Organized vs. competitive corruption[1]

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Abstract

We study bureaucratic corruption in a model in which a constituency sets required levels for a given set of activities. Each activity is carried out by an external provider, and its realization is supervised by a bureaucrat. While bureaucrats are supposed to act on behalf of the constituency, they can decide to be corrupt and allow providers to deliver lower activity levels than contracted in exchange for a bribe. Given this, the constituency sets the optimal activity levels weighing o¤ the value of activity levels, their costs, as well as the possibility for the bureaucrats to be corrupt. We use this setup to study the impact on equilibrium corruption of the degree of decentralization of corruption. To do this we compute equilibrium corruption in two di¤erent settings: 1) Each bureaucrat acts in such a way as to maximize his own individual utility (competitive corruption); 2) An illegal syndicate oversee the corruption decisions of the population of bureaucrats in such a way as to maximize total proceeds from corruption (organized corruption). We show that, since average corruption payo¤ is increasing in the activity levels set by the constituency, and since the latter responds to high levels of corruption by reducing required activity levels, in equilibrium the illegal syndicate acts in such a way as to restrain the total number of corrupt transactions, so that corruption is lower when it is organized than when it is competitive.

Keywords: Competitive and organized corruption, institutional response.

JEL classi…cation numbers: C72, D73, K42.

1 Introduction

Corruption has long been recognized as one of the most important factors a¤ecting the creation and the distribution of wealth and the last years have witnessed an increased interest in the topic. Apart from innumerable accounts of corruption cases in the press, the concern of the international economic community can be easily recognized looking at the e¤orts that international organizations and consulting organizations are devoting to study the problem and to propose solutions for it. OECD countries recently approved the "Convention on Combating Bribery of Foreign Public O¢cials in International Business Transactions." Ongoing projects of the World Trade Organization, the United Nations, the Council of Europe are but a few examples of supranational attempts to …ght corruption. The Business International Corporation, part of the Economist Intelligence Unit, sells rankings (based on questionnaires …lled by correspondents and analysts) of countries' institutional e¢ciency, including bureaucratic e¢ciency and corruption.

The economic profession has increased its attention to the problem especially since it has become clear that corruption does not simply lead to redistribution of surplus, but, due to its illegal nature, also creates a score of additional distortions in the production of wealth. Early contributions to this line of research include Tullock's (1967) and Krueger's (1974) studies of the distortions implied by rent-seeking activities. Mauro (1995 and 1998) uses corruption indices to show corruption's impact on investment levels, government expenditure composition, and ultimately on GDP growth.

Recent research has turned attention to the implications of the di¤erent ways corrupt transactions are organized ranging from the substantially centralized structures of Italy, the Soviet Union, South Korea and Japan to the more decentralized systems operating in former Soviet republics, India and Africa. Shleifer and Vishny (1993) argued that when bureaucrats sell government assets and can collect bribes from private agents and when di¤erent government assets are complements for the latter, the fact that one bureaucrat demands a bribe and therefore increases the cost of the asset, has an external e¤ect on the other bureaucrats in that it decreases demand for their assets and ultimately their ability to pro…t from corruption. For this reason Shleifer and Vishny (1993) argue that whenever bureaucrats collude in bribe setting, they internalize the external e¤ect to maximize total corruption revenue and in so doing decrease the negative e¤ects of corruption on economic activity. Bardhan (1996) argued that centralization of bribe setting also

allows the possibility of "lump sum" corruption that minimizes distortions and therefore the e¢ciency cost of corruption. Cartier-Bresson (1997) described ways in which a corruption network can reduce transaction costs of possibly complex corrupt agreements, an e¤ect that has also been discussed by Goudie and Stasavage (1997).

In the same line of research, in this paper we argue that if society optimally responds to the existing level of corruption, the degree of centralization of corruption decisions of government bureaucrats is likely to have an impact on equilibrium corruption. To do this we focus on two alternative setups, one in which each bureaucrat decides individually whether to be corrupt or not, a situation we refer to as competitive corruption, and the other in which the decision of how many and which bureaucrats are to carry out corrupt transactions is taken by an illegal syndicate maximizing the total net proceeds of corrupt transactions, a situation we refer to as organized corruption.

We propose a game-theoretical model in which a constituency sets required levels for a given set of activities (examples include procurement, regulation, tax collection). Each activity is carried out by an external party, called a provider, and its realization is supervised by a bureaucrat. While each bureaucrats is supposed to act on behalf of the constituency, he can decide to be corrupt and allow the provider to deliver a lower activity level than contracted in exchange for a bribe. Given this, the constituency sets the optimal activity levels weighing o¤ the value of activities, their costs, as well as the possibility for the bureaucrats to be corrupt.

We model competitive corruption as a simultaneous move game in which the constituency sets the required activity levels and the individual bureaucrats decide whether to be corrupt or not. By contrast, we argue that organized corruption is best represented as a sequential move game in which the illegal syndicate sets (credibly commits to) an aggregate corruption level and subsequently the constituency sets the required activity levels.

Since average corruption payo¤ is increasing in the activity levels set by the constituency, and since the constituency's response to higher levels of corruption is to reduce required activity levels, in the subgame perfect Nash equilibrium of the organized corruption game the illegal syndicate acts in such a way as to restrain the total number of corrupt transactions, so that corruption is lower when it is organized than

when it is competitive.

Our result is similar to Shleifer and Vishny's (1993) in that we also suggest that organized corruption can serve to curb the negative externalities individual bureaucrats impose on each other. While Shleifer and Vishny (1993) claim that these externalities arise because the willingness to pay for corrupt acts is decreasing in corruption, we propose the institutional response to the existing levels of corruption as an additional avenue through which these externalities might arise.

Apart from the previous similarity a major di¤erence between our the testable implications of our model and the ones of Shleifer and Vishny (1993) exists. While our model predicts that, as compared to competitive corruption, under organized corruption total corruption is lower and the unit bribe is higher, Shleifer and Vishny's (1993) predictions are exactly the opposite. Although we regard the two models as possibly complementary, the di¤erences in their testable implications can be used to assess the relative merits of their assumptions.

As mentioned above this paper focuses on the institutional responses to corruption, following a renewed interest in the issue. La¤ont and N'Guessan (1999) consider a model of regulation in which the agent may be corrupt and in which the regulator optimally chooses the contract to be o¤ered to the regulated …rm and to the agent. Ades and di Tella (1999) propose a model in which a regulation agent may be corrupt and argue that an increase in competition parameters (that lower regulated …rms' equilibrium pro…ts) has an ambiguous e¤ect on the level of corruption due to the regulator's optimal response that changes the agent's wage and therefore his incentives to be corrupt.

In a related paper, Celentani and Ganuza (2001), we propose a procurement problem in which the procurement agent is supposed to allocate the realization of a project according to a competitive mechanism that values bids in terms of the proposed price and quality. In a similar vein as in this paper, the procurement agent can decide to be corrupt and allow an arbitrary …rm to be awarded the realization of the project and to produce a quality level lower than the announced and the principal can select an appropriate competitive mechanism given the anticipated corruption level. We study the impact on corruption of the increased competitiveness of the environment and show that, because of the regulatory response of the principal and contrary to conventional wisdom, corruption may well be increasing in competition.

The paper is structured in the following way. Section 2 presents the model. In section 3 optimal activity levels are derived keeping into account a given level of corruption. Section 4 focuses on the bureaucrats' decisions to be corrupt or not for given required activity levels. In section 5 we use the results of the previous two sections to compute the equilibrium under competitive corruption. In section 6 we discuss organized corruption and we compare the equilibrium levels of corruption and activity levels with the case of competitive corruption.. Section 7 concludes.

2 The model

Consider a situation in which a constituency employs a population of bureaucrats with mass 1. Each bureaucrat is in charge of overseeing a particular activity that is to be carried out by an external party, to whom we refer as a provider. In particular, the bureaucrat is supposed to make sure that the provider delivers activity level α. The constituency values a project carried out at level α and with price p according to the following utility function, $U^C(\alpha; p) = V(\alpha) - p$. Suppose that it is known that the provider has a cost of realizing activity level α equal to $C(\alpha)$. We assume the provider is risk-neutral so that its payo¤ function is $U^P(p; \alpha) = p - C(\alpha)$ and we normalize its reservation level to zero. Since $C(\alpha)$ is assumed to be common knowledge, the price paid to the provider for a given activity level α is the price that makes its payo¤ equal to 0, $p = C(\alpha)$.

This kind of situation is meant to represent a wide range of possible instances in which corruption may take place, with examples stretching from procurement[2] (where α could be the quality of the good or service to be procured) to regulation (where α could represent a reduction of carbon dioxide emissions) to tax collection (where α could be a company's employment of minority workers that entitles it to a tax rebate).

In the following we will consider payo¤ and cost functions that satisfy the following conditions: (a) $V(:)$ is twice continuously di¤erentiable, $V'(:) > 0$, $V''(:) < 0$, $\lim_{\alpha \to 0^+} V'(\alpha) = +\infty$, $\lim_{\alpha \to +\infty} V'(\alpha) = 0$; (b) $C(:)$ is twice continuously di¤erentiable; $C'(:) > 0$, $C''(:) \geq 0$. In order to give a more concrete ‡avor to some of the results, we will occasionally concentrate on the case in which $V(\alpha) = \log \alpha$ and $C(\alpha) = \mu\alpha$.

[2] The purpose of looking at such a simpli…ed setting is to avoid unnecessary complications. The reader interested in a more realistic description of this kind of problem is referred to Celentani and Ganuza (2000) in which we analyze a procurement problem with a …nite number of potential contractors and asymmetric information on their cost functions. The model we present here retains all the relevant features of this more realistic setting while simplifying the derivation of the results.

Each bureaucrat is able to verify whether the delivered activity level he oversees coincides with the contracted level and has the option of misrepresenting his information and (illegally) allowing the provider to deliver a lower activity level, ψ_c, in exchange for a reward (bribe).

If a bureaucrat gets corrupt, he is detected with probability ρ, and in this case he and the provider are imposed penalties, P^B and P^P, respectively. The detection probability ρ and the penalties P^B and P^P are thought of as features of the legal framework and in the following will therefore be assumed to be exogenously given. If a bureaucrat does not get corrupt, or if he does but he is not detected, he is paid a fixed wage which is normalized to zero.

Bureaucrats are risk-neutral and are assumed to be heterogeneous in a component of the cost of being corrupt. A bureaucrat of type θ has utility function

$$U^B(x;\theta) = \begin{cases} x & \text{if honest} \\ x - \theta & \text{if corrupt} \end{cases}$$

where x is expected income (including, possibly, any bribe paid by the provider or expected penalties ensuing from corrupt conduct) and θ is the heterogenous cost component that can be given different interpretations, e.g., a moral cost (the disutility a bureaucrat derives from engaging in illegal behavior) or the cost of arranging a corrupt transaction. To simplify notation we will assume that θ is uniformly distributed on $[0;1]$. In the remainder of the paper we will always refer to θ as the corruption cost, although it should be clear that it does not include the explicit cost of becoming corrupt associated with the possibility of being fined.

The first goal of this paper is to characterize the equilibrium under competitive corruption. To do that, in the following we will make reference to the extensive form summarized in the following:

1. Bureaucrats privately learn their type, θ.

2. The constituency announces the required activity levels ψ. Simultaneously bureaucrats decide whether to get corrupt or not. If a bureaucrat decides to be honest, he instructs the provider to deliver the required activity level and reimburses it the cost of producing it, $C(\psi)$.[3] If a bureaucrat decides to get corrupt, he pays the cost θ and then bargains with the provider over a bribe b to be received in

[3] Recall that the firm's reservation level is assumed to be 0.

exchange for the agreement that the …rm will be permitted to deliver activity level γ_c rather than the one set by the constituency while still receiving a cost reimbursement for the required activity level.

3. With probability μ the constituency gets a perfect signal of delivered activity level. If delivered level is less than the required one, the bureaucrat and the provider are imposed penalties P^B and P^P.

In the following section we characterize the constituency's optimal activity level when it is known that a …xed fraction θ of the bureaucrats is corrupt. In section 4 we will then study how individual bureaucrats take a rational decision to get corrupt in the face of a given activity level required by the constituency. In section 5 we combine the results of the previous two sections to compute the equilibrium under competitive corruption.

3 The optimal activity level

Consider a situation in which the constituency faces a continuum of bureaucrats with unit mass and suppose the constituency knows that a fraction θ of them is corrupt. Since the constituency does not know the identity of the corrupt bureaucrats this is equivalent to believing that any particular bureaucrat is corrupt with probability θ. Suppose the constituency sets an activity level γ. In this case if the bureaucrat is honest he guarantees that the delivered activity level is the required one and pays the provider a price equal to the cost of delivering γ, $C(\gamma)$; if he is corrupt, he requires only γ_c of the provider but announces that the delivered activity level is γ and accordingly pays $C(\gamma)$ to the provider. Given this and given that all activities are ex ante identical for the constituency, its maximization problem for any activity will be

$$\max_{\gamma} (1-\theta)(V(\gamma) - C(\gamma)) + \theta(V(\gamma_c) - C(\gamma)) = (1-\theta)V(\gamma) + \theta V(\gamma_c) - C(\gamma)$$

and the optimal activity level given the mass of corrupt bureaucrat θ, $\gamma(\theta)$, is given by the following …rst-order condition:

$$(1-\theta)V'(\gamma(\theta)) = C'(\gamma(\theta)) \tag{1}$$

equating the expected marginal value of activity level to its marginal cost. It is easy to see that, under the assumptions speci…ed above, $\gamma(\theta)$ exists and is unique and that

$$\gamma'(\theta) = \frac{V'(\gamma^*)}{(1-\theta)V''(\gamma^*) - C''(\gamma^*)} < 0$$

so that the optimal activity level is decreasing in the probability of the bureaucrats being corrupt.

It is probably important to clarify at this point that we are describing a situation in which the constituency and the makes a decision about the activity level taking the bureaucrats' decision to be corrupt as given. With this set-up the reason why the constituency sets a lower activity level with corruption is, as shown by equation (1), that the expected marginal value of activity level ¸ is decreasing in the mass of corrupt bureaucrats, °, as activity level ¸ is only delivered with probability 1 ¡ °.

The reason we are interested in the constituency's best response to a given corruption level ° is that we describe competitive corruption as a situation in which the constituency and the bureaucrats move simultaneously and therefore the constituency regards the bureaucrats' decision as given. In other words in our formulation the constituency is unable to observably and credibly commit to an activity level before the bureaucrats decide whether to be corrupt or not. In an alternative formulation the constituency could be allowed to play as a leader and commit to a given activity level prior to the bureaucrat deciding whether to be corrupt or not and in this way the constituency would no longer regard the corruption decision as a given, but would try to in‡uence it in such a way as to maximize his expected surplus.[4]

We view the two setups as two extremes. While we only consider an irreversible decision to be corrupt or not, the alternative formulation describes a situation in which the decision to be corrupt has no element of irreversibility whatsoever—a bureaucrat has enough time to decide whether to be corrupt or not after the activity level has been announced.

The reasons we consider the current setup as the appropriate modeling choice are the following:[5]

1. We think of the constituency not as a legislator who can credibly set activity levels by decree, but as represented by an administrator who, though benevolent, is in charge for a relatively short period.

2. Assuming that the decision to be corrupt is taken before observing the activity level chosen by the constituency (its representative) translates to a static framework the idea that the decision to be corrupt has an element of irreversibility. By this we mean that a bureaucrat who decides to be corrupt typically sinks a …xed cost to arrange a network of contacts that can then be used for several

[4] In this case it is easy to show that equilibrium corruption and activity levels will both be lower than in the game we present.

[5] For a similar discussion of this issue, refer to Celentani and Ganuza (2000).

transactions. If this is true, a constituency's representative can do no (much) better than optimally respond to a decision to be corrupt that is (largely) independent of the activity levels he will choose to employ.

3. We regard this paper as giving a positive rather than a normative contribution and we therefore believe it is important not to overestimate the commitment power of public administrators.

4 The decision to be corrupt

The goal of this section is to study how a bureaucrat's payo¤ from being corrupt depends on the activity level set by the constituency and ultimately how a bureaucrat decides whether to be corrupt or not given such activity level.

If a bureaucrat decides to get corrupt, he pays the cost θ and then bargains with the provider over the bribe to be received in exchange for the fact that the provider will be paid $C(\gamma)$ but will be asked to deliver only $\gamma_c < \gamma$.[6]

We assume that the outcome of the bargaining process between the corrupt bureaucrat and the provider is the solution of a generalized Nash bargaining problem[7]. Let π^B denote the agreement payo¤ to a (corrupt) bureaucrat and d^B his disagreement point. Let $\pi^P(\gamma)$ denote the agreement payo¤ from a corrupt transaction to the provider when the activity level standard set by the constituency is γ and let d^P denote the provider's disagreement point. The bribe b will then be given by the solution to the following problem, where its dependence on θ and γ is left implicit:

$$\max_b (\pi^B - d^B)^{\alpha} (\pi^P - d^P)^{1-\alpha}$$

A type θ corrupt bureaucrat's agreement payo¤ is

$$\pi^B = b - \theta P^B; \tag{2}$$

i.e., bribe minus expected penalty, minus corruption cost; his disagreement level will simply be his constant reservation wage which has been normalized to zero, $d_B = 0$. Given activity level standard γ, the provider's

[6] In terms of the procurement example we referred to above, γ can be interpreted as the quality of a given product or service to be supplied and $C(\gamma)$ the cost of supplying it, with γ_c and $C(\gamma_c)$ representing, respectively, the quality supplied under corruption and the cost of supplying it.

[7] Notice that since θ is a sunk cost it has no impact on the outcome of the Nash bargaining problem. While we consider this realistic, assuming that θ is a sunk cost only simpli…es the calculation of the equilibrium but is by no means essential for our results.

agreement payo¤ will be

$$¼^P(¸) = C(¸) ¡ C(¸_c) ¡ b ¡ ¹P^P$$

i.e., the payment it receives, minus the cost of producing activity level $¸_c$, minus the bribe, minus the expected penalty; its disagreement point will be its payo¤ without corruption, $d^P = 0$. Given this, it is easy to show that the equilibrium bribe paid by the provider to the bureaucrat is

$$b = ®\left[C(¸) ¡ C(¸_c) ¡ ¹P^P\right] + (1 ¡ ®)¹P^B \tag{3}$$

and is therefore increasing in the bureaucrat's bargaining power ®.[8]

We now want to compute the mass of bureaucrats who decide to get corrupt when the constituency sets activity level standard $¸$. To do this we need to compute the mass of bureaucrats that, for a given $¸$, have a su¢ciently low corruption cost, or more precisely the type $¯(¸)$ who is exactly indi¤erent between being honest and corrupt. Straightforward calculations show that

$$¯(¸) = C(¸) ¡ C(¸_c) ¡ ¹\left[P^B + P^P\right]¢$$

or, letting $k = C(¸_c) + ¹\left[P^B + P^P\right]¢$ denote the non-idiosyncratic cost of agreeing to (illegally) deliver activity level $¸_c$,

$$¯(¸) = C(¸) ¡ k \tag{4}$$

Given $¯$ has been assumed to be uniformly distributed on $[0;1]$, without loss of generality, in the following we will always assume that the type of bureaucrat who is exactly indi¤erent between being corrupt or not is less than or equal to 1. Under this assumption the mass of corrupt bureaucrats will be exactly the type of bureaucrat who is indi¤erent between being honest and corrupt

$$°(¸) = ¯(¸): \tag{5}$$

Since $¯'(:) > 0$, it is easy to see that the mass of corrupt bureaucrats is increasing in the desired activity level set by the constituency.

[8] Notice that $C(¸) ¡ C(¸_c) ¡ ¹P^P ¡ ¹P^B > 0$ is a necessary condition for an agreement to take place and this implies that $C(¸) ¡ C(¸_c) ¡ ¹P^P > ¹P^B$, which in turn implies that b is increasing in ®.

5 Competitive corruption

Since we describe competitive corruption as a situation in which the constituency and the bureaucrats play simultaneously the equilibrium under competitive corruption is easily obtained combining equations (1) and (5) representing the best response of the constituency to the aggregate strategy of the bureaucrats and the aggregate best response of the bureaucrats to the strategy of the constituency, respectively. Substituting $¸(°)$ into (4) and (4) into (5) we get

$$° = C(¸(°)) ¡ k: \tag{6}$$

Let

$$¡(°) = C(¸(°)) ¡ k: \tag{7}$$

Since $¡(°)$ denotes the expected payo¤ from being corrupt (gross of the bureaucrats' heterogeneous corruption costs) when corruption is equal to $°$ and, therefore, when the constituency requires activity level $¸(°)$, in the following we will refer to it as the pro…tability of corruption. Since all bureaucrat with a corruption cost less than or equal to the pro…tability of corruption decide to be corrupt, from (6) and (7) the equilibrium level of corruption, b, is de…ned by the following equation

$$b = ¡(b): \tag{8}$$

Since $C'(¸(°)) > 0$ and $¸'(°) < 0$, $¡'(°) = C'(¸(°))¸'(°) < 0$. Since $¸(1) = 0$; $¡(1) = ¡k < 0$ and a su¢cient condition for an interior equilibrium to exist is $¡(0) = C(¸(0)) ¡ k > 0$.

In the case in which $V(¸) = \log ¸$ and $C(¸) = ¹¸$, from equations (1) and (5)

$$¸(°) = \frac{1 ¡ °}{¹}$$
$$°(¸) = ¹¸ ¡ k:$$

and the equilibrium (if it is interior) will be

$$b_¸ = \frac{1 + k}{2¹}$$
$$b = \frac{1 ¡ k}{2}:$$

Figure 1 depicts this situation by plotting the best response of the constituency to the aggregate strategy of the bureaucrats, $¸(°)$, and the aggregate best response of the bureaucrats to the strategy

of the constituency, $\Phi(\gamma)$, respectively as well as their intersection, $(\hat{b}, \hat{\gamma})$. The model presented in this section could be used for comparative statics exercises to study the consequences of both temporary or permanents shocks to the profitability of corruption. As one could expect, all changes implying a higher (lower) profitability of corruption, such as changes in the penalties, P^B and P^P, or in the probability of detection, π, would lead to higher (lower) levels of corruption.

6 Organized corruption

In section 3 we have analyzed the optimal response of the constituency to a given level of corruption, or equivalently to the probability of each bureaucrat being corrupt. A higher corruption level was then argued to have a negative impact on the marginal value of activity levels and the constituency's response to it was therefore lower activity levels. Since lower activity levels on the other side lead to lower returns from corruption, it seems natural to ask if, when and how corrupt bureaucrats could improve upon the outcome under competitive corruption and how the equilibrium will differ from the case of competitive corruption. The goal of this section is to turn to these questions.

Many cases have been documented in which corruption has been centrally organized over extended periods of time.[9]

To study the possibility of bureaucrats coordinating their corruption decisions, we assume that an illegal syndicate of the population of bureaucrats centralizes the decision of which bureaucrats get corrupt with the goal to maximize the total payoffs to the bureaucrats. We refer to this situation as organized corruption following Schelling's (1971) definition of organized crime as an organization that has monopoly power over illegal activities.

Suppose such a syndicate exists and suppose, as in the previous section, that the constituency and the syndicate move simultaneously. This implies that each one of them will take the strategy of its opponent as given. If the syndicate takes the activity level decision of the constituency as given, it is however clear, that its payoff will be maximized when all bureaucrats that have a nonnegative payoff from becoming corrupt are in fact corrupt. In other words the best response of the syndicate to a given activity level will be $\Phi(\gamma)$ in (5), that is it will be identical to the aggregate best response in the case in which the decision to be

[9] Examples include Italy, the Soviet Union, Korea and Japan.

corrupt or not is decentralized. Since the best response of the constituency to a given corruption level τ is $\gamma(\tau)$ as implicitly de…ned by (1), it is clear that in this case the equilibrium would be the same as in the case in which corruption decisions are decentralized.

The previous discussion should make it clear that for a syndicate to be able to improve upon the case in which corruption decisions are decentralized it is essential that it can observably commit to a certain level of corruption.

Taken literally, this structure seems an unlikely description of events. As the discussion in the end of section 3 should have already clari…ed, however, although we use a static model, we regard it as a way to characterize the steady state of a dynamic model in which the bureaucrats's time horizons exceed the ones of the (politically appointed) constituency's representatives. Given this, we think that if an illegal syndicate does exist, it is likely that its time horizon exceeds the one of the person or the institution acting on behalf of the constituency.

In such a situation it is reasonable to think that the syndicate establishes a reputation for playing the Stackelberg strategy, that is to say for setting an aggregate level of corruption, τ_S, that maximizes the total net pro…t from corruption given that the constituency play a best response to it. To represent this situation in our simple static model we assume that the aggregate corruption chosen by the syndicate of bureaucrats is observed by the constituency (although the individual bureaucrats' corruption decisions are obviously not) before it decides on required activity levels.

The following proposition provides a comparison of equilibrium corruption under organized and competitive corruption.

Proposition 1 Equilibrium corruption is lower and equilibrium bribe is higher under organized than under competitive corruption.

Proof. Appendix.

Letting τ^O and τ^C denote equilibrium corruption under organized and competitive corruption, respectively, when $V(\gamma) = \log \gamma$ and $C(\gamma) = \mu\gamma$ we have:

$$\tau^O = \frac{1-k}{3} < \frac{1-k}{2} = \tau^C.$$

Increasing the number of corrupt bureaucrats has an obvious direct effect that increases total corruption revenue. Since higher corruption also implies a response on the part of the constituency that decreases the activity levels and therefore the profit per corrupt transaction, increasing corruption also has an indirect effect that decreases total corruption revenue. Proposition 1 shows that when bureaucrats are able to centralize the corruption decision, they internalize the indirect effect of corruption on total corruption revenue (much like a monopolist internalizes the pecuniary externalities of supply decisions) and restrict the number of corrupt transactions with respect to competitive corruption.

The difference between organized and competitive corruption is shown in Figure 2. Figure 2 reproduces Figure 1 but it adds a map of isoprofit curves for the bureaucrats. Consider a point on the bureaucrats' aggregate best response, $\left(\bar{\lambda}; \gamma\left(\bar{\lambda}\right)\right)$. Since $\gamma\left(\bar{\lambda}\right)$ is the aggregate best response to $\bar{\lambda}$,[10] it is straightforward to recognize that for the bureaucrats to have the same aggregate profits with corruption levels different from $\gamma\left(\bar{\lambda}\right)$ (that is to say for levels of corruption that are either strictly larger or strictly smaller than $\gamma\left(\bar{\lambda}\right)$ and, therefore, suboptimal given $\bar{\lambda}$), it is necessary that $\lambda > \bar{\lambda}$, so that the isoprofit curves have a minimum at their intersection with $\gamma(\lambda)$. Given higher isoprofit curves are associated to higher aggregate profits for the bureaucrats, it is easy to recognize that, under organized corruption, the bureaucrats will choose the point on the constituency's best response function $\lambda(\gamma)$ that lies on the highest isoprofit curve, or, in other words, will choose $\hat{\gamma}_O < \hat{\gamma}$ in Figure 2 and the constituency will respond by choosing $\hat{\lambda}_O = \lambda(\hat{\gamma}_O) > \hat{\lambda}$. Since by (3) the equilibrium bribe is increasing in the activity level λ, the previous inequality implies that the bribes will be higher under organized than under competitive corruption.

The result of Proposition 1 is similar to Shleifer and Vishny's (1993). In their model a sequence of independent monopolistic corrupt bureaucrats face a market that demands their services and vertically organized corruption serves to solve the problem of multiple marginalization and reduces the negative impacts of corruption. In our model, the optimal regulatory response of the constituency implies that the unit value of corrupt transaction is higher the lower total corruption and horizontally organized corruption serves to optimally trade off corruption revenue base against corrupt transaction unit profit, so that corruption is lower than under competitive corruption.

[10] As was discussed above, $\gamma(\lambda)$ not only describes the response of individual agents to a given λ, but is also the level of corruption that maximizes total profits from corruption.

Apart from the previous similarity, as was mentioned in the introduction, the comparisons in Proposition 1 of equilibrium corruption under organized and competitive corruption are opposite to the ones proposed by Shleifer and Vishny (1993). According to Shleifer and Vishny (1993) under competitive corruption the excessive demands of individual bureaucrats price many potential bribers out of the market so that bribes are higher and total corruption is lower. To assess the di¤erences between the predictions of the two models, it is important to highlight the fact that Shleifer and Vishny (1993) do not allow for bureaucrat heterogeneity and assume that 100% of transactions are corrupt regardless of whether bureaucrats collude or not. Given these assumptions, the total number of corrupt transactions turns out to be higher when bureaucrats collude (as in this case they charge a lower bribe). By contrast, in our model, we introduce bureaucrat heterogeneity, we explicitly focus on the fraction of transactions which turn out to be corrupt in equilibrium, and, while we endogenize the activity levels, we assume that total number of transactions (corrupt or not) is …xed.

Since the two models focus their attention on di¤erent issues, we regard them as providing complementary rather than con‡icting explanations. Nevertheless, the di¤erent testable implications of the comparisons between organized and competitive corruption of the two models allow empirical studies to assess their relative merits. While we are not aware of systematic data on the degree of centralization of corruption, tentative evidence is provided by anecdotal testimony on the collapse of the Soviet Union. Several authors have argued that the Communist Party of the Soviet Union as well as the KGB provided a central structure for corrupt exchanges, and that the end of the Soviet Union has given way to a much less centralized organization of corruption in Russia.[11] According to survey data by the International Country Risk Guide, this transition has witnessed a signi…cant surge in corruption,[12] a …nding in line with the predictions of this paper.

Before concluding we want to mention that a straightforward implication of Proposition 1 is that the equilibrium under organized corruption Pareto dominates the equilibrium with competitive corruption as

[11] See, for example, Shleifer and Vishny (1993), Bardhan (1997), and Leitzel (1998). In referring to Russian Ma…a, Judge Giovanni Falcone claimed that it lacked the unitary structure of sicilian Ma…a: "There is no sense in calling something a Ma…a when it is not" (Falcone with Padovani, 1993, page 102).

[12] The International Country Risk Guide is a monthly publication of the PRS Group and it includes a rating of corruption risk from 0 (highest risk of corruption) to 6 (lowest risk of corruption). According to data published by the International Country Risk Guide and assembled by the IRIS Center (University of Maryland), Russia's corruption rating in 1985-1991 was 4, went down to 3.5 in 1992, and to 3 in 1993-1995. Leitzel (1998) shares the view the corruption in Russia increased as a consequence of the reforms that followed the failed putsch of August 1991.

corruption is lower and corruption pro…t is higher.[13] We believe that such a welfare comparison should be discounted and should not be taken as grounds for sensible policy implication as the model we consider does not keep into account other features of organized corruption that may make it less appealing from the point of view of society, as, for instance, a better technology to decrease the e¤ectiveness of deterrence policies.

7 Conclusions

This paper proposes a model of bureaucratic corruption and studies the possibility of bureaucrats centralizing corruption decisions. The main goal of the paper is to analyze if and how an illegal syndicate acting on behalf of the population of bureaucrats is able to improve upon the outcome that obtains when bureaucrats make the decision to be corrupt individually and what implications this may have on the equilibrium level of corruption. Our result is that when corruption decisions are centralized (organized corruption) equilibrium corruption is lower and equilibrium bribes are higher than when corruption decisions are decentralized (competitive corruption).

The result relies on the assumption that the constituency a¤ected by corruption responds optimally to it in a way that reduces the revenue per corrupt transaction unit. When this element is taken into account, i.e., when it is clari…ed that corruption may extinguish its culture medium, it is easy to recognize that corruption revenue is not monotonically increasing in corruption level. When bureaucrats individually decide whether to be corrupt or not, they disregard the indirect e¤ect that their decision to be corrupt has on other bureaucrats' corruption revenue. Under organized corruption, on the other hand, the e¤ect that increasing corruption has on total corruption revenue through the constituency's response is internalized so that the illegal syndicate acts in such a way as to restrain the total number of corrupt transactions as compared to the case of competitive corruption.

Although the lack of reliable data on the degree of centralization of corruption decisions makes the task of empirically testing the predictions of our model especially di¢cult, the anecdotal evidence reported on post communist Russia seems in line with the predictions of our model that a transition from an organized to competitive corruption leads to increased levels of corruption.

[13] The same result is obtained by Shleifer and Vishny (1993).

A Appendix

Proof of Proposition 1

Under organized corruption the illegal syndicate acting on behalf of bureaucrats takes a corruption decision taking into account the constituency's best response. In other words bureaucrats choose a $\bar{\theta}^O$ such that all (and only) bureaucrats with $\theta < \bar{\theta}^O$ will be corrupt so as to maximize their aggregate payo¤:

$$\max_{\bar{\theta}^O} \int_0^{\bar{\theta}^O} \left[C\left(\gamma\left(\theta\right)\right) - C\left(\gamma_c\right) - \left(1 - P^B + P^P\right) - s \right] ds$$

From the de…nition of k, and recalling that $\theta = \bar{\theta}^O$ the above maximization problem is equivalent to

$$\max_{\bar{\theta}^O} \int_0^{\bar{\theta}^O} \left[C'\left(\gamma(\bar{\theta}^O)\right) - k - s \right] ds$$

whose …rst order condition is

$$\left[C'\left(\gamma(\bar{\theta}^O)\right) - k - \bar{\theta}^O + C'\left(\gamma(\bar{\theta}^O)\right) \gamma'(\bar{\theta}^O) \bar{\theta}^O \right] = 0: \tag{9}$$

Consider now the equilibrium condition under competitive corruption

$$\left[C'\left(\gamma(\bar{\theta}^C)\right) - k - \bar{\theta}^C \right] = 0 \tag{10}$$

Subtracting (10) from (9) we obtain:

$$\left[C'\left(\gamma(\bar{\theta}^O)\right) - k - \bar{\theta}^O \right] - \left[C'\left(\gamma(\bar{\theta}^C)\right) - k - \bar{\theta}^C \right] = - C'\left(\gamma(\bar{\theta}^O)\right) \gamma'(\bar{\theta}^O) \bar{\theta}^O :$$

Since $C'\left(\gamma(\bar{\theta}^O)\right) > 0$ and $\gamma'(\bar{\theta}^O) < 0$, $C'\left(\gamma(\bar{\theta}^O)\right) \gamma'(\bar{\theta}^O) \bar{\theta}^O < 0$. Then

$$\left[C'\left(\gamma(\bar{\theta}^O)\right) - k - \bar{\theta}^O \right] > \left[C'\left(\gamma(\bar{\theta}^C)\right) - k - \bar{\theta}^C \right] \tag{11}$$

Since $[C'(\gamma(\bar{\theta})) - k - \bar{\theta}]$ is decreasing in $\bar{\theta}$, (11) implies $\bar{\theta}^O < \bar{\theta}^C$; and $\theta^O < \theta^C$.

Since the previous inequality implies that $\bar{\gamma}_0 = \gamma(\bar{\theta}_O) > \gamma(\bar{\theta}) = \bar{\gamma}$ and since, by (3) the equilibrium bribe is increasing in γ, the equilibrium bribe will be higher under organized than under competitive corruption. ■

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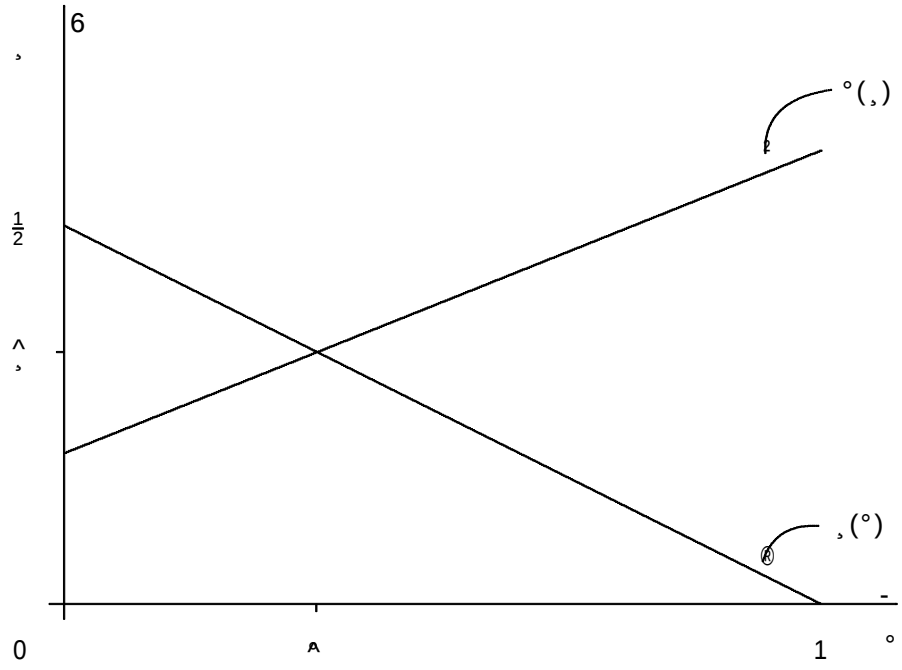

Figure 1: Equilibrum under competitive corruption

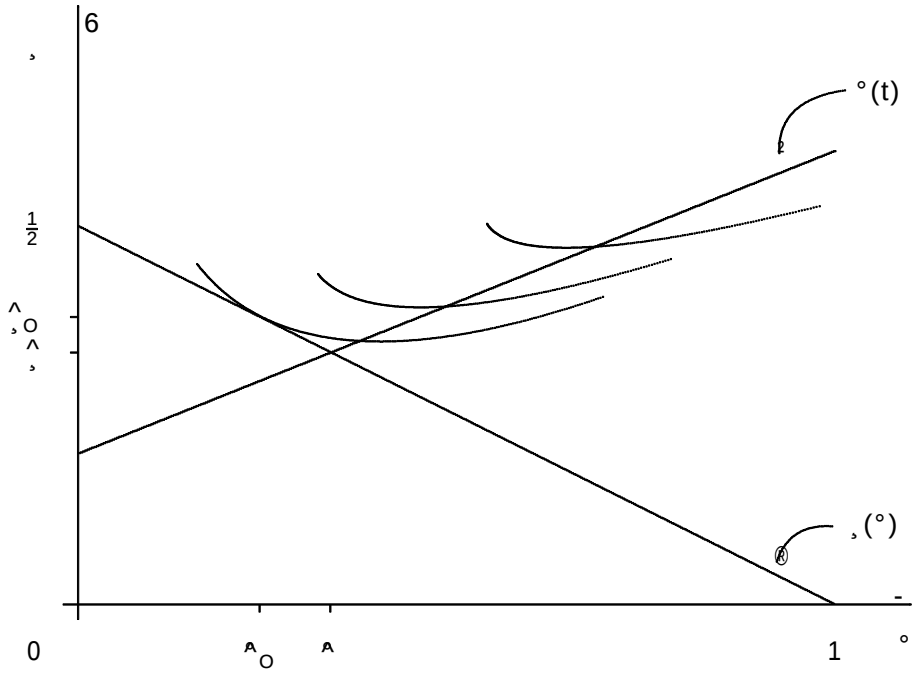

Figure 2: Organized vs. competitive corruption