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Red tape and corruption

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Abstract

We study the emergence and interaction of red tape and corruption in a principal–bureaucrat–agent hierarchy. The principal is to provide the agent with a unit of a good that involves externalities so that market mechanisms fail to achieve first best. Red tape produces information but is costly to the agent and is administered by a corrupt bureaucrat. First, the bureaucrat may extort bribes from the agent in exchange for reducing the amount of red tape. Second, the bureaucrat may take bribes to conceal the information produced through red tape. Even though the former kind of corruption tends to reduce red tape, we show that the equilibrium level of red tape is above the social optimum.

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1. Introduction

In this paper, we study the emergence and interaction of different types of corruption and red tape in a hierarchy. Red tape and corruption are probably the most ancient and widespread diseases of bureaucracy. They have been observed in all societies; there is no reason to believe that they will soon disappear. Numerous attempts to fight either of them seem to have brought only limited results. One of the problems with corruption and red tape in bureaucracy is that they cannot be treated independently. Corruption in one part of a hierarchy may stem from corruption in another part; excessive red tape may emerge due to potential corruption; bribes may be extorted because of potentially high red tape. When trying to make public bureaucracy

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more efficient, one should keep these interdependencies in mind in order to fight causes rather than consequences.

1.1. Costs and benefits of red tape

The costs of red tape are well known. These are non-pecuniary costs imposed on agents dealing with bureaucracy: firms and households spend substantial time and resources on getting through red tape.[1] In many parts of the world, especially in non-OECD countries, red tape ranks very high as an obstacle to doing business (De Soto, 1989; Brunetti et al., 1997), often being more important than financial constraints (EBRD, 1999; Johnson et al., 2000). Also, excessive regulation breeds corruption (Bardhan, 1997) which in turn is very costly to growth and development (Mauro, 1995).

The benefits of red tape are not yet well understood. One view is that complex rules and regulations are imposed on bureaucracy to reduce favoritism and discretion in order to contain corruption. Among others, Wilson (1989) argues that complicated red tape is created because society has compassion for people who, under simpler mechanisms (e.g. auctions or bribe auctions), would not get what society believes they deserve; red tape helps to overcome certain market failures. Although red tape may be very costly, nobody suggests eliminating red tape altogether; the socially optimal level of red tape is perceived to be positive. The problem is that self-interested bureaucrats tend to overproduce red tape relative to the social optimum.[2] The main goal of this paper is to study why there can be too much red tape and how to implement the socially optimal level of red tape if bureaucracy is self-interested and (potentially) corrupt.

1.2. Interaction between red tape and corruption

The well-known ‘grease-in-the-wheels’ argument claims that corruption may be good for growth since it relaxes the rigidity of bureaucracy (Huntington, 1968). Through bribes (‘speed money’), bureaucrats internalize the costs that regulations impose on other agents. This claim is widely criticized for not taking into account the endogeneity of the rigidity. Indeed, ‘when rules can be used to extract bribes, more rules will be created’ (Tanzi, 1998). Still, even if rigidities are endogenous, it is not clear why the *equilibrium* level of red tape is excessive. Indeed, the official level of red tape is high, but it is then negotiated down to a lower level. Moreover, since the outcome of illicit bargaining maximizes the joint surplus of the bureaucrat and the bribe-giver without taking into account the social benefits of red tape, the equilibrium level of red tape should be below the social optimum! For example, when regulations are intended to provide scarce goods to the poor,

[1] See EBRD (1999, p.124) for estimates of the ‘time tax’ imposed on managers by bureaucrats. Surveys of managers show that the time tax is substantial (about 10% of senior managers’ time), while the ‘bribe tax’ is about 6% of firms’ revenues. To register a firm in a median country in Djankov et al.’s dataset (which includes both OECD and non-OECD economies) one has to spend 32 business days.

[2] Excessive red tape is so common that many dictionaries *define* red tape as ‘unnecessary’ or ‘excessive’ official routines, rules, or procedures resulting in delays. In this paper, we understand red tape as any non-trivial number of routines, but do show that in equilibrium it tends to be excessive.

corruption reduces red tape too much and allocates the goods to the rich through a bribe auction.

In this paper, we show that excessive red tape can be explained in a more realistic setting where (in addition to speed money) there is also a risk of ex post collusion. We model red tape as a series of costly tests that produce information about the agent. Therefore, corruption can occur both ex ante and ex post. Ex ante corruption is described above: the agent pays speed money to reduce the amount of red tape *before* the information is produced. Ex post corruption occurs *after* the information is produced and the agent's type is known: the bureaucrat can collude with the agent to conceal the information. Ex post corruption provides the bureaucrat with incentives to increase the level of red tape: the more red tape, the greater chance to obtain the information and receive the bribe.

Thus, the effect of ex post corruption on red tape is opposite to that of ex ante corruption. Which of the two effects prevails? We show that a benevolent principal (public) always ends up having too much rather than too little red tape. In our model, the principal cannot implement the social optimum through price mechanisms: because of externalities, allocating a scarce resource to the agents with higher willingness to pay may be socially undesirable. Red tape helps to sort out the agents who do not deserve the resource. However, since administering red tape requires specific skills, the government has to hire a self-interested bureaucrat and deal with the ex ante and ex post corruption. Ex post corruption destroys all the benefits of red tape (the information produced through red tape is wasted), while all the costs are present. Hence, the government has to prevent the collusion ex post by paying the bureaucrat more for rejecting a socially undesirable applicant than the applicant's private willingness to pay. This payment can easily exceed the social value of rejecting the undesirable applicant. In this case, too much red tape is produced. Indeed, the bureaucrat fully internalizes the cost of red tape (through speed money) but benefits from it more than society does. The bureaucrat can end up with too much incentive to employ red tape but never too little. Indeed, if the private valuation (and therefore potential bribe) is below the social value of rejecting the applicant, then the collusion-proofness constraint is not binding and the social optimum is implemented.

1.3. Literature

Although the economic literature on corruption is relatively young (initiated by Rose-Ackerman, 1978), it has already developed into a well-established field (see surveys by Tirole, 1992; Bardhan, 1997). Both ex ante corruption and ex post corruption have been studied in detail (Shleifer and Vishny, 1993 refer to them as 'corruption without theft' and 'corruption with theft', respectively). In particular, our setting is similar to the three-tier hierarchy model of Tirole (1986) and Laffont and Tirole (1991). In the three-tier hierarchy, ex post corruption occurs when the bureaucrat finds out that the agent is of a socially undesirable type but agrees not to report this fact to the principal. Also, the result that the threat of corruption imposes a constraint on the social planner and therefore distorts the equilibrium (even if efficiency wages prevent corruption) is not new; it has been obtained in different settings (e.g. Tirole, 1992; Acemoglu and Verdier, 2000). The contribution of our paper is to combine ex post and ex ante corruption in one model, and to study the interaction between different kinds of corruption and red tape.

Red tape has received much less attention in the literature. The seminal paper by Banerjee (1997) analyzes red tape in general, and the link between red tape and corruption in particular. In his model, the government wants to provide a cash-constrained agent with a good which may be either of high or low value to the agent. The government prefers to give the good to agents of high type rather than to those of low type. The agent's type is her private information. In order to screen the agents, the government introduces red tape.

In this paper, we use a similar framework, but there are two major distinctions. First, in the work of Banerjee (1997), red tape is a pure cost imposed upon the agent. The bureaucrat can then use red tape as an uninformative costly signal about the agent's type. Another screening device is prices, but as long as agents are cash-constrained, red tape is more effective. The model can therefore be applied to any means of non-monetary harassment which bureaucrats are authorized to use (e.g., queues). In this paper, we study the case where red tape is informative per se.[3] A simple point that may justify the informativeness of red tape is that it is always related to the social value of the good to be allocated. When applying for a welfare benefit from the government, a person is usually asked to submit a document certifying her low income rather than required to do some physical exercises or taking a course in economics, though all are costly and can be used for screening.

Second, we study a more general case of market failure by considering a setting with externalities rather than cash constraints. We assume that private and social values of the good are different. This setting covers many government activities such as issuing and renewing licenses, passports, visas, and product quality certificates; assigning procurement contracts; and providing certain public goods. Even in the case of regulated provision of private goods such as targeted transfers, welfare benefits, and food rations, the social value is higher than the private value: the society has a preference for equity. In the presence of externalities, neither prices nor any uninformative mechanisms can help in screening agents even if there are no cash constraints. In the work of Banerjee (1997), the socially desirable types of agents are willing to pay for the good, but cannot pay in cash. In our setting, the market failure is more fundamental: the eligible agents are not willing to pay (in monetary or non-monetary ways). Hence, red tape can screen the agents only when it produces information. Our model therefore formalizes the insights of Wilson (1989) and Bardhan (1997), who argue that regulation is often introduced in order to achieve certain social objectives. The trade-off between informativeness and cost of red tape results in imperfect screening of agents in the social optimum, when all types of agents apply for the good but get the good with different probabilities.

1.4. Structure of the paper

In Section 2, we set up the formal model. In Section 3, we solve for the equilibrium level of red tape under the threat of ex ante and ex post corruption, and compare it to the social optimum. Section 4 concludes.

[3] Banerjee (1997, p. 1294) acknowledges that red tape does produce information in the real world, but chooses to concentrate on the case of purely wasteful red tape. In this sense, our paper complements his analysis.

2. Model

2.1. Setting

We consider a hierarchy of a principal P (government or public), an agent A (customer), and a bureaucrat B (government official) who supervises the agent and reports to the principal. B and A are selfish. P maximizes social welfare which is the sum of the utilities of A and B, and of externalities on agents who are not included in the model.

2.1.1. Production technology and externalities

The principal can supply a unit of a good (or a service) to the agent. The agent's valuation of the good is $\theta > 0$. The social cost of provision of the good is c. The net social benefit of provision is therefore $v = \theta - c$. The agent can be either of a 'good' type characterized by private value θ^g and cost of provision $c^g < \theta^g$ or of a 'bad' type with θ^b and $c^b > \theta^b$. Since $v^b < 0 < v^g$, the first best would be to provide the good to the good type and not to provide to the bad one. The difference in the social costs $c^b - c^g > 0$ is the externality that the bad type imposes on the society.

The framework is quite general and describes surprisingly many governmental activities: provision of goods and services with externalities on third parties; assignment of procurement contracts; university admission and appointments; recruitment of public servants; etc. A typical example is issuing licenses to firms, some of which want to engage in legal business, and some to engage in semi-criminal activities or those endangering the environment. The private return to the socially undesirable activities may be very high so that the public does not want to sell the license in an auction.

The same logic applies to issuing passports or visas, or to privatizing public property under imperfect capital markets. Suppose that the government wants to allocate property to the most efficient owner (the 'good' type) but the latter does not have enough cash and the cost of borrowing is very high. On the other hand, it may occur that a less efficient owner (the 'bad' type) has enough cash to buy the property. In this case, the good type's valuation is NPV of future revenues minus the cost of borrowing, which may be less than the bad type's NPV.

2.1.2. Asymmetric information

The agent's type is her private information. The prior distribution of types is common knowledge: with probability $\pi \in (0,1)$ the agent is of the bad type and with probability $1 - \pi$, she is of the good type. The model also allows an alternative formulation with a continuum of agents, proportion π of which are of bad type, and $1 - \pi$ of the good type.

2.1.3. Red tape

The principal cannot distinguish the types ex ante. However, types can be screened through red tape. We model red tape as a questionnaire that consists of a number of tests. The greater the amount of red tape (the number of tests), the more it costs the agent, but the more likely the agent's type is revealed. Red tape is measured in terms of its cost to the agent $r \geq 0$. The outcome ρ of the tests is either 'pass' $\rho = 1$ or 'fail' $\rho = 0$. The good type passes any number of tests with probability 1. The bad type passes r tests with probability

$1-I(r)$. Here $I(r)$ is a measure of the informativeness of red tape. We will assume that $I(r)$ is an increasing concave twice-differentiable function: $I'(r)>0$, $I''(r)<0$, $I(0)=0$, and $I(\infty)\leq 1$ (for simplicity's sake, r is a real number). The share of the good types among those who pass r tests $\frac{1-\pi}{\pi(1-I(r))+(1-\pi)}$ is greater than their share in the whole population $1-\pi$. Moreover, the former share increases with r.

P is not competent at administering red tape and hires a bureaucrat B. B chooses the level of red tape r, observes its outcome ρ and reports $\hat{\rho}$. The report $\hat{\rho}$ may or may not coincide with the true outcome ρ. We assume that B can conceal the evidence of failing the test, but cannot forge the evidence of A's failure if the test is passed successfully; in other words, $\hat{\rho}\geq\rho$.[4] If $\rho=1$, B can only report $\hat{\rho}=1$; if $\rho=0$, B may report $\hat{\rho}=1$ or $\hat{\rho}=0$.

P cannot observe the level of red tape r. Indeed, the number of tests is public information but what matters is how much the red tape costs the agent and how much information it produces.

Since the *reported outcome* $\hat{\rho}$ is verifiable, P announces a provision rule $\sigma(\cdot):\{0,1\}\rightarrow\{0,1\}$—whether or not to provide the good contingent on the reported outcome of the tests $\hat{\rho}$. P can choose either of $2*2=4$ provision rules $\sigma(\cdot)$: (i) provide to everyone $\sigma(\hat{\rho})\equiv 1$; (ii) provide to nobody $\sigma(\hat{\rho})\equiv 0$; (iii) provide only to those who pass the test $\sigma(\hat{\rho})=\hat{\rho}$, and (iv) provide only to those who fail $\sigma(\hat{\rho})=1-\hat{\rho}$. Using red tape makes sense only if rule (iii) is chosen: $\sigma(\hat{\rho})=\hat{\rho}$. This rule incorporates the common view that P uses red tape to reduce B's discretion: B can only provide the good to those who pass the test.[5]

2.1.4. Bureaucrat's incentives

Following Banerjee (1997), we assume that the bureaucrat's salary can be made contingent on the ex post distribution of types who received the good or who were rejected. The technology for measuring the distribution ex post is as follows. With a very small probability, P (costlessly) learns the type of the agent. In the alternative interpretation with a continuum of agents A, P checks a negligible number of agents and extrapolates the share of bad types which received the good. Also, the number of rejected applications is known ex post. In both formulations, the probability of being caught is infinitesimal for every given agent. The bad types who successfully passed through the red tape will keep the good with a probability very close to 1.[6]

Consider the case of licensing firms with environmental externalities. In order to observe the ex post distribution, the government simply needs to measure pollution. A

[4] This follows the framework in the works of Tirole (1986) and is based on the concept of 'partial verifiability' (Green and Laffont, 1986). If B could both fabricate and conceal the evidence, red tape would not make sense: reporting would be fully in B's discretion.

[5] In addition to provision rules, the principal could also use prices or application fees (payments made when A applies for the good rather than when she gets the good, similar to all-pay mechanisms in Banerjee, 1997). For simplicity, we do not consider these mechanisms at all. The setting with red tape, prices and application is discussed in the working paper Guriev (2003). Although adding prices and application fees helps to increase welfare, the main results still hold: in the presence of externalities, it is hard to implement the social optimum.

[6] The principal can check a small representative sample but not the whole population. If the principal observed types of the whole population ex post and could take the good away from the bad type (or impose a penalty on her), red tape would not be needed. See Banerjee (1997, p.1295) for a detailed discussion of this assumption.

similar logic applies in the case of issuing visas, hiring public servants, or university admissions. Neither the admissions committee (B) nor the trustees (P) can observe the quality of applicants (A) ex ante. On the other hand, quality is observed ex post (for example, via placement of graduates) and P can reward (in pecuniary or non-pecuniary means, or through career concerns) B for admitting better applicants.

Thus, P offers B a contract (s^b, s^g, s^0): B is paid s^b when the bad type gets the good, s^g when the good type does, and s^0 when nobody does.[7] The base salary s^0 is determined by B's reservation utility (for simplicity normalized to zero).[8] We assume that the cost of transfers is zero: a dollar paid to B costs taxpayers (whose utility enters P's objective function) precisely one dollar. In other words, the contract (s^b, s^g, s^0) may include monetary payments or fines as well as non-pecuniary benefits, but does not include imprisonment. To shorten the proofs, we will only consider monotonic rules $s^b \leq s^0 \leq s^g$.

2.1.5. Notation

To simplify notation, we will introduce the marginal incentives $\Delta^g = s^g - s^0$ (the bonus for letting the good type get the good) and $\Delta^b = s^0 - s^b$ (the punishment for letting the bad type get the good). Hence, B's contract (s^b, s^g, s^0) will be replaced with ($s^0 - \Delta^b$, $s^0 + \Delta^g$, s^0).

Denote R^g and R^b to be the maximum participation levels of red tape at $\sigma(\rho) = \rho$ for the good and bad types, respectively:

$$\theta^g = R^g, \theta^g(1 - I(R^b)) = R^b.$$

Also, let us introduce r^0, the maximum amount of red tape which still produces more information than it costs the agent. Apparently, r^0 is the largest root of

$$\pi \,|\, v^b \,|\, I(r) = r.$$

Whenever $\pi \,|\, v^b \,|\, I'(0) > 1$, this amount is positive, and red tape produces a positive social benefit for all $r \in (0, r^0)$.

2.2. Timing and payoffs

The timing is as in Fig. 1. First, A learns her type. Then the principal offers a contract (s^b, s^g, s^0) to B. P also chooses the provision rule $\sigma(\cdot)$. B decides whether to take the contract. If B takes the contract, he sets the level of red tape r. B may also ask A for a bribe β for lowering red tape: B may threaten A with a high level of red tape and offer a lower level for a bribe. Given r and $\sigma(\cdot)$, the agent decides whether to apply for the good. If she

[7] The technology of observing the distrubution ex post requires B's reward to be linear: B gets $N^g s^g + N^b s^b + N^0 s^0$, where N^g, N^b, N^0 are probabilities that the good was given to the good type, to the bad type, or to nobody, respectively. The results would not change if non-linear contracts were allowed (e.g. in a formulation with a continuum of agents): only marginal rewards ($s^g - s^0$ and $s^0 - s^b$ in a neighborhood of equilibrium) matter. Other parameters of the contract only influence the expected level of compensation which is determined by B's participation constraint.

[8] Instead of the individual rationality constraint $E_i s^i \geq 0$, one could introduce the limited liability constraint: $s^i \geq 0$ for all i. The results would be the same since the level of red tape only depends on the marginal rewards $s^g - s^0$ and $s^0 - s^b$.

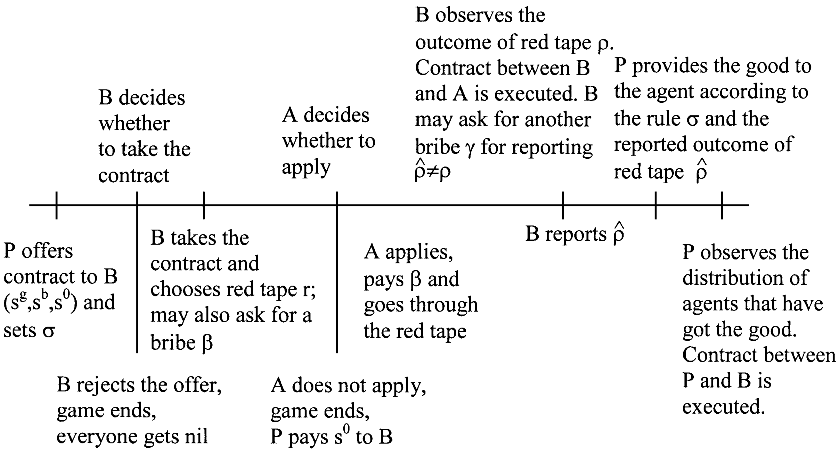

Fig. 1. Timing.

quits, the game ends. If she applies, she pays the bribe β to B. Then she undergoes the tests and bears the cost r. B learns the outcome ρ of the tests and reports $\hat{\rho}$ to the principal. B may misreport the outcome ($\hat{\rho}>\rho$) in exchange for another bribe γ.

Given the reported outcome of tests $\hat{\rho}$, P executes the contract. If $\sigma(\hat{\rho})=1$, P provides the good to the agent; otherwise A does not get the good. Then P checks a small representative sample of the agents who received the good and observes the distribution of types. For each agent who gets the good, B is paid s^i, $i=g$, b, if the agent's type is i; if the agent does not get the good, B is paid s^0.

We will compare the outcomes with and without corruption. If there is no ex ante corruption, then $\beta\equiv 0$. If there is no ex post corruption, then $\gamma\equiv 0$. If corruption is allowed, then the bribes β and γ are determined through bargaining between B and A. For simplicity's sake, we assign all bargaining power to B: B makes A a take-it-or-leave-it offer.

The agent maximizes her expected payoff net of the cost of red tape. If the good type applies, she gets

$$U^{\mathrm{g}} = \theta^{\mathrm{g}}\sigma(1) - r - \beta. \tag{1}$$

If the bad type applies, she gets

$$U^{\mathrm{b}} = \theta^{\mathrm{b}}[\sigma(1)(1 - I(r)) + \sigma(\hat{\rho})I(r)] - r - \beta - \gamma I(r). \tag{2}$$

The bureaucrat maximizes her expected salary plus bribes, taking into account the fact that agents may choose not to apply for the good:

$$\begin{aligned} U^{\mathrm{B}} = s^0 &+ (\Delta^{\mathrm{g}}\sigma(1) + \beta)(1 - \pi)1(U^{\mathrm{g}}\geq 0) + (-\Delta^{\mathrm{b}}[\sigma(1)(1 - I(r)) \\ &+ \sigma(\hat{\rho})I(r)] + \beta + \gamma I(r))\pi 1(U^{\mathrm{b}} > 0), \end{aligned} \tag{3}$$

where $1(x)$ is the indicator function which takes a value of 1 whenever statement x is true, and equals 0 otherwise.

The principal maximizes social welfare which includes the welfare of B and A, but also takes into account externalities on third parties, as well as taxpayers' expenditures. Hence, all monetary transfers (bribes and B's salary) cancel out; when an agent of type i gets the good, social welfare changes by v^i rather than by θ^i:

$$W = (v^{\mathrm{g}}\sigma(1) - r)(1-\pi)1(U^{\mathrm{g}} \geq 0) + (v^{\mathrm{b}}[\sigma(1)(1-I(r)) + \sigma(\hat{\rho})I(r)] - r)\pi 1(U^{\mathrm{b}} > 0). \tag{4}$$

To illustrate Eq. (4), let us consider an important special case when both types apply, the good is provided to those who pass $\sigma(\hat{\rho}) = \hat{\rho}$, and the outcome is truthfully reported $\hat{\rho} = \rho$:

$$W = [(1-\pi)v^{\mathrm{g}} - \pi|v^{\mathrm{b}}|] + [\pi|v^{\mathrm{b}}|I(r) - r].$$

The first term is welfare without red tape (the good is given to everybody). The second term is the net social benefit produced by red tape: red tape costs r, but saves $\pi|v^{\mathrm{b}}|I(r)$ because the good is not provided to the bad type with probability $I(r)$.

It is important to emphasize the difference between ex ante and ex post corruption. Ex post corruption is collusion between the bad type and the bureaucrat, while ex ante corruption occurs when B has no information on the agent. Ex ante, both good and bad types may give a bribe to reduce the level of red tape. Ex ante corruption seems innocent: unlike ex post corruption, there is no clear 'theft' from the public. On the other hand, this kind of corruption also involves changes in real terms: B and A choose the level of red tape best for their joint surplus, which may well differ from the socially optimal level. P may try to influence the outcome of ex ante collusion by choosing B's incentives Δ^{g} and Δ^{b},[9] but as we show below the choice of Δ^{b} may be constrained by the threat of ex post corruption.

The timing above rules out signalling the agent's type through bribes. Allowing such signals would not change the results: it is the good type that would like to reveal its type. B would also like to serve the good type: in equilibrium, P provides B with incentives to care more for the good type. In the presence of externality, however, it is the bad type who is willing to pay a higher bribe.

2.3. Assumptions

In order to concentrate on the most interesting case, we shall make the following assumptions.

[9] We assume that P knows B's propensity for ex post and ex ante corruption. In this setting, P always prevents ex post corruption in equilibrium. If there were asymmetric information and bureaucrats differed in their cost of illicit tranfers (Tirole, 1992), probability of being caught (Acemoglu and Verdier, 2000), or disutility of punishment (Banerjee, 1997), collusion would still occur in equilibrium. This would also be the case in a setting with several bad types.

Assumption A1: The pooling equilibrium without red tape yields positive social welfare

$$W^0 = (1-\pi)v^g + \pi v^b > 0. \tag{5}$$

This assumption implies that social welfare is greater when the good is provided to everyone rather than when it is not provided at all.

Assumption A2: Agents cannot be fully separated: $\theta^b > \theta^g/(1-I(\theta^g))$.

This assumption is equivalent to $R^b > R^g$. The bad type's valuation is so high that she is even ready to go through more red tape than the good type (unlike Banerjee, 1997). Assumption A2 helps to simplify the structure of equilibria; otherwise for some parameter values, the second best would be to exclude the bad type at a cost of very high red tape.

Assumption A2 implies $\theta^b > \theta^g$. Therefore, if the good is sold at a given price p or auctioned off, the first best cannot be achieved.

Assumption A3: Interior optimum:

$$\pi|v^b|I'(R^g) < 1 < \pi|v^b|I'(0).$$

This is a technical assumption that assures that the social optimum is interior and is determined by the first order condition. The right-hand-side inequality implies that the marginal social benefit of a small amount of red tape $\pi|v^b|I'(0)\mathrm{d}r$ is greater than its cost $\mathrm{d}r$; hence, red tape is not trivial in the social optimum. Similarly, the left-hand side inequality requires that the marginal social benefit of red tape falls below its marginal cost before the good type drops out.

3. Red tape and corruption in equilibrium

In this section, we solve for the equilibrium. We shall begin by describing the social optimum, i.e. the benchmark outcome that is achieved when B maximizes social welfare. Then we check whether this social optimum can be implemented if B is selfish, i.e. maximizes Eq. (3). Essentially, the model has two layers of agency problems. First, there is an adverse selection problem, with the bad type pretending to be the good one. Second, there is a two-dimensional moral hazard problem, with B choosing red tape r and reporting its outcome ρ. B may want to choose inefficient level of red tape because he does not internalize its social cost fully, or because red tape increases the probability of getting the bribe ex post. B may also want to misreport ρ since he can extort bribes from the bad type ex post.

3.1. Social optimum

Red tape is costly but also informative; therefore, the optimal level of red tape is not trivial. If the agent's type was common knowledge, no red tape would be needed $r=0$; the good type would be given the good and the bad type would be excluded. The first-best level of welfare would be $W^{FB}=(1-\pi)v^g$. In what follows, we will assume that the agent's type is known only to the agent and can only be verified through red tape. We will refer to the resulting second best as the social optimum. Essentially, we study how well P would cope with the adverse selection problem if there were no moral hazard related to the choice of red tape and corruption. This is the case if B never takes bribes $\beta \equiv \gamma \equiv 0$ and acts in the interest of P, i.e. always sets the level of red tape that the principal wants to implement and truthfully reports the outcome $\hat{\rho} = \rho$.

The social optimum is therefore the choice of r and $\sigma(\cdot)$ that maximizes Eq. (4) subject to Eqs. (1) and (2), $\beta = \gamma = 0$, $\hat{\rho} = \rho$.

Proposition 1: *Under Assumptions A1–A3, the social optimum is as follows:* $\sigma(\rho) = \rho$, $r = r^*$ *where*

$$I'(r^*) = \frac{1}{\pi |v^{\mathrm{b}}|}. \tag{6}$$

Both types apply. Welfare is $W^* = W^0 + \pi |v^b| I(r^*) - r^*$.[10]

Thus, in the social optimum, the types are partially screened: both types apply, but the good type gets the good with a higher probability than the bad one. The good type still receives lower expected rent $U^{\mathrm{g}} < U^{\mathrm{b}}$. Indeed, Assumptions A2 and A3 jointly imply $r^* < R^{\mathrm{g}} < R^{\mathrm{b}}$, hence $\theta^{\mathrm{g}} - r^* < \theta^{\mathrm{b}}(1 - I(r^*)) - r^*$.

3.2. Corruption and excessive red tape

In order to implement the social optimum, P needs to overcome two moral hazard problems. B should have incentives (i) to choose the right level of red tape, and (ii) to report the true outcome of the tests. In this subsection we show that solving both problems may be hard if B is corrupt.

We allow both for ex ante and ex post corruption. Ex ante corruption occurs when the bureaucrat threatens the agent with a high level of red tape r^{t}, but also offers to lower red tape down to r in exchange for a bribe β to maximize his surplus, which is legal rewards plus bribes (Eq. (3)). Since red tape is not observed by the principal, B can threaten a prohibitively high level of red tape $r^{\mathrm{t}} \geq R^{\mathrm{b}}$ at which both types get zero rent (by taking the outside option). The bureaucrat may choose whether (i) to deter one type and extract all the rent from the other one or (ii) let both types in. If both types apply, then B extracts all the rent from the type with lower rent, leaving a certain informational rent to the other type. Assumption A2 implies that the good type gets a lower rent, hence $\beta = \theta^{\mathrm{g}} - r$.

Ex post corruption may occur once the bad type fails the test. If the evidence of failure is concealed and $\sigma(\rho) = \rho$, the bad type gets the good and gains θ^{b}. On the other hand, the bureaucrat gets a lower salary ($s^0 - \Delta^{\mathrm{b}}$ instead of s^0). If collusion increases the joint surplus of B and A ($\theta^{\mathrm{b}} - \Delta^{\mathrm{b}} > 0$), then the bribe $\gamma \in [\Delta^{\mathrm{b}}, \theta^{\mathrm{b}}]$ redistributes the gain from A to B so that both B and A benefit from collusion. Since B has all the bargaining power, he gets a bribe of $\gamma = \theta^{\mathrm{b}}$.

The principal can prevent collusion by setting $\Delta^{\mathrm{b}} \geq \theta^{\mathrm{b}}$. Indeed, in this case, the bureaucrat earns more by reporting the bad type.

[10] Proofs are available in the working paper version of Guriev (2003).

Definition 1: B's contract is said to be collusion-proof if $\Delta^b \geq \theta^b$.

If B's salary is not collusion-proof $\Delta^b < \theta^b$, B will always report that A passes the test $\hat{\rho}=1$ while the true outcome ρ may be either success or failure. Therefore, $\sigma(0)$ becomes irrelevant, and the provision rule $\sigma(\rho)=\rho$ ('provide the good only to those who pass the test') performs as badly as the rule $\sigma(\rho)\equiv 1$ ('provide to everyone'). The latter rule does not take advantage of red tape's informativeness and can only achieve welfare W^0. To implement any level of welfare higher than W^0, P must offer a collusion-proof contract. The problem is that collusion-proofness may become a binding constraint for the mechanism design problem (like in the work of Tirole, 1992).

Proposition 2: *Suppose that Assumptions A1–A3 hold, and both ex ante and ex post corruption is allowed.*

1. *If $\theta^b \leq |v^b|$, P implements the social optimum through setting $\sigma(\rho)=\rho$, $\Delta^b=|v^b|$, and sufficiently high Δ^g.*
2. *If $\theta^b > |v^b|$, P cannot implement the social optimum. The equilibrium is as follows:*

   (a) If $|v^b| < \theta^b \leq [\pi I'(\min\{r^0, R^g\})]^{-1}$, P sets $\sigma(\rho)=\rho$, $\Delta^b=\theta^b$, and sufficiently high Δ^g. The equilibrium level of red tape is $\bar{r}>r^*$, where $I'(\bar{r})=\frac{1}{\pi\theta^b}$. Welfare is

   $$\bar{W} = W^0 + \pi|v^b|I(\bar{r}) - \bar{r}.$$

   (b) If $\theta^b > [\pi I'(\min\{r^0, R^g\})]^{-1}$, P sets $\sigma(\rho)\equiv 1$, $\Delta^b=\Delta^s=0$. The equilibrium level of red tape is $r=0$. Welfare is W^0.

The intuition is straightforward. If giving the good to the bad type is very costly ($|v^b|$ is sufficiently high, case 1), then P wants to implement a high level of red tape. P provides a large bonus Δ^b for catching and reporting the bad type, the collusion-proofness constraint is not binding, and the social optimum is implemented. However, if the social benefit of red tape is relatively low (case 2), then P would like to reduce red tape by lowering Δ^b, but collusion-proofness requires that the bonus Δ^b exceeds the potential bribe θ^b. Hence, the principal can only prevent ex post corruption at a cost of excess incentives to catch the bad type, which in turn results in excessive red tape $\bar{r}>r^*$. If the increase in red tape is moderate (case 2a) then the principal accepts it.

If the deviation from the social optimum is too large (case 2b), the principal prefers to abandon red tape altogether. In this case, the potential costs of corruption are so high that the second best is essentially equivalent to firing the bureaucrat. It is not uncommon for both OECD and non-OECD governments to discontinue regulating certain business activities that have previously been closely controlled.[11] Many of the deregulated activities have clear externalities, so a positive amount of red tape would increase social welfare.

[11] See Klitgaard (1988) for a discussion of the positive effect on corruption of legalizing off-track betting in Hong Kong. Russia's recent deregulation reform has cut the list of licensed activities tenfold (CEFIR, 2002). Also, see Djankov et al's (2002) discussion of the new business registration procedures in New Zealand (takes 3 business days) and France (53 business days).

However, in the presence of corruption, the high social cost of red tape makes the society better-off implementing zero level of red tape and providing the good to all applicants.

3.3. Ex post vs. ex ante corruption

In this subsection, we shall find out whether it is ex ante or ex post corruption that leads to excessive red tape. We study the cases when B can be involved in one kind of corruption but not in the other one, and compare the equilibrium to the social optimum. Although it is unlikely that the bureaucrat can be honest ex ante but corrupt ex post, this problem does reach beyond theoretical interest. Indeed, if P has limited resources to fight corruption, e.g. through hiring external monitors, which kind of corruption should P focus upon to reduce inefficiency?

Let us start with the case where B can extort bribes ex ante but cannot engage in ex post collusion (i.e. $\gamma \equiv 0$). Collusion-proofness is not a constraint any more, so the main problem of Proposition 2 disappears. Hence, P can align B's incentives with those of society by setting Δ^g sufficiently high (so that the good type is not excluded) and $\Delta^b = |v^b|$ so that the optimal amount of red tape is implemented. Indeed, B gets

$$s^0 + (1-\pi)\Delta^g - \pi\Delta^b(1 - I(r)) + (\theta^g - r).$$

The last term represents the bribe β. The bureaucrat fully internalizes the cost of red tape: if A's cost of red tape increases by one dollar, B can extort one dollar less in bribes. B's individual marginal return to red tape is equal to the social one: $\pi\Delta^b I'(r) = \pi|v^b|I'(r)$. Hence, B chooses the level of red tape that maximizes $\pi|v^b|I(r) - r$; the social optimum is implemented.

Now let us see whether potential ex post collusion limits the principal's ability to implement the social optimum in the absence of ex ante corruption. If B does not take bribes either ex post or ex ante, the social optimum is implemented through $\Delta^b = 0$. B gets $s^0 + (1-\pi)\Delta^g$ and is therefore indifferent in choosing the level of red tape, and can set $r = r^*$.[12]

Compare the case of an honest B with the case where he can be corrupt ex post but not ex ante. B maximizes $U^B = s^0 + \Delta^g(1-\pi) - \pi\Delta^b(1 - I(r)) + \pi\theta^b I(r)1(\theta^b > \Delta^b)$, where the last term represents the ex post bribe. The flat contract $\Delta^b = 0$ is not collusion-proof; offering the flat contract would provide incentives for excessive red tape. Indeed, B does not internalize the cost of red tape, and is interested in raising it to increase the probability of detecting the bad type. Through setting Δ^g high enough, P can constrain red tape from above only by R^g (B is afraid to deter the good type from applying). P can prevent ex post collusion by offering $\Delta^b \geq \theta^b$, but this will not reduce red tape. Hence P faces a choice between too much red tape ($r = R^g > r^*$, welfare is $W^0 + \pi|v|^b I(R^g) - R^g < W^*$) and firing the bureaucrat ($r = 0$, welfare is $W^0 < W^*$).

The discussion above is summarized in the following proposition.

[12] The fact that B is indifferent between r^* and other levels of red tape in equilibrium is an artefact of the trivial cost of red tape to the bureaucrat. if the red tape imposed a positive (even infinitesimal) cost on B, the socially optimal level r^* would be B's unique choice: P would set Δ^b such that B's private marginal cost of red tape would be equal to his private marginal benefit $\Delta^b \pi I'(r^*)$.

Proposition 3: *Assume that Assumptions A1 A2 A3 hold.*

1. *If there is ex ante corruption but no threat of ex post corruption, then P implements the social optimum via the following mechanism: P sets* $\sigma(\rho)=\rho$, $\Delta^{g}=\max\{v^{g},\frac{\theta^{b}-\theta^{g}}{1-\pi}\}$ *and* $\Delta^{b}=|v^{b}|$. *Then B chooses* $r=r^{*}$ *and* $\beta=\theta^{g}-r^{*}$.
2. *If ex post corruption is allowed but there is no ex ante corruption, then P cannot implement the social optimum. The equilibrium is as follows:*
   (a) *If* $R^{g}<r^{0}$, *P sets* $\sigma(\rho)=\rho$, $\Delta^{b}\geq\theta^{b}$, *and* Δ^{g} *sufficiently high. The equilibrium level of red tape is* $R^{g}>r^{*}$. *Welfare is* $W^{0}+\pi|v^{b}|I(R^{g})-R^{g}$.
   (b) *If* $R^{g}\geq r^{0}$, *P sets* $\sigma(\rho)\equiv 1$, $\Delta^{b}=\Delta^{s}=0$. *The equilibrium level of red tape is* $r=0$. *Welfare is* W^{0}.
3. *If neither ex post nor ex ante corruption are allowed, then P implements the social optimum through a flat contract* $\Delta^{b}=0$, *and sufficiently high* Δ^{s}.

Propositions 1–3 imply that ex post corruption limits the principal's ability to implement the socially optimal level of red tape. Again, corruption results in too much rather than too little red tape. The excessive red tape may be so costly that P may even prefer to abandon red tape and to provide the good to everybody $\sigma(\rho)\equiv 1$ (effectively firing the bureaucrat).

4. Conclusions

We have built a theory of red tape and corruption in a principal–bureaucrat–agent hierarchy. The setting is very simple: a benevolent government provides a good to different types of agents. Provision involves externalities so that agents who are eligible for the good are willing to pay less than agents whom the government wants to exclude. Because of these externalities, the agent's type cannot be perfectly screened by market mechanisms. Red tape can help to screen types, albeit partially. Red tape is modelled as a series of costly tests that reveal information about the agent's type. To administer red tape, government hires a bureaucrat, who can take bribes ex ante and ex post. In the model, both red tape and bribes are endogenously determined given the bureaucrat's propensity for each type of corruption.

The government faces a complex web of challenges. On top of the adverse selection problem (the agent's type is her private information), there is a two-dimensional moral hazard problem: the bureaucrat may set an inefficient level of red tape ex ante and misreport the agent's type ex post. In equilibrium, the government manages to solve the latter problem, but this undermines its ability to solve the former. Although the threat of ex post corruption is not realized in equilibrium, it still results in excessive red tape, even after the bureaucrat reduces red tape in exchange for bribes.

The contribution of the paper is in showing that potential corruption results in too much (rather than too little) red tape in equilibrium compared with the social optimum. This result is not trivial because we consider two countervailing effects: (i) corrupt officials can take bribes ex ante to reduce red tape; (ii) corrupt bureaucrats create more red tape in order to reveal information and extort bribes. The first effect alone should predict a high official level of red tape which is negotiated to a lower level in exchange of a bribe. Moreover, since the equilibrium level of red tape is chosen by the coalition of the bureaucrat and the agent without taking externalities into account, one should expect too little red tape compared with the social optimum. The second effect predicts that the equilibrium level of red tape is above the social optimum. We show that the second effect always prevails. Excessive red tape occurs because of the threat of ex post corruption even if there is no corruption in equilibrium. The principal eliminates ex post corruption by offering a collusion-proof contract, but the need to alter the bureaucrat's contract adds a constraint to the mechanism design problem and reduces the principal's ability to achieve the efficient outcome.

Our result runs against a common view best stated by Huntington (1968):

> ...the only thing worse than a society with a rigid, overcentralized, dishonest bureaucracy is one with a rigid, overcentralized, honest bureaucracy.

Why does not this view hold in our model? The question is not trivial. Indeed, our model does include the effect the view is based upon: corruption helps the bureaucrat internalize the costs of rigidities imposed on society. However, our model has two other important features. First, we assume that the bureaucrat's incentives are set by a rational benevolent principal. Second, and what is more important, we endogenize the rigidities. Indeed, if the official level of red tape is too high, (ex ante) corruption reduces it to a more reasonable level, which in turn depends on the incentives that the principal offers to the bureaucrat. Our analysis shows that due to the threat of ex post corruption, the principal cannot provide incentives to bring the equilibrium level of red tape all the way down to the social optimum. Corruption results in excessive red tape.

Formally speaking, our model also includes a special case with too little red tape. This is the case where the problem of excessive red tape is very acute. If government were to undertake regulation, potential corruption would result in so much red tape that it is better to abandon any regulation. The red tape is therefore zero which is below the positive socially optimal level.

Therefore, even taking into account the positive role of speed money, the overall effect of corruption on red tape is not at all innocent. Corruption either results in excessive red tape or makes the government withdraw from socially justified regulation. In both cases, corruption reduces social welfare.

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