

[4]Supervision of the bureaucrat is indirect in our environment, and inseparably linked to project supervision. This view differs from the way monitoring is typically modelled in the literature (see, for example, Khalil (1997)), where it can directly yield evidence of opportunistic behaviour.

be correlated with information that can be collected by the citizen.[5]

Aghion, Dewatripont and Rey (2004) also ask if transferring control can induce cooperation. They show that a principal may choose to delegate control ex ante to an agent, before deciding whether to implement or stop a project, in order to learn her type through observation of her action. There is no learning in our environment. The presence of joint investment and the unwillingness of the citizen to stop the project ex post further distinguish our structure from theirs.

In a different environment, Strausz (1997) finds that a principal may benefit from delegating supervision of an agent. In his model, creating an intermediate layer in the hierarchy allows the principal ex ante commitment power and also helps resolve a bilateral moral hazard problem. Delegation is beneficial because third-party contracting helps mitigate a conflict of interest between the principal and the agent. By contrast, in our paper, incentive delegation is useful because it creates a conflict of interest.

Other papers have studied in very different settings whether corruption or conflicts of interest between a principal and a subordinate may be beneficial to the principal.[6] In Acemoglu (1998), competition between financial intermediaries can create high-powered incentives for an owner, and hence an adverse selection problem. Delegating to a manager with conflicting objectives may then benefit the owner by mitigating adverse selection. Olsen and Torsvik (1998) study a three-tier hierarchy where a principal's inability to commit to long-term contracts leads to the ratchet problem. Collusion between the supervisor and the agent limits the principal's ability to extract rents ex post which, by mitigating the information revelation problem, can benefit the principal.[7]

In Aghion and Tirole (1997), the principal and the subordinate have divergent interests ex post, and their efforts are strategic substitutes.[8] Ex ante delegation leads to loss of

[5]As an example, suppose a community wishes to design and implement reforms to improve its school system. The optimal policy is either a modest one, involving relatively incremental reform, or a radical one, requiring relatively significant changes. If education authorities suggest that improvement will not need substantial infusion of resources, the community will likely conclude that relatively incremental reforms will suffice, as such reforms are likely to require less resources. See Section 4 for further discussion.

[6]By studying the impact of corruption in contexts with partial conflict, the current article also conributes to the wider existing literature which points out the need to understand why corruption exists, why it is often tolerated, how it can be controlled, and what role it plays in different institutional settings. For a partially representative sample, see Shleifer and Vishny (1993), Bliss and Di Tella (1997), Prendergast (1999) and Polinsky and Shavell (2001).

[7]See also Lambert-Mogiliansky (1998) for a similar analysis.

[8]Unlike in our framework, the conflict of interest arises in Aghion and Tirole (1997) because each party may prefer to have 'real authority' (i.e., ex post control), conditional on effort levels and information. By contrast, parties have ex post common interest in our structure. This feature also distinguishes our work from Dessein (2002) and Dur and Swank (2005) who, in addition, do not consider bilateral moral hazard problems.

control for the principal, reducing his effort, but can still emerge if the resulting increase in the subordinate's effort is sufficiently valuable.[9] By contrast, the principal (citizen) and the subordinate (bureaucrat) are symmetric with respect to task performance in our model. Delegation may be valuable because task reassignment can induce greater effort from both. Our structure may therefore be useful in understanding delegation in various team, partnership, outsourcing and joint venture settings where holders of formal control rights remain substantively engaged even after ceding some executive authority.[10] A point similar to Aghion and Tirole (1997) is made in an owner-manager game by Burkart, Gromb and Panunzi (1997) who show that monitoring by the owner, combined with failure to guarantee the manager 'effective control', can dampen managerial initiative.[11] The owner can then benefit by dispersing the ownership base through outside equity, which reduces monitoring and enhances initiative.

In our environment, incentive delegation, while it may benefit the principal by resolving an underinvestment problem, results in the principal foregoing cost information. Others have shown that poorer information can benefit a principal. In a two-period problem, Crémer (1995) shows that poorer information may render certain harsh punishments immune to renegotiation; the principal can thus benefit by giving up information because it allows him to credibly commit to such punishments.[12] We stress a different aspect of arm's length relationships in this paper, and suggest that giving up one kind of information may induce the principal to collect more of another. Seen as a theory of outsourcing, this article emphasises a distinction between delegation and disengagement, and argues that the two need not occur together.

The paper is organised as follows. Section 2 presents the basic model, and Section 3 studies equilibrium. In Section 4, we analyse the impact of an increase in the degree of dishonesty on the citizen's payoff. Section 5 studies whether the citizen would prefer to retain or cede executive authority. Sections 4 and 5 also discuss the main assumptions of the model. Section 6 concludes, while an Appendix contains proofs.

---

[9] See also Aghion, Dewatripont and Rey (2002) for a model where giving up some control rights enhances the incentives for future cooperation on the part of both the donor and the receiver in a reputation-building environment.

[10] Although our arguments are developed in the context of community governance, similar issues can arise in other organisational settings such as firms (should a senior manager delegate executive authority over a project to a subordinate?), universities (how much executive control over decisions should faculty members have?), etc., and so our analysis may be useful in understanding such questions as well.

[11] Khwaja (2004), in a related analysis, also offers some empirical evidence in support of the proposition that communities may be better off from delegating authority.

[12] Riordan (1990) and Schmidt (1996) present similar analyses.

## 2 The model

There are two players, a Citizen ($\mathcal{C}$) and a Bureaucrat ($\mathcal{B}$), who have to jointly implement a project. It is always better for them to initiate and proceed with the project than to cease operations. The citizen performs task $C$, and the bureaucrat performs task $B$, both detailed below. In addition, $\mathcal{B}$ performs the *executive* task: she controls budgeting, i.e., she observes and reports project cost, and also has discretionary authority over the project execution or implementation technique.[13]

The players' direct payoffs from the project are assumed to be equal to the output.[14] The output, realised at the end of date 5, can be either 0 (failure), or $e > 0$ (success). The probability of success depends on two things. Firstly, it depends on how much effort the bureaucrat puts into task $B$. We assume $\mathcal{B}$ has to choose private effort, or investment, at date 1. She could choose low effort at private cost 0, or high effort at private cost $k_B > 0$. Secondly, the probability depends on the choice of project implementation technique, which has to be made by $\mathcal{B}$ at the beginning of date 5. The choice of technique is important as which technique is appropriate depends on the realisation of a state variable $\Theta$.

$\Theta$ is realised at the beginning of date 2. It is commonly known that the realisation, denoted by $\theta$, can take the values $\theta_0 = 0$, or $\theta_1 = 1$, with probabilities $\alpha$ and $1 - \alpha$ respectively, with $\alpha \in (0, 1)$. We can now define the probability of success.

If $\mathcal{B}$ takes high effort at date 1, the probability of success is $\lambda_H[1 - E(\tau - \theta)^2]$, where $\tau \in [0, 1]$ is the chosen execution technique, and where the expectation is taken over information available with $\mathcal{B}$ at the beginning of date 5. It is clear that $\mathcal{B}$ chooses $\tau = E\theta$. If she takes low effort at date 1, the probability of success is $\lambda_L[1 - E(\tau - \theta)^2]$.[15] We assume $0 < \lambda_L < \lambda_H < 1$.

Since the optimal technique depends on the realisation $\theta$, information on the true realisation of $\Theta$ is useful. The availability of such information depends on how much effort the citizen puts into task $C$. We assume $\mathcal{C}$ has to choose private effort, or investment, at date 1. He could choose high effort at private cost $k_C > 0$, or low effort at private cost 0. At the end of date 2, conditional on having taken high effort at date 1, $\mathcal{C}$ observes the

[13] We assume for now that the executive task is pre-assigned to $\mathcal{B}$, and also that it is composite, so the budgeting and execution components cannot be separated. These assumptions are examined in Section 5.

[14] This could be the case if the output is a public good. Our qualitative results are not affected if the two players value the output differently.

[15] We can write $E(\tau - \theta)^2 = L$. The two players thus have common interest ex post in the sense that they both wish to have $\tau$ chosen to minimise $L$, and that they both wish to see the project succeed. Implicitly, we are assuming therefore that the citizen has screened bureaucrats and chosen one with whom there are no ex post conflicts of interest. The assumption of ex post commonality of interest helps focus attention on the interim conflict of interest.

realisation of $\Theta$ with probability $\sigma \in (0, 1)$ and observes no signal with probability $1 - \sigma$. Otherwise, if $\mathcal{C}$ takes low effort at date 1, he obtains no signal.[16] We assume that the signal received by $\mathcal{C}$ is also observed by $\mathcal{B}$.[17]

Each player thus generates a positive externality for the other. $\mathcal{B}$'s private effort increases the likelihood of success directly, while $\mathcal{C}$'s private effort can produce information which aids in choosing the optimal project execution technique.[18] In turn, a better choice raises the likelihood of success.

The project requires an up-front investment at date 4, borne by $\mathcal{C}$.[19] The project cost is the realisation of a random variable $\Omega$, with the realisation occurring at the beginning of date 3. $\mathcal{B}$ privately and costlessly observes the realisation of $\Omega$, which can take two values; 0 or $\varpi > 0$, according to probabilities given in the table below, where $\beta \in (0, 1)$.

| | $\Omega = 0$ | $\Omega = \varpi$ |
|---|---|---|
| $\theta = 0$ | 1 | 0 |
| $\theta = 1$ | $\beta$ | $1 - \beta$ |

Hence, a higher value of $\theta$ makes a higher cost realisation more likely. Further, if $\Omega = \varpi$, there is no uncertainty about $\theta$.[20] Assume that $\mathcal{C}$ does not observe the realisation of $\Omega$.[21]

At the end of date 3, $\mathcal{B}$ sends a cost realisation report. $\mathcal{C}$ then transfers resources to $\mathcal{B}$, who sinks in the cost at date 4. We assume that production is not feasible if the amount sunk in is less than the true cost. Hence, when the true cost is 0, $\mathcal{B}$ may have an incentive to send a high cost report and appropriate the difference for private benefit.

We assume that with probability $1 - \gamma$, $\gamma \in [0, 1]$, $\mathcal{B}$ has no opportunity to misreport. $\gamma$ may be construed as a measure of dishonesty or corruptibility, or the ability or inclination

[16] Allowing $\mathcal{C}$ to instead observe the signal with a positive probability $\sigma_l$ in the absence of private investment does not change our results, as long as $\sigma_l < \sigma$.

[17] Information received by $\mathcal{C}$ is useful in selecting the optimal project execution technique. Moreover, $\mathcal{C}$ has no incentive to misreport, while $\mathcal{B}$ conditions her decisions on information received by $\mathcal{C}$. One way to interpret this assumption is that some information is processed centrally. Thus, information received by $\mathcal{C}$ becomes available to the team, while information received by $\mathcal{B}$ can remain private. Allowing $\mathcal{C}$'s information to remain private does not affect any of the main results.

[18] If instead we assume that both players' efforts generate information which can be used to select the project execution technique, our results will go through unchanged whenever success is sufficiently valuable, i.e., $e$ is not too low. See Section 4 for a discussion.

[19] Implicitly, we assume that $\mathcal{B}$ has no access to investible resources. Our results hold under alternative cost sharing rules, as long as $\mathcal{C}$ bears most of the cost. When $\mathcal{C}$ bears the cost, and $\mathcal{B}$ has executive authority, a conflict of interest may be generated, which is critical to our analysis.

[20] It is important for our results that $\beta$ is strictly between 0 and 1. If $\beta$ were equal to 0, the realisation of $\Omega$ fully reveals the state, and hence private investment by $\mathcal{C}$ has no production benefit to the team. If $\beta$ were equal to 1, there would be no opportunities for misreporting.

[21] Our results hold as long as $\mathcal{B}$ has superior information regarding the realisation of $\Omega$ compared to $\mathcal{C}$.

to misreport, or of the structural constraints on opportunism within the organisation, here defined as the entity jointly consisting of $\mathcal{C}$ and $\mathcal{B}$. Alternatively, $\gamma$ can be interpreted as the probability with which the cost realisation is publicly observed at the beginning of date 3. A higher $\gamma$ then implies a deterioration in the quality of the information system available with $\mathcal{C}$, and hence greater 'informational distance' between the citizen and the bureaucrat, as $\mathcal{C}$'s ability to preserve veracity in $\mathcal{B}$'s report is impaired.

The cost realisation is informative about $\theta$, so knowing the true cost allows beliefs about the realisation of $\Theta$ to be updated. Further, since $\Omega$ and $\Theta$ are correlated, knowing the realisation of $\Theta$ yields information about the realisation of $\Omega$. This correlation between $\Omega$ and $\Theta$ is central to our analysis, as it allows private investment by $\mathcal{C}$ to have a supervisory role.

We now analyse this model to determine private effort choices at date 1, and the impact of a higher degree of dishonesty on $\mathcal{C}$'s payoff. Later, we shall also study the optimal task assignment structure, from $\mathcal{C}$'s perspective. We take an incomplete contracting approach throughout the paper. In Section 4, we discuss environments where such an approach may be valid. The timeline follows.[22]

Date 1: Players decide on private investment.

Date 2: $\Theta$ is realised. If $\mathcal{C}$ took low effort at date 1, no information arrives about the realisation of $\Theta$. Otherwise, the team observes the realisation of $\Theta$ with probability $\sigma$.

Date 3: $\Omega$ is realised. $\mathcal{B}$ observes the realisation of $\Omega$, and then sends a report.

Date 4: The up-front project cost is sunk.

Date 5: A project execution technique is chosen which depends on information available to $\mathcal{B}$ about the true state. Payoffs are realised.

# 3 Equilibrium

$\mathcal{B}$ performs the executive task, and reports the cost of the project. Considering the game at the beginning of date 3, if $\mathcal{B}$ observes $\Omega = \varpi$, she reports the cost truthfully. If she observes $\Omega = 0$, she reports truthfully if she has no opportunity to be dishonest, the probability of which is $1 - \gamma$. Otherwise, she has an incentive to report $\Omega = \varpi$, sink in the true cost $\Omega = 0$, and privately appropriate an amount $\varpi$ for herself. Her ability to do so is dependent on the signal observed by the team at date 2.

Suppose no signal is observed. The citizen then believes that the probability that $\theta = 0$ equals $\alpha$, and the probability that the project has high cost is $(1 - \alpha)(1 - \beta)$. So

[22] The key assumptions of the model, including the timing of the game, are discussed in Sections 4 and 5.

the report $\Omega = \varpi$ is compatible with $\mathcal{C}$'s belief over the state, and $\mathcal{B}$ will misreport if she has the opportunity. Similarly, if it is observed that $\theta = 1$, there is again no inconsistency between the citizen's observation and the report $\Omega = \varpi$. In this case too, $\mathcal{B}$ will misreport if she has the opportunity. Suppose however, that $\theta = 0$ is observed. Since a high cost project with $\Omega = \varpi$ is possible only if $\theta = 1$, misreporting by $\mathcal{B}$ is infeasible. In this case therefore, $\mathcal{B}$ will report truthfully even if she has the opportunity to be dishonest.

The cost report, together with the information arising from $\mathcal{C}$'s investment decision, induces a probability distribution over the true state. $\mathcal{B}$ then chooses optimal project execution technique, and output is realised.

Suppose $\mathcal{B}$ observes that $\Omega = \varpi$. She then knows that $\theta = 1$, and so chooses $\tau = 1$ at date 5. Next suppose she observes $\Omega = 0$. Although the state is not revealed fully to her by the cost observation, if now $\mathcal{C}$ observes $\theta$, the state is once again revealed fully, and $\mathcal{B}$ chooses $\tau = \theta$ at date 5. Now suppose when $\mathcal{B}$ observes $\Omega = 0$, $\mathcal{C}$ does not receive a signal. In such a situation, the exact state is not known, and so $\mathcal{B}$ chooses $\tau = E(\Theta|\Omega = 0)$. In this case, since $\tau \neq \theta$, there is an information loss, $L$. Let $I = 1 - L$.

$$E(\Theta|\Omega = 0) = \overline{\theta} = \frac{(1-\alpha)\beta}{\alpha + (1-\alpha)\beta}$$

$$I = 1 - \frac{\alpha\overline{\theta}^2 + (1-\alpha)\beta(1-\overline{\theta})^2}{\alpha + (1-\alpha)\beta} = 1 - \frac{\alpha(1-\alpha)\beta}{[\alpha + (1-\alpha)\beta]^2} \in (0,1)$$

We can now determine the equilibrium investment choices, and their dependence on $k_C$ and $k_B$. First define

$$\underline{k}_B = (\lambda_H - \lambda_L)e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}I]$$

$$\overline{k}_B = (\lambda_H - \lambda_L)e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{\sigma + (1-\sigma)I\}]$$

$$\underline{k}_C(\gamma) = \sigma[\varpi\gamma\alpha + \lambda_L e\{\alpha + (1-\alpha)\beta\}(1-I)]$$

$$\overline{k}_C(\gamma) = \sigma[\varpi\gamma\alpha + \lambda_H e\{\alpha + (1-\alpha)\beta\}(1-I)]$$

We see that $\overline{k}_B > \underline{k}_B$ and $\overline{k}_C(\gamma) > \underline{k}_C(\gamma)$ (see Figure 1).[23] We now have the following:

[23] $\underline{k}_B$ ($\overline{k}_B$) is the critical level of effort cost for $\mathcal{B}$ such that she is indifferent between high and low effort, given $\mathcal{C}$ takes low (high) effort, while $\underline{k}_C(\gamma)$ ($\overline{k}_C(\gamma)$) is the critical level of effort cost for $\mathcal{C}$ such that he is indifferent between high and low effort, given $\mathcal{B}$ takes low (high) effort.

**Proposition 1** *If $k_B \leq \underline{k}_B$ and $k_C \leq \overline{k}_C(\gamma)$, or $k_B \in (\underline{k}_B, \overline{k}_B]$ and $k_C \leq \underline{k}_C(\gamma)$, both players always invest. If $k_B > \overline{k}_B$ and $k_C \leq \underline{k}_C(\gamma)$, only $\mathcal{C}$ invests. If $k_B \leq \underline{k}_B$ and $k_C > \overline{k}_C(\gamma)$, only $\mathcal{B}$ invests. If $k_B \geq \underline{k}_B$ and $k_C > \overline{k}_C(\gamma)$, or $k_B > \overline{k}_B$ and $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$, the players never invest. Finally, if $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$, there are multiple equilibria.*

**Proof.** See the Appendix. ■

We see that $\overline{k}_C(\gamma)$ and $\underline{k}_C(\gamma)$ are increasing in $\gamma$. This is because $\mathcal{C}$'s marginal benefit from investment, given $\mathcal{B}$'s private investment choice, is increasing in $\gamma$. Higher investment by $\mathcal{C}$ is beneficial to him for two reasons: it generates information which helps in the selection of optimal project implementation technique, and also helps in the prevention of opportunistic misreporting by $\mathcal{B}$. A higher $\gamma$ implies that the latter benefit is higher.

A unique equilibrium exists, except when $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$.[24] There are then two pure strategy equilibria, one where both players invest, and another where neither player invests. There is also a mixed strategy equilibrium, where the players randomise between investing and not investing. We show below that $\mathcal{C}$'s payoff is highest in the equilibrium where both players invest, and is lowest in the equilibrium where neither player invests. But as far as $\mathcal{B}$ is concerned, there are two opposing effects. Increased investment by both players makes her better off as there is a higher probability of project success, and a lower probability of information loss. But increased investment by $\mathcal{C}$ also reduces her ability to misreport, and therefore makes her worse off. We characterise these effects below.

**Corollary 1** *Suppose $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$. Comparing payoffs across equilibria, $\mathcal{C}$'s payoff is highest when both players invest, and is lowest when neither player invests. $\mathcal{B}$'s payoff is highest in the equilibrium where both players invest if*

$$\frac{e}{\varpi} > \frac{\gamma\alpha}{\lambda_L\{\alpha + (1-\alpha)\beta\}(1-I)}$$

**Proof.** See the Appendix. ■

$\mathcal{B}$ prefers the equilibrium where both players invest whenever $e$ is high relative to $\varpi$. This is because a low $\varpi$ implies a relatively low benefit from misreporting, whereas a high $e$ indicates a relatively high gain from joint investment. We shall assume for now that when multiple equilibria exist, the equilibrium where both players invest is selected. This equilibrium dominates others from $\mathcal{C}$'s perspective. Moreover, as shown in the above

[24] Dominant strategies exist for the players for some values of $k_B$ and $k_C$. If $k_C \leq \underline{k}_C(\gamma)$ ($k_B \leq \underline{k}_B$), it is a dominant strategy for $\mathcal{C}$ ($\mathcal{B}$) to invest. Conversely, it is a dominant strategy for $\mathcal{C}$ ($\mathcal{B}$) not to invest when $k_C > \overline{k}_C(\gamma)$ ($k_B > \overline{k}_B$).

result, this equilibrium is Pareto superior to the others whenever $e$ is sufficiently large. We now discuss whether an increase in $\gamma$ can make $\mathcal{C}$ better off, given delegation. Our main comparative static result does not depend on which equilibrium is selected, as shown below.

## 4 Opportunism and the citizen's payoff

Consider a small increase in $\gamma$. If investment decisions remain unchanged, then $\mathcal{C}$ is worse off. An increase in $\gamma$ without a change in both players' investment choices increases the loss $\mathcal{C}$ faces from misreporting by $\mathcal{B}$, and reduces his expected payoff. However, notice that an increase in $\gamma$, while leaving $\overline{k}_B$ and $\underline{k}_B$ unchanged, leads to an increase in $\overline{k}_C(\gamma)$ and $\underline{k}_C(\gamma)$, as greater conflict of interest increases supervision incentives, with $\overline{k}_C^{'}(\gamma) = \underline{k}_C^{'}(\gamma)$ $= \varpi\alpha\sigma > 0$. Therefore, if $\gamma$ increases from $\gamma_1$ to $\gamma_2$, equilibrium investment choices may change if $k_C \in (\underline{k}_C(\gamma_1), \underline{k}_C(\gamma_2))$ or if $k_C \in (\overline{k}_C(\gamma_1), \overline{k}_C(\gamma_2))$ (see Figure 2).

Suppose $k_C \in (\underline{k}_C(\gamma_1), \underline{k}_C(\gamma_2))$. Then, if $k_B \leq \overline{k}_B$, there is no change in investment choices when $\gamma$ increases, as both players invest in either case. Further, if $k_B > \overline{k}_B$, when $\gamma$ increases, only $\mathcal{C}$ changes his investment decision. Hence, a higher $\gamma$ makes $\mathcal{C}$ worse off, as any investment response he has does not change $\mathcal{B}$'s investment choice.

Now suppose $k_C \in (\overline{k}_C(\gamma_1), \overline{k}_C(\gamma_2))$. Then, if $k_B > \overline{k}_B$, there is no change in investment choices when $\gamma$ increases, as in either case, no player invests. Also, if $k_B \leq \underline{k}_B$, when $\gamma$ increases, only $\mathcal{C}$ changes his investment decision. Again, $\mathcal{C}$ is worse off when $\gamma$ increases.

However, suppose when $k_C \in (\overline{k}_C(\gamma_1), \overline{k}_C(\gamma_2))$, $k_B \in (\underline{k}_B, \overline{k}_B]$. In this case when $\gamma = \gamma_1$, neither player invests, while with $\gamma = \gamma_2$, both players invest. In such a situation, $\mathcal{C}$ is better off when $\gamma$ increases if and only if the direct cost of effort $k_C$, plus the net additional cost of misreporting $\varpi[\{\alpha(1-\sigma) + (1-\alpha)\beta\}(\gamma_2 - \gamma_1) - \alpha\sigma\gamma_1]$, are together less than the extra benefit from joint effort, i.e., when

$$k_C < \widetilde{k}_C(\gamma_1) - \varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\}(\gamma_2 - \gamma_1)$$

$$\text{where } \widetilde{k}_C(\gamma) = \underline{k}_B + \overline{k}_C(\gamma)$$

We see that $\widetilde{k}_C(\gamma)$ increases with $\gamma$, and that

$$\widetilde{k}_C(\gamma_1) - \overline{k}_C(\gamma_2) = \underline{k}_B - \varpi\alpha\sigma(\gamma_2 - \gamma_1)$$

Therefore, for $\gamma_2 - \gamma_1$ sufficiently small,

$$\begin{aligned} \widetilde{k}_C(\gamma_1) &> \overline{k}_C(\gamma_2) > k_C > \overline{k}_C(\gamma_1), \text{ and so} \\ k_C &< \widetilde{k}_C(\gamma_1) - \varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\}(\gamma_2 - \gamma_1) \end{aligned}$$

We have thus proved

**Proposition 2** *If $\gamma_2 - \gamma_1$ is sufficiently small, $k_C \in (\overline{k}_C(\gamma_1), \overline{k}_C(\gamma_2))$, and $k_B \in (\underline{k}_B, \overline{k}_B]$, $\mathcal{C}$ is better off when $\gamma = \gamma_2$ compared to when $\gamma = \gamma_1 < \gamma_2$.*

Why does an increase in $\gamma$ make $\mathcal{C}$ better off? The presence of positive externalities in our joint production model implies that sometimes both players would be better off if they both invested, but the inability to commit to investing leads to lower investment and lower payoffs. An increase in corruption forces $\mathcal{C}$ to increase supervision. Supervision limits misreporting and is only possible through investment in information acquisition about the true state. At the same time, such investment benefits both parties by reducing the probability that a suboptimal technique is chosen to execute the project. Thus $\mathcal{C}$, by investing, raises the marginal benefit from investing to $\mathcal{B}$, and thereby induces her to invest as well. Hence an increase in the degree of dishonesty induces supervisory investment and helps mitigate the underinvestment problem, and thereby benefits $\mathcal{C}$.[25]

The result that an increase in $\gamma$ can make $\mathcal{C}$ better off was derived under the assumption that when multiple equilibria exist in the investment choice game, players select the equilibrium in which they both invest. We now show that the result also holds if players select some other equilibrium.

Suppose in such a case the players select the equilibrium where neither invests. Suppose also $k_C \in (\underline{k}_C(\gamma_1), \underline{k}_C(\gamma_2))$ and $k_B \in (\underline{k}_B, \overline{k}_B]$. In such a setting, neither player invests when $\gamma = \gamma_1$, while both invest when $\gamma = \gamma_2$. The same logic as above then shows that if $\gamma_2 - \gamma_1$ is sufficiently small, $\mathcal{C}$ is better off when $\gamma = \gamma_2$ compared to when $\gamma = \gamma_1$.

Finally, suppose that when multiple equilibria exist, i.e., when $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$, players choose to randomise between investing and not investing. Let $\pi_B(\gamma)$ be the probability with which $\mathcal{B}$ invests in equilibrium. From the proof of Proposition 1,

$$\pi_B(\gamma) = \frac{k_C - \gamma\varpi\alpha\sigma}{e(\lambda_H - \lambda_L)\{\alpha + (1-\alpha)\beta\}\sigma(1-I)} - \frac{\lambda_L}{\lambda_H - \lambda_L}$$

Can an increase in $\gamma$ make make $\mathcal{C}$ better off in this case? Consider $\gamma_1 < \gamma_2$ as before. Suppose first $k_C \in (\underline{k}_C(\gamma_1), \underline{k}_C(\gamma_2))$, so that when $\gamma = \gamma_2$, both players invest. Let $\underline{\Delta}C$ be the change in $\mathcal{C}$'s payoff resulting from an increase in $\gamma$ from $\gamma_1$ to $\gamma_2$. We have

[25] We show in the next section that the citizen may therefore strategically introduce conflict as a prior commitment device. Conflict can here be thought of as providing an off-setting incentive that can effectively internalise the investment externality.

$$\begin{aligned}\underline{\Delta}C &= \{1-\pi_B(\gamma_1)\}(\lambda_H-\lambda_L)e[(1-\alpha)(1-\beta)+\{\alpha+(1-\alpha)\beta\}\{\sigma+(1-\sigma)I\}] \\ &\quad -\varpi\{\alpha(1-\sigma)+(1-\alpha)\beta\}(\gamma_2-\gamma_1)\end{aligned}$$

Now suppose $k_C \in (\overline{k}_C(\gamma_1), \overline{k}_C(\gamma_2))$, so that when $\gamma = \gamma_1$, neither player invests. Let $\overline{\Delta}C$ be the change in $\mathcal{C}$'s payoff resulting from an increase in $\gamma$ from $\gamma_1$ to $\gamma_2$. We have

$$\overline{\Delta}C = \pi_B(\gamma_1)(\lambda_H-\lambda_L)e[(1-\alpha)(1-\beta)+\{\alpha+(1-\alpha)\beta\}I] - \varpi\{\alpha+(1-\alpha)\beta\}(\gamma_2-\gamma_1)$$

In either case, therefore, we see that if $\gamma_2 - \gamma_1$ is sufficiently small, $\mathcal{C}$ is better off when $\gamma = \gamma_2$ compared to when $\gamma = \gamma_1$. Hence an increase in $\gamma$ can make $\mathcal{C}$ better off, irrespective of which equilibrium is played when multiple equilibria exist. We shall assume for convenience therefore that whenever multiple equilibria exist in the investment choice game, players select the equilibrium where they both invest.

## 4.1 Discussion

We now discuss the main assumptions. The model was constructed using various simplifications, some of which are readily generalisable. For example, our qualitative results do not depend on effort, output, cost, etc. being binary and discrete. We also assumed that the two players' efforts play distinct roles in driving output, with $\mathcal{B}$'s effort increasing expected output directly, and $\mathcal{C}$'s effort reducing information loss. We could alternatively have assumed that both players' efforts help generate information. If so, since $\mathcal{B}$'s effort may produce information correlated with the cost realisation, and thereby impede her own ability to misreport, she may be more reluctant to invest. However, such considerations are unimportant when success is sufficiently valuable, and it can be shown that the positive externality effect, and the effect of an increase in $\gamma$, survive whenever $e$ is high.

The central assumption is the correlation between $\Omega$ and $\Theta$, since it endows $\mathcal{C}$'s private investment with a supervisory function. The assumption simply means that $\Theta$, the state variable, guides both the structure of project cost, as well as the framework within which project execution methods are determined. To illustrate, think of an organisation such as a firm, and consider information generated by internal control processes, such as Enterprise Resource Planning systems, Management Information System software, managerial supervision, personnel reports, audit reports, etc. Such information is useful both because it guides future strategy, and because it curbs current opportunistic behaviour.

The supervisory role of $\mathcal{C}$'s effort works by limiting the opportunities $\mathcal{B}$ has to be dishonest. Since $\mathcal{C}$ has no additional means of auditing or verifying $\mathcal{B}$'s report, monitoring is necessarily indirect in our environment.[26] In that sense, the assumption that only some of the conditional distributions of $\Omega$ do not have full support, as well as the assumption that information on the realisation of $\Theta$ is received before $\mathcal{B}$ has to send the cost report, are important. Indirect monitoring could still be important even if direct monitoring were available; the degree of reliance placed on either would depend on their relative opportunity costs. Thus, focussing attention on a situation where the citizen has to rely on a productive contribution to mitigate opportunistic behaviour is not overly restrictive. Direct monitoring may be ineffective or costly in many community governance contexts. Consider for example a local community wishing to implement a costly project with the help of its municipal bureaucracy. Optimal project specifications typically depend on information on preferences, which is diffusely held by members and often learned through the project development phase. Supervision of bureaucratic performance in such settings is usually feasible only through community involvement in project development; such involvement, while costly, also improves information acquisition and project implementation.

Our incomplete contracting approach assumes non-verifiability of the signal received by $\mathcal{C}$ at the end of date 2.[27] If the signal were verifiable, $\mathcal{C}$ could internalise the externality and solve the incentive problem by contractually committing to taking high effort. Signals and techniques internal to organisations are often soft or dispersed, so such verifiability may not obtain. Soft information is common in a variety of settings such as the interaction between different levels of government, between Prime Minister and cabinet member, between government and regulator, between chief executive and divisional head, etc. Dispersed information could additionally arise in interactions between a community and its bureaucracy. Further, in some settings firms or other organisations may not be willing to make all internal information verifiable, because of concerns over privacy, access by rivals, etc.[28]

[26]Studies of auditing look at the relationship between the incentives for corruption and the intensity of ex post detection. By contrast, we focus on the relationship between the incentives for corruption and the limitation on ex ante opportunity.

[27]Similar contractability assumptions can be found in several recent studies of delegation, such as Aghion and Tirole (1997), Dessein (2002), Li and Suen (2004) and Dur and Swank (2005).

[28]If transfers were infeasible, while information and cost reports were verifiable, along with $\mathcal{B}$'s choice of technique, then Szalay (2005) shows in a one-sided moral hazard setting that a principal may wish to impose restrictions on ex post choice of an agent, in order to improve her incentives. A similar point is made in an analysis of committee decision-making by Li (2001), who shows that ex ante commitment to an ex post inefficient decision standard can increase the information acquisition incentive of individual committee members. While such a possibility can arise in our environment as well, $\mathcal{C}$'s marginal benefit to investment in information acquisition will still increase in $\gamma$. Hence, an increase in corruption may still

## 5 Ceding executive authority

In this section, we study the optimal task assignment structure, from $\mathcal{C}$'s perspective. Suppose either player is equally capable of performing the executive task. Would $\mathcal{C}$ then prefer to perform the executive task and thereby retain discretionary authority, or would he prefer to delegate executive authority to $\mathcal{B}$? Assume $\mathcal{C}$ has to make the decision at date 0, prior to players making their effort choices.

First suppose that the executive task cannot be separated into its constituent components, so the executor controls both budgeting and implementation. Suppose $\mathcal{C}$ retains the role of the executor at date 0. Assume $\mathcal{C}$ is committed to this scheme. Regardless of investment decisions, $\mathcal{C}$ reports the cost of the project truthfully. The cost report, together with the information on the realisation of $\Theta$, induces a probability distribution over the true state. $\mathcal{C}$ then chooses optimal project execution technique, and output is realised.

What are the equilibrium investment choices, and how do they depend on $k_B$ and $k_C$? To answer that, we first define

$$\underline{k}_C = \lambda_L e\sigma\{\alpha + (1-\alpha)\beta\}(1-I) = \underline{k}_C(0) \text{ from Section 3}$$

$$\overline{k}_C = \lambda_H e\sigma\{\alpha + (1-\alpha)\beta\}(1-I) = \overline{k}_C(0) \text{ from Section 3}$$

We have the following proposition, the proof of which is similar to the proof of Proposition 1, and is omitted.

**Proposition 3** *Suppose $\mathcal{C}$ retains executive authority. If $k_C \leq \underline{k}_C$ and $k_B \leq \underline{k}_B$, or $k_C \in (\underline{k}_C, \overline{k}_C]$ and $k_B \leq \underline{k}_B$, or $k_C \leq \underline{k}_C$ and $k_B \in (\underline{k}_B, \overline{k}_B]$, both players invest. If $k_C \leq \underline{k}_C$ and $k_B > \overline{k}_B$, only $\mathcal{C}$ invests. If $k_C > \overline{k}_C$ and $k_B \leq \underline{k}_B$, only $\mathcal{B}$ invests. If $k_C > \overline{k}_C$ and $k_B > \overline{k}_B$, or $k_C > \overline{k}_C$ and $k_B \in (\underline{k}_B, \overline{k}_B]$, or $k_C \in (\underline{k}_C, \overline{k}_C]$ and $k_B > \overline{k}_B$, neither player invests. Finally, if $k_C \in (\underline{k}_C, \overline{k}_C]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$, there are multiple equilibria. In such a situation, the equilibrium where they both invest Pareto dominates other equilibria.*

A unique equilibrium exists, except when $k_C \in (\underline{k}_C, \overline{k}_C]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$, in which case, neither player investing is an equilibrium, and both players investing is an equilibrium as well. There is also a mixed strategy equilibrium where the players randomise. As before, we shall assume that players select the equilibrium where both invest.

Can $\mathcal{C}$ benefit by ceding discretionary authority, and thereby introducing a conflict of interest? We have shown above that given delegation, $\mathcal{C}$ may be better off when $\gamma$

leave him better off.

increases because such an increase can result in an increase in investment by both parties. An increase in $\gamma$ does not always induce increased investment by both players. When it does not, $\mathcal{C}$ is worse off. Moreover, while $\mathcal{C}$ may be better off when $\gamma$ increases given delegation, will he in fact delegate at date 0 when $\gamma > 0$, i.e., when there are conflicts of interest? Notice, $\mathcal{C}$ can always prevent dishonesty by not delegating. $\mathcal{B}$ has then no opportunity to be corrupt, as she does not have discretionary authority. The interesting case arises when $k_B \in (\underline{k}_B, \overline{k}_B]$ and $k_C > \overline{k}_C$. We have

**Proposition 4** *Suppose $k_B \in (\underline{k}_B, \overline{k}_B]$ and $k_C > \overline{k}_C$. Then, $\mathcal{C}$ delegates if and only if*

$$\frac{k_C - \overline{k}_C}{\sigma\varpi\alpha} \leq \gamma < \frac{\underline{k}_B - (k_C - \overline{k}_C)}{\varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\}}$$

**Proof.** See the Appendix. ■

When $\gamma > \frac{k_C - \overline{k}_C}{\sigma\varpi\alpha}$, $\overline{k}_C(\gamma) > k_C$. In such a situation, if $\mathcal{C}$ delegates, both players invest, while if $\mathcal{C}$ retains authority, neither player invests. $\mathcal{C}$ can then be better off by ceding authority provided $\gamma$ is not too high, i.e., as long as $\gamma < \frac{\underline{k}_B - (k_C - \overline{k}_C)}{\varpi\{\alpha(1-\sigma)+(1-\alpha)\beta\}}$. Therefore, when $k_B \in (\underline{k}_B, \overline{k}_B]$ and $k_C \in (\overline{k}_C, \overline{k}_C(\gamma)]$, incentive delegation by $\mathcal{C}$ can arise to enable him to commit to investing, and thereby induce $\mathcal{B}$ to invest as well. For this result to hold, $\gamma$ has to be sufficiently small, so that the loss from misreporting is not too high. But $\gamma$ also has to be sufficiently large, as otherwise there is inadequate incentive on the part of $\mathcal{C}$ to invest implying that delegation will have no commitment value.[29] Hence incentive delegation may arise only when there is less 'trust' between the citizen and the bureaucrat, i.e., the citizen may benefit from the conflict of interest. This contrasts with Aghion and Tirole (1997), who show that delegation can emerge if the principal can trust the subordinate more.

The arguments above imply that $\mathcal{C}$ may be able to use delegation as a commitment device if $\mathcal{B}$ is not always honest ($\gamma > 0$). By doing so, he commits to investing in order to reduce misreporting, which in turn raises investment by $\mathcal{B}$. Therefore, the presence of corruption can sometimes induce $\mathcal{C}$ to delegate and make him better off.[30]

[29] The following numerical example illustrates. It can be easily checked that when $\mathcal{B}$ has discretionary authority, her payoff is highest in the equilibrium where both players invest. Suppose $\alpha = \beta = \sigma = 0.5$, $\lambda_H = 0.75$, $\lambda_L = 0.25$, $\varpi = 4$, $e = 100$, $k_B = 43$, $k_C = 7$. If $\mathcal{B}$ is always honest ($\gamma = 0$), $\mathcal{C}$ is indifferent between retaining and ceding executive authority and his net expected payoff is 19.875. If $\mathcal{B}$ is always dishonest ($\gamma = 1$), $\mathcal{C}$ prefers to delegate and his net expected payoff is 58.8125.

[30] In our model, delegation may be beneficial because it induces the citizen to supervise. Supervision generates information which, apart from increasing expected output from the project, limits the bureaucrat's choice, as he may be unable to send messages which benefit him and harm the principal. The beneficial effect of restricting agent choice has also been discussed in Szalay (2005), where such a restriction harms the principal ex post. In our paper however, restriction of agent choice is indirect and benefits the principal ex post.

In the model, we assumed that the players' ex post interests were perfectly aligned at date 5, i.e., they have common interest as far as the choice of $\tau$ is concerned. With imperfectly aligned interests, the citizen, if he cedes executive authority to the bureaucrat at date 0, may have an incentive to revoke such authority once private investment decisions have been made, and information internal to the organisation has arisen. Aghion and Tirole (1997) and Burkart, Gromb and Panunzi (1997) have pointed out that such revocation possibilities can lead to a dampening of subordinate incentives. In our model, introducing the possibility of revocation with imperfect alignment of interests also may lead to such a negative 'initiative effect'. However, a positive 'investment effect' may exist as well. This is because the citizen's ability to revoke leads him to invest more in information acquisition which, because of the positive externality, leads to greater investment by the bureaucrat. The relative strength of the two effects depends on parameter values. Overall, however, the effect of a higher $\gamma$ identified earlier survives, as, conditional on ceding discretionary authority, the marginal benefit from investment to the citizen is still increasing in $\gamma$.

So far, our study has assumed that the executive task is composite, i.e., the two constitutive elements, budgeting, and implementation (or technique selection), cannot be separated. Hence $\mathcal{C}$ could either delegate fully, with both components under the purview of the bureaucrat, or not at all. Suppose instead these two components can be split up, so $\mathcal{C}$ can also choose to delegate partially. It is immediate that if $\mathcal{C}$ retains budgeting with himself, it is irrelevant as to whether implementation is under the control of $\mathcal{C}$ or $\mathcal{B}$, because of the commonality of ex post interest. The outcome is then identical to when there is no delegation.

Alternatively, $\mathcal{C}$ could delegate partially, with $\mathcal{B}$ controlling budgeting, and $\mathcal{C}$ retaining authority over implementation. Such a decision is not advantageous to him, however.

To see that, notice $\mathcal{B}$ has a reduced incentive to misreport, compared to when $\mathcal{C}$ delegates fully, given the team receives no signal on the realisation of $\Theta$.[31] This is because in the absence of such information, misreporting by $\mathcal{B}$ leads to a suboptimal choice of $\tau$ by $\mathcal{C}$, and hence makes $\mathcal{B}$ worse off. Ergo if $\varpi$ is low enough relative to $e$, $\mathcal{B}$ will never misreport when the team receives no signal. But $\mathcal{C}$ is then worse off under partial delegation than when he does not delegate. Firstly, $\mathcal{C}$ faces a loss due to misreporting, as $\mathcal{B}$ will misreport, given she has an opportunity, when the team receives a signal. Secondly, $\mathcal{C}$ has a lower incentive to invest in information acquisition, as $\mathcal{B}$ will misreport only when the team receives a signal, and so the benefit to information acquisition is lower.

Alternatively, suppose $\mathcal{B}$ may misreport when the team does not receive a signal. Then,

[31] If the team does receive a signal, then $\mathcal{B}$ will always misreport given she has an opportunity: since the team has received a signal, the state is revealed and hence there will be no information losses, while misreporting still allows $\mathcal{B}$ to gain.

given the two players' investment choices, information losses are higher under partial delegation than under no delegation, as $\mathcal{C}$ selects implementation technique in both cases, but has better information under no delegation since he also controls budgeting. Moreover, $\mathcal{C}$ suffers losses due to misreporting under partial delegation. However, investment behaviour may differ under partial delegation, for the same reason as to why it differed under full delegation: the possibility of misreporting can raise $\mathcal{C}$'s marginal investment incentive, which in turn induces $\mathcal{B}$ to invest. But if such were the case, it is better to delegate fully than partially – $\mathcal{C}$'s investment incentives are higher under full delegation, and since $\mathcal{B}$ controls both budgeting and implementation, information losses are lower under full delegation.

Hence, $\mathcal{C}$ does not benefit from partial delegation. The main reason is that the separation of budgeting from implementation under partial delegation leads to information losses, and is suboptimal. Thus, either $\mathcal{C}$ delegates fully, or not at all.[32]

# 6 Conclusion

In a joint production problem with costly effort and positive externalities, an underinvestment problem may emerge. We show in such a setting that a citizen may prefer a dishonest bureaucrat to an honest one. Increased opportunities for dishonesty raises the marginal benefit of supervision to the citizen. Supervision by the citizen can limit losses due to corruption, and also generates information, increasing the expected output. Thus lower honesty enables the citizen to commit to investing, which in turn induces the bureaucrat to invest.

The discussion can help understand when the citizen may gain by delegating discretionary authority to the bureaucrat, even though doing so may create a conflict of interest. We show that such incentive delegation can arise only when the opportunity for dishonesty is sufficiently high, i.e., when the potential conflict of interest is severe. Delegating in this setting can act as a commitment device. For the commitment to be credible, however, there has to be a sufficiently high probability that the bureaucrat is dishonest.

The results of the paper may be useful in understanding why conflicts of interest persist in a wide variety of organisational settings and production contexts characterised by unverifiable information. The essay shows why dishonesty may not only be tolerated, but sometimes engendered by allowing opportunistic bureaucrats discretionary authority, and why clients may remain engaged through supervisory or advisory roles in the context of

[32]For corruption to have a beneficial effect, control must be delegated to $\mathcal{B}$. As shown above, full delegation can arise endogenously, and so our results are not driven by specific assumptions on $\mathcal{C}$'s delegation decision.

outsourced projects. In the context of a community, the article shows why there may be a benefit to a citizenry from transferring executive authority to its government: the resulting conflict of interest can lead to greater citizen involvement through supervision, and hence improved government performance. In that sense, the essay sounds a note of caution with regard to the debate over the desirable extent of participatory governance, and suggests that excessive transfer of executive authority from a bureaucracy or political establishment to a citizenry may not always be advisable. At the same time, the article highlights the need for citizen participation in governance. It points out some of the systemic benefits of such involvement, and gives an informational foundation to the notion that well-governed communities require the practice of "active liberty" (Breyer (2005)) or "active and constant participation in collective power" by citizens (Constant (1988)).

# 7 Appendix

**Proof of Proposition 1.** We first derive payoffs, given any profile of private effort choices. What are the two players' expected payoffs at the beginning of date 2, given a profile of investment choices? Suppose first both invest. Define

$$\begin{aligned} \eta_1 &= (1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{\sigma + (1-\sigma)I\} \\ \eta_0 &= (1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}I \end{aligned}$$

Then, ignoring private investment costs as we are at the beginning of date 2, the payoffs of $\mathcal{B}$ and $\mathcal{C}$ are respectively

$$\begin{aligned} P_{11}^{B} &= \lambda_H e \eta_1 + \gamma\varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\} \\ P_{11}^{C} &= \lambda_H e \eta_1 - \varpi[(1-\alpha)(1-\beta) + \gamma\{\alpha(1-\sigma) + (1-\alpha)\beta\}] \end{aligned}$$

If the realisation of $\Omega$ is $\varpi$, the probability of which is $(1-\alpha)(1-\beta)$, or if the realisation of $\Omega$ is 0 and the team observes the realisation $\theta$, the probability of which is $\sigma\{\alpha + (1-\alpha)\beta\}$, there is no information loss, as in such cases $\tau$, the optimal technique chosen by $\mathcal{B}$, is equal to $\theta$, the true state. But if the realisation of $\Omega$ is 0 and the team does not observe a signal, the probability of which is $(1-\sigma)\{\alpha + (1-\alpha)\beta\}$, there is an information loss. Together with the fact that $\lambda = \lambda_H$ as $\mathcal{B}$ invests, this explains the first term in the payoff expressions for $\mathcal{C}$ and $\mathcal{B}$. For the second term, recall that $\mathcal{C}$ bears the cost of the project. With probability $(1-\alpha)(1-\beta)$, the cost is $\varpi$, and $\mathcal{C}$ incurs the cost. In such a situation, $\mathcal{B}$ has no opportunity to privately appropriate benefits. With probability $\alpha + (1-\alpha)\beta$, the cost is 0. If $\mathcal{B}$ is honest, $\mathcal{C}$ faces no cost in this case. But with probability $\gamma$, $\mathcal{B}$ is corrupt and will misreport, unless $\mathcal{C}$ observes that $\theta = 0$.

Now suppose only $\mathcal{C}$ invests. Then payoffs of $\mathcal{B}$ and $\mathcal{C}$ are respectively

$$\begin{aligned} P_{10}^{B} &= \lambda_L e\eta_1 + \gamma\varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\} \\ P_{10}^{C} &= \lambda_L e\eta_1 - \varpi[(1-\alpha)(1-\beta) + \gamma\{\alpha(1-\sigma) + (1-\alpha)\beta\}] \end{aligned}$$

Thus the payoffs are the same as when both players invest, with one difference. Since $\mathcal{B}$ does not invest, the probability the project succeeds is lower. Now suppose only $\mathcal{B}$ invests. Then payoffs are

$$\begin{aligned} P_{01}^{B} &= \lambda_H e\eta_0 + \gamma\varpi\{\alpha + (1-\alpha)\beta\} \\ P_{01}^{C} &= \lambda_H e\eta_0 - \varpi[(1-\alpha)(1-\beta) + \gamma\{\alpha + (1-\alpha)\beta\}] \end{aligned}$$

Since $\mathcal{C}$ does not invest, the team does not observe the realisation $\theta$. Thus, when $\Omega = 0$, there is always an information loss and each party receives expected gross payoff $\lambda_H eI$. However, as before, if $\Omega = \varpi$, the state is revealed and there is no information loss. Furthermore, if $\Omega = 0$, $\mathcal{B}$ always misreports if he is corrupt, and hence $\mathcal{C}$ bears total expected project cost $\varpi[(1-\alpha)(1-\beta) + \gamma\{\alpha + (1-\alpha)\beta\}]$.

Finally, suppose neither invests. Then payoffs are

$$\begin{aligned} P_{00}^{B} &= \lambda_L e\eta_0 + \gamma\varpi\{\alpha + (1-\alpha)\beta\} \\ P_{00}^{C} &= \lambda_L e\eta_0 - \varpi[(1-\alpha)(1-\beta) + \gamma\{\alpha + (1-\alpha)\beta\}] \end{aligned}$$

Given these induced payoffs, what private investment choices do the players make? We first look $\mathcal{B}$'s investment decision. Given $\mathcal{C}$ does not invest, $\mathcal{B}$ invests if and only if $P_{01}^{B} - k_B \geq P_{00}^{B}$, i.e., $k_B \leq \underline{k}_B$, while if $\mathcal{C}$ invests, $\mathcal{B}$ invests if and only if $P_{11}^{B} - k_B \geq P_{10}^{B}$, i.e., $k_B \leq \overline{k}_B$. Similarly, given $\mathcal{B}$ does not invest, $\mathcal{C}$ invests if and only if $P_{10}^{C} - k_C \geq P_{00}^{C}$, i.e., $k_C \leq \underline{k}_C(\gamma)$, while if $\mathcal{B}$ invests, $\mathcal{C}$ invests if and only if $P_{11}^{C} - k_C \geq P_{01}^{C}$, i.e., $k_C \leq \overline{k}_C(\gamma)$.

If $k_C \leq \underline{k}_C(\gamma)$, it is a dominant strategy for $\mathcal{C}$ to invest. Similarly, it is a dominant strategy for $\mathcal{B}$ to invest if $k_B \leq \underline{k}_B$. Conversely, it is a dominant strategy for $\mathcal{C}$ not to invest when $k_C > \overline{k}_C(\gamma)$, while it is a dominant strategy for $\mathcal{B}$ not to invest when $k_B > \overline{k}_B$. Therefore, if $k_C \leq \underline{k}_C(\gamma)$ and $k_B \leq \underline{k}_B$, both parties invest, while if $k_C > \overline{k}_C(\gamma)$ and $k_B > \overline{k}_B$, neither invests. Also, if $k_C \leq \underline{k}_C(\gamma)$ and $k_B > \overline{k}_B$, only $\mathcal{C}$ invests, while if $k_C > \overline{k}_C(\gamma)$ and $k_B \leq \underline{k}_B$, only $\mathcal{B}$ invests.

Now suppose $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B \leq \underline{k}_B$. Since $k_B \leq \underline{k}_B$, $\mathcal{B}$ invests. But then, since $k_C \leq \overline{k}_C(\gamma)$, $\mathcal{C}$ invest as well. Thus, both players invest in this case. The same logic implies that both players invest when $k_C \leq \underline{k}_C(\gamma)$ and $k_B \in (\underline{k}_B, \overline{k}_B]$.

On the other hand, suppose $k_C > \overline{k}_C(\gamma)$ and $k_B \in (\underline{k}_B, \overline{k}_B]$. Since $k_C > \overline{k}_C(\gamma)$, $\mathcal{C}$ does not invest. But then, since $k_B > \underline{k}_B$, $\mathcal{B}$ does not invest either. Hence, the players do not invest in this case. Similarly, neither player invests when $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B > \overline{k}_B$. Hence we have a unique equilibrium in all the above cases.

Finally suppose $k_C \in (\underline{k}_C(\gamma), \overline{k}_C(\gamma)]$ and $k_B \in (\underline{k}_B, \overline{k}_B]$. If $\mathcal{C}$ invests, $\mathcal{B}$'s best response is to invest as $k_B \leq \overline{k}_B$. Similarly, if $\mathcal{B}$ invests, $\mathcal{C}$'s best response is to invest as $k_C \leq \overline{k}_C(\gamma)$. Thus, it is an equilibrium for both players to invest. Also, if $\mathcal{C}$ does not invest, $\mathcal{B}$'s best response is to not invest as $k_B > \underline{k}_B$. Further, if $\mathcal{B}$ does not invest, $\mathcal{C}$'s best response is to not invest as $k_C > \underline{k}_C(\gamma)$. Hence, it is an equilibrium for neither player to invest. There are thus two pure strategy equilibria in this case. There is also a mixed strategy equilibrium where the players randomise between investing and not investing. In the mixed strategy equilibrium, suppose $\mathcal{C}$ invests with probability $\pi_C$, and suppose $\mathcal{B}$ invests with probability $\pi_B$. It is easy to show that

$$\pi_B = \frac{k_C - \gamma\varpi\alpha\sigma}{e(\lambda_H - \lambda_L)\{\alpha + (1-\alpha)\beta\}\sigma(1-I)} - \frac{\lambda_L}{\lambda_H - \lambda_L}$$

$$\pi_C = \frac{1}{\sigma(1-I)}[\frac{k_B}{e(\lambda_H - \lambda_L)\{\alpha + (1-\alpha)\beta\}} - \frac{(1-\alpha)(1-\beta)}{\alpha + (1-\alpha)\beta} - I]$$

■

**Proof of Corollary 1.** We first show that $\mathcal{C}$ is better off when the mixed strategy equilibrium is played than when neither player invests. In the mixed strategy equilibrium, $\mathcal{C}$'s net payoff is

$$[\lambda_L + \pi_B(\lambda_H - \lambda_L)]e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}I]$$

When neither player invests, $\mathcal{C}$'s net payoff is

$$\lambda_L e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}I]$$

$\mathcal{C}$ is therefore better off if and only if $\pi_B(\lambda_H - \lambda_L) > 0$, which always holds.

We now show that $\mathcal{C}$ is better off when both players invest than when the mixed strategy equilibrium is played. The ordering holds

$$\begin{aligned} \Leftrightarrow \quad & \lambda_H e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{\sigma + (1-\sigma)I\}] - k_C > \\ & [\lambda_L + \pi_B(\lambda_H - \lambda_L)]e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{\sigma + (1-\sigma)I\}] - k_C \end{aligned}$$

$$\Leftrightarrow (\lambda_H - \lambda_L)(1 - \pi_B) > 0, \text{ which is true as long as } k_C \ < \ \overline{k}_C(\gamma)$$

We now look at $\mathcal{B}$'s payoff ordering. Compared to when the agents do not invest, $\mathcal{B}$ is better off in the case when they play mixed strategies in equilibrium

$$\begin{aligned} \Leftrightarrow \quad & \lambda_L e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{I + \pi_C\sigma(1-I)\}] + \gamma\varpi\{\alpha(1-\pi_C\sigma) + (1-\alpha)\beta\} \\ > \quad & \lambda_L e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}I] + \gamma\varpi\{\alpha + (1-\alpha)\beta\} \end{aligned}$$

$$\Leftrightarrow e > \frac{\varpi\gamma\alpha}{\lambda_L\{\alpha + (1-\alpha)\beta\}(1-I)} = \widetilde{e}_L$$

And, compared to when the agents play mixed strategies in equilibrium, $\mathcal{B}$ is better off in the case when they both invest

$$\begin{aligned} \Leftrightarrow \quad & \lambda_H e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{I + \sigma(1-I)\}] + \gamma\varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\} - k_B \\ > \quad & \lambda_H e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{I + \pi_C\sigma(1-I)\}] + \gamma\varpi\{\alpha(1-\pi_C\sigma) + (1-\alpha)\beta\} \\ & -k_B \end{aligned}$$

$$\Leftrightarrow e > \frac{\varpi\gamma\alpha}{\lambda_H\{\alpha + (1-\alpha)\beta\}(1-I)} = \widetilde{e}_H$$

The proof is complete as $\widetilde{e}_H < \widetilde{e}_L$. ■

**Proof of Proposition 4.** Suppose $k_B \in (\underline{k}_B, \overline{k}_B]$, $k_C > \overline{k}_C$, and

$$\gamma \geq \frac{k_C - \sigma\lambda_H e\{\alpha + (1-\alpha)\beta\}(1-I)}{\sigma\varpi\alpha}, \text{ so that } \overline{k}_C(\gamma) \geq k_C$$

If $\mathcal{C}$ retains discretionary authority, neither player invests, and his payoff is

$$\lambda_L e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}I] - \varpi(1-\alpha)(1-\beta)$$

If $\mathcal{C}$ delegates, both players invest, and his payoff is

$$\begin{aligned} & \lambda_H e[(1-\alpha)(1-\beta) + \{\alpha + (1-\alpha)\beta\}\{\sigma + (1-\sigma)I\}] \\ & -\varpi[(1-\alpha)(1-\beta) + \gamma\{\alpha(1-\sigma) + (1-\alpha)\beta\}] - k_C \end{aligned}$$

Hence $\mathcal{C}$ prefers to delegate if and only if

$$\gamma < \frac{\underline{k}_B - (k_C - \overline{k}_C)}{\varpi\{\alpha(1-\sigma) + (1-\alpha)\beta\}}$$

■

# 8 References


1. Acemoglu, D. (1998): "Credit Market Imperfections and the Separation of Ownership from Control", *Journal of Economic Theory* v. 78, p. 355–81.

2. African Union (2003): Draft African Union Declaration on Elections, Democracy and Governance, Version 1.1, February, 2003.

3. Aghion, P., M. Dewatripont and P. Rey (2002): "On Partial Contracting", *European Economic Review* v. 46, p. 745-53.

4. Aghion, P., M. Dewatripont and P. Rey (2004): "Transferable Control", *Journal of the European Economic Association* v. 2, p. 115-38.

5. Aghion, P. and J. Tirole (1997): "Formal and Real Authority in Organizations", *Journal of Political Economy* v. 105, p. 1-29.

6. Bliss, C. and R. Di Tella (1997): "Does Competition Kill Corruption?", *Journal of Political Economy* v. 105, p. 1001-23.

7. Breyer, S. (2005): *Active Liberty.* New York: Knopf.

8. Burkart, M., D. Gromb and F. Panunzi (1997): "Large Shareholders, Monitoring, and the Value of the Firm", *Quarterly Journal of Economics* v. 112, p. 693-728.

9. Constant, B. (1988): "The Liberty of Ancients Compared with that of Moderns", in B. Fontana, R. Geuss and Q. Skinner eds., *Constant: Political Writings.* Cambridge: Cambridge University Press.

10. Crémer, J. (1995): "Arm's Length Relationships", *Quarterly Journal of Economics* v. 110, p. 275-95.

11. Dessein, W. (2002): "Authority and Communication in Organizations", *Review of Economic Studies,* v. 69, p. 811-38.

12. Dur, R. and O. Swank (2005): "Producing and Manipulating Information", *Economic Journal*, v. 115, p. 185-99.

13. Khalil, F. (1997): "Auditing without Commitment", *RAND Journal of Economics* v. 28, p. 629-40.

14. Khwaja, A. (2004): "Is Increasing Community Participation always a Good Thing?", *Journal of the European Economic Association* v. 2, p. 427-436.

15. Lambert-Mogiliansky, A. (1998): "On Optimality of Illegal Collusion in Contracts", *Review of Economic Design* v. 3, p. 303-28.

16. Li, H. (2001): "A Theory of Conservatism", *Journal of Political Economy* v. 109, p. 617-36.

17. Li, H. and W. Suen (2004): "Delegating Decisions to Experts", *Journal of Political Economy,* v. 112, p. S311-35.

18. Olsen, T. and G. Torsvik (1998): "Collusion and Renegotiation in Hierarchies: A Case of Beneficial Corruption", *International Economic Review* v. 39, p. 413–38.

19. Organisation for Economic Cooperation and Development (2001): *Citizens as Partners: OECD Handbook on Information, Consultation and Public Participation in Policy-Making*. Paris: OECD.

20. Polinsky, A. and S. Shavell (2001): "Corruption and Optimal Law Enforcement", *Journal of Public Economics* v. 81, p. 1-24.

21. Prendergast, C. (1999): "Investigating Corruption", World Bank Policy Research Working Paper 2500.

22. Reich, R. (1990): "Policy Making in a Democracy", in R. Reich eds., *The Power of Public Ideas.* Cambridge, MA: Harvard University Press.

23. Riordan, M. (1990): "What is Vertical Integration?", in M. Aoki, B. Gustafsson and O. Williamson eds., *The Firm as a Nexus of Treaties.* London: Sage Publications.

24. Schmidt, K. (1996): "The Costs and Benefits of Privatization: An Incomplete Contracts Approach", *Journal of Law, Economics and Organization* v. 12, p. 1-24.

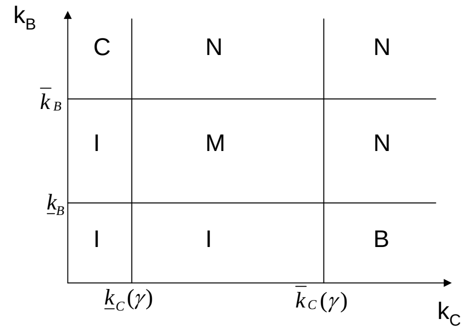
25. Schneider, H. (1999): "Participatory Governance: The Missing Link for Poverty Reduction", OECD Policy Brief No. 17, 1999.

26. Shleifer, A. and R. Vishny (1993): "Corruption", *Quarterly Journal of Economics* v. 108, p. 599–617.

27. Strausz, R. (1997): "Delegation of Monitoring in a Principal-Agent Relationship", *Review of Economic Studies* v. 64, p. 337-57.

28. Szalay, D. (2005): "The Economics of Extreme Options and Clear Advice", *Review of Economic Studies,* v. 72, p. 1173-98.

29. United Nations (2000): United Nations Millenium Declaration (United Nations General Assembly, Fifty-fifth Session), September, 2000.




Key – I: Both invest; B: Only B invests; C: Only C invests; N: Neither invest; M: Multiple equilibria

Figure 1: Equilibrium zones

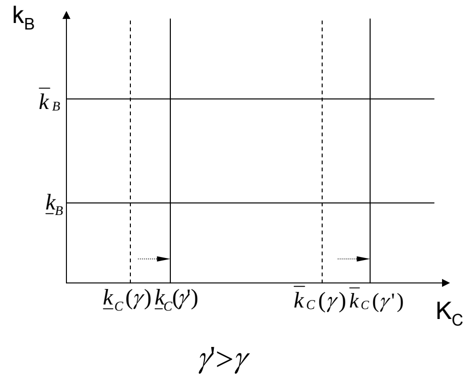



Figure 2: Effect of an increase in γ