Why firms pay occasional bribes: the connection economy

Ariane Lambert-Mogiliansky

CERAS, Ecole Nationale des Ponts et Chaussées, 28 rue des Saints-Pères, 75 343 Paris, France

Received 1 November 2000; received in revised form 1 March 2001; accepted 1 May 2001

Abstract

This paper suggests that legal business networks facilitate corruption. When the prospects of future deals fail to provide incentives to comply, bribes can be enforced relying on punishments in the network through exclusion. Network members administer the punishments because of the fear that the bureaucrat will retaliate against all network members. The bureaucrat may, for instance, stop revealing his private information to the network. The analysis predicts that the extent of occasional corruption can be larger when the legal and administrative rules are complex and unstable, and if the market is poorly developed. The paper discusses policy measures to reduce corruption. © 2002 Elsevier Science B.V. All rights reserved.

JEL classification: L14; L2; K42
Keywords: Corruption; Network; Enforceability

1. Introduction

Some illegal transactions are occasional by nature. An example of this is when a hotel manager “buys” a building permit in violation of environmental laws.¹ In other cases, a corrupt transaction may be the first step in a long-running illegal relationship. The deal can, however, be perceived as occasional when the prospects of future cooperation are uncertain because, for example, the parties do not know each other.² Occasional corruption is then a

¹ When the hotel is built, the owner of the hotel has no need for other illegal favors (in particular from the construction permit bureau). He simply runs his business.

² The firm may not know how long the civil servant will remain in office.
port of entry into repeated illegal cooperation. The fact that the transaction is occasional exacerbates the parties’ incentives to cheat each other: Why do firms pay bribes in such situations?

This paper suggests that business networks can provide an answer to this question. Firms generally belong to a business network because it is profitable to do so (in particular, they gain access to the insiders’ information). A bureaucrat will be able to exploit this fact if the non-payment of the bribe triggers exclusion. Cheating then becomes very costly. I show that, in a network, firms can be induced to discipline each other with respect to bribe payment for fear of collective punishment. To obtain an intuition for this result consider the following situation. We have a bureaucrat who can seldom offer illegal favors to any particular firm. The threat of terminating the relationship is therefore not sufficient to secure the payment of bribes. We now assume that the bureaucrat has also private information that is of (little) value to firms (for example, he is aware of procurement projects before this information is released to the public). In a situation where the firms discount the future, this feature may only have a limited impact on incentives to pay the bribes. In the presence of a business network, however, the effect can be quite dramatic: large bribes become enforceable. The reason is that the bureaucrat can threaten not to reveal his information to the network unless the firm that failed to honor the illegal contract, i.e. refused to pay the bribe, gets excluded. The firms may then prefer to exclude from the network cheating members. As a result firms also prefer to pay their bribes rather than to lose access to the resources available in the network.

A contribution of the approach taken in this paper is to highlight links between the extent of corruption and aspects of the legal economy. In particular, I unveil the significance of asymmetric information between the firms and the bureaucrat. The bureaucrat is able to profit from illegal collusion because the firms value his (or her) private information on legal matters. The more unstable and complex the legal administrative framework, the more valuable the bureaucrat’s insider information. This favors the (strategic) complementarity between corruption and network interaction.

A second aspect of transparency in the legal economy relates to inter-firms relationships. The better developed the market, the lower the value of the firms’ private information to others (because prices convey most of the business-relevant information). This can make it more difficult to sustain occasional corruption. In contrast, in an economy where firms are highly dependent on “good connections” to do business, corruption is expected to be more widespread.

The results suggest that a government that wishes to reduce corruption should settle for simple and stable legal and administrative rules and improve on the information provided to the private sector. The government should also promote development from a personalized “connection economy” into an anonymous market economy, for example, by promoting the development of efficient arbitrage courts.4

---

3 This is distinguished from asymmetric information between the “principal” (the government) and the bureaucrat as in most agency models of corruption (collusion). See for instance Laffont and Tirole (1993).

4 The idea is that in the absence of well-functioning arbitrage, business partners do in effect bear the whole risk for defection from the other parts. Therefore, they would need a lot of information to evaluate those risks. A business network may be the best place to obtain this kind of information.
There exists a widespread consensus among empirical and theoretical sociologists (see for instance Kadushin, 1995; Skworetz and Willer, 1993; Useem, 1982) that networks play an important role in business. In particular, privileged access to information is regarded as a main resource of a business network. The connections between occasional corruption and business networks have been emphasized by the French sociologists Meny (1992) and Cartier Bresson (1997). In the 1990s, corruption affairs in France also revealed a close connection between powerful networks and corruption. My aim in this paper is to formally investigate a mechanism that connects corruption to business networks. The argument I develop is by no means exhaustive. There exist other mechanisms with a potential to enforce occasional bribes. Organized crime is one of these. Another mechanism is when the bureaucrat retaliates by refusing to provide legal services.

The economic literature concerned with collusion and corruption usually assumes that side contracts are enforceable. I shall relax this assumption. Instead, I propose a solution using the theory of community enforcement. Fascinating applications that have shed light on economic historical puzzles have been developed by Milgrom et al. (1990), Greif (1989) and Greif et al. (1994). Grief et al. provide an explanation as to why, in the Middle Ages, rulers in trade centers promoted merchant guilds. They argue that the guilds provided the rulers with an instrument to commit to the safety of alien merchants. Safety was necessary for the expansion of trade. As in the case of occasional corruption, bilateral reputation (between the ruler and alien merchants) was not sufficient. Merchant guilds allowed for a multilateral reputation mechanism to develop. As a result, fair and safe trade could be secured. In a similar way, I argue here that a business network provides a multilateral reputation mechanism that is able to surmount the enforcement problem in occasional corruption.

The results in the paper are also consistent with findings in development economics. In particular, Barnerjee and Newman (1998) investigate the links between the “connection economy” in traditional sectors and under-development. They show how the informational advantage of the traditional inefficient sector may result in the economy becoming stuck in a poverty trap.

5 Cartier Bresson (1997, p. 80) writes: “In the second case (when corruption is occasional), it is most often organized by social networks.”

6 Central participants implied in the corruption scandals in the management of social housing (HLM) in les Hauts-de-Seine and Nimes were free masons (Vogelweith and Vaudano, 1995 pp. 128–129). L’Usine Nouvelle (1996) provides an exhaustive description of the French regional business networks and their connections with prominent people involved in corruption scandals.

7 This argument, however, raises the issue of why the bureaucrat would bother with illegal favors when he can extract rents by simply threatening not to do his job. My view is that extortion is a topic of its own that deserves more research.


9 The theory of community enforcement has been developed by Cremer (1986) and Kandori (1992).

10 Corruption is now widely recognized as a main obstacle to development in LDCs and Transition economies. See for instance, Hellman et al. (2000).
In Section 2, I present the setting. The network interaction and the corruption game are described. In Section 3, I analyze an equilibrium where the bureaucrat can exploit the network to enforce the payment of bribes. In Section 4, I derive comparative static results and discuss implications for anti-corruption policy. Section 5 sets out conclusions.

2. The setting

One bureaucrat and \( n \) firms interact in two fields.\(^{11}\) To simplify the presentation, we start by describing the network game. We then introduce the corruption game. The two games are brought together in the next section.

2.1. Network interaction

Network interaction is modelled as a game where players exchange information. The actions within the network are observable by all network members.\(^{12}\) In each period, the firms simultaneously engage in \( n-1 \) bilateral interactions. In its interaction with firm \( j \), firm \( i \) faces the following choice. It may either cooperate with \( j \) or boycott \( j \). When \( i \) cooperates with \( j \) two things happen: (i) \( i \)'s private information goes into a common pool that is, it becomes public within the network, (ii) firm \( j \) gains access to the pool. When \( i \) boycotts \( j \), (i) no provision to the common pool is made, (ii) \( j \) is not given access to the pool (through \( i \)). The pool approach is a simple device to capture the following two basic features: (i) a firm \( i \) has access to network information if and only if at least one network firm \( j \) agrees to cooperate with \( i \), (ii) information is public within the network.

We assume that there is no cost to boycotting a firm. There is, however, a positive per period fixed cost \( g \) of cooperating. This cost does not depend on the number of bilateral interactions. It may capture the effort of processing one’s private information so that it can be used by others. When a firm does not contribute (so it saves \( g \)) while still interacting with firms (so it has access to the pool), we say that the firm free-rides. The value of the \( n \) firms’ collective contributions is \( \Sigma_{i=1}^{n} \pi_{i}, \pi_{i} \in [\pi, \pi] \).\(^{13}\) We define \( \Pi = \Sigma_{i=1}^{n} \pi_{i} - \pi \) as the value of the pool for the most contributive firm, i.e. the value of the pool net of that firm’s own contribution.

The bureaucrat chooses between either contributing to the pool, which costs nothing, or not, i.e. exiting, which is irreversible. In each period, the value of the bureaucrat’s contribution to the firms is denoted \( \pi_{k}, \pi_{k} > \pi \). There is no strict benefit for the bureaucrat from being in the network.\(^{14}\) We assume that when he is indifferent between belonging to the network or not, he chooses to belong.

\(^{11}\) The reasoning extends to the case with more than one bureaucrat.
\(^{12}\) Outsiders only observe collective boycotts, i.e. exclusion (see below).
\(^{13}\) Kadushin (1995, pp. 204–205) names four main outcomes from interaction in a network of the French financial elite: better information, increased opportunity for compromises, promotion of the network’s interest in politics, promotion of trust.
\(^{14}\) We could also let the bureaucrat earn some benefit from network interaction. This would not modify the main results.
Note that, by assumption, the bureaucrat (like the other network members) cannot cash in on his private information, i.e. there is no money exchange in network interaction. This feature of the model plays an important role in the analysis. One motivation is that information, in contrast to favors, is a non-rivalrous good. Therefore, if the bureaucrat attempted to sell his information, firms would have an incentive to free-ride. Moreover, it can be shown that in any simple mechanism where the bureaucrat uses a threat to exit to extract rents from his private information, there exists an equilibrium where the firms obtain his information for free.\(^{15}\)

2.1.1. Network cooperation

The number of possible outcomes of the network game in terms of payoffs is relatively small. Denote \(M_\subseteq N\) the set of firms currently cooperating with at least one other firm. Let us also assume that the bureaucrat cooperates. When \(i\) is not subject to a collective boycott, its stage game payoff is

\[
U_i = \sum_{j \in M, j \neq i} \pi_j + \pi_k - g,
\]

when firm \(i\) cooperates with at least one firm, and \(U_i = \sum_{j \in M, j \neq i} \pi_j + \pi_k\) if it does not. If \(i\) is subject to a collective boycott, its payoff reduces to minus \(g\) when it cooperates and zero otherwise. After one period of collective boycott, the firm is disconnected irreversibly.

Let us now assume that all the firms adopt the following strategy. They all cooperate with each other, i.e. in each of the \(n-1\) bilateral relationships unless some firm free-rides. In that latter case, all the others respond by boycotting the free-rider from the next period on, i.e. they exclude him. If a firm defects from the boycott, the others respond by ending all cooperation from the next period on. The network disintegrates. We call \(\delta\) the discount factor reflecting the players’ common time preferences.

**Proposition 1.** Cooperation is sustainable with slack whenever \(\Delta > 0, \Delta = \delta (\Pi_k + \pi_k) - g\).

**Proof.** See Appendix.

**Comments**

The sole problem for cooperation within the network is to secure the firms’ incentives to incur the cost of making their private information available to others.\(^{16}\) When the threat of exclusion is stronger than necessary to secure incentives to incur the fixed cost \(g\), we say that we have an enforcement slack. This slack plays a key role in the analysis. It captures “punishment resources” that are not “used up” to sustain cooperation. The slack might

---

\(^{15}\) The basic results of the paper would not be affected if we allowed the bureaucrat to extract some rents from his private information directly.

\(^{16}\) In particular, there can be no issue of firm \(j\) bribing firm \(l\) to avoid being boycotted. All that \(j\) could win is the access to the pool for 1 period. In contrast, firm \(l\) loses access to the pool for all the future. The network disintegrates in the next period.
therefore be exploited in a judicious mechanism for other purposes, for example, to sustain the payment of bribes. Note that, in equilibrium, all the firms cooperate in a single network.\textsuperscript{17}

2.2. The corruption game

An illegal transaction involves two parties, a firm and the bureaucrat. The corruption game is played within a period and involves the following steps:

1. The bureaucrat offers a deal, i.e. a favor of fixed value $F$ for the firm in exchange for a bribe $\hat{B}$.\textsuperscript{18}
2. The firm either accepts or refuses the deal.
3. If it refuses the game ends. If it accepts, the bureaucrat chooses whether to deliver the favor or not. If he does, he incurs a cost\textsuperscript{19} $C > 0$, $C < F$.
4. The firm chooses the level of the bribe, and pays $B \in R^+$. 
5. The bureaucrat either terminates the relationship. Or he waits until he has a new favor to offer and, at that time the game starts over from $t = 1$.

The corruption game between the same two players is infinitely repeated. The bureaucrat is engaged in at most one corrupt deal per period.\textsuperscript{20} In each period, the probability that he offers an illegal favor to any specific firm is assumed to be very small: corruption is occasional. We denote by $\varepsilon$, $\varepsilon < \delta$, the discount factor relevant in the (bilateral) corruption game ($\varepsilon$ also captures time preference). As $\varepsilon$ tends to zero, we approach the case when the relationship is “one-shot”.

**Proposition 2.** Let $\hat{B}$ be the bribe required by the bureaucrat in his deal offer. Occasional corruption can be sustained as an equilibrium of the (two-agent) corruption game if and only if $\varepsilon \geq (\hat{B} / F)$ and $\hat{B} \geq C$.

**Proof.** See Appendix.

**Comments**

The largest bribe that satisfies the firm’s incentive constraint in the corruption game above is $B^{se} = \varepsilon F$. As the probability that the bureaucrat will have a favor to offer the firm becomes small, $B^{se}$ tends to 0. Hereafter, we assume that $C > \varepsilon F$, i.e. the cost of providing an illegal favor exceeds the self-enforceable bribe. In such a situation occasional corruption is not self-sustainable.

\textsuperscript{17} The single network result is consistent with exclusion leading to a zero payoff. We could also consider situations with a few existing networks and where either switches between networks are very costly or are not feasible due to, for example, the “bad reputation” following exclusion.

\textsuperscript{18} Restricting attention to take-it-or-leave-it deals offered by the bureaucrat has no implications for the main results of the analysis.

\textsuperscript{19} The cost $C$ captures expenditures related to making the deal hard to detect.

\textsuperscript{20} This restriction on the bureaucrat’s action set has no implication for the corruption game but it simplifies the argument of the next section. In particular, it allows a focus on pure strategies in paying bribes and the use of simple threats (exit). We assume that when the bureaucrat can offer favors to several firms, he randomizes.
A crucial feature in the corruption game above is that the favor is granted before the bribe is paid, rather than after.\textsuperscript{21} The following lemma contributes to motivating our choice.

**Lemma 1.** Consider a situation where the parties agree on a timing before the game starts. Also assume that there exists a mechanism outside corruption that can enforce bribes but not favors. Then, the subgame perfect equilibrium of this extended game entails a timing where the favor is granted before the bribe is paid.

**Proof.** See Appendix.

The intuition is that no firm ever refuses a deal where the favor is granted first. In particular, this is true even if the bureaucrat previously cheated, i.e. failed to delivered a favor that had been paid for. Moreover, the bureaucrat is willing to offer the favor first if bribes are enforceable relying on a mechanism outside corruption, for example, a mechanism related to network interaction. Therefore, the firms always require the favor first and the bureaucrat accepts that timing. Empirical evidence also suggests that the proposed timing does indeed capture real features of corrupt transactions. It is well known to professionals that in most East Asian markets for military equipment, the winning firm pays a “success fee”.\textsuperscript{22} The payment is expected after the agent provided his service (for example, he tailored the technical requirements, secured favorable evaluation, etc.).\textsuperscript{23} Another example is one of the key rules proposed by Transparency International (TI is a NGO fighting corruption). The rule includes an obligation to declare all transactions between firms and civil servants up to 6 months after the public market has been allocated. This rules reflects the awareness that (to reduce detection risks) the firm’s payment of the bribe to the agent often occurs relatively long after the agent performed the illegal intervention in the allocation procedure that secured the contract to the firm. In a regulatory context, the issue of “post regulatory” jobs to reward civil servant for lax regulation has also been addressed in Brezis and Weiss (1997). They investigate how the wage paid in public-service employment and a “cooling-off” period can be used in tandem to reduce capture by regulated firms.

As we proceed to consider corrupt transactions in a broader context, we shall make the following assumptions: (i) All actions within the corrupt game are private information of the parties. (ii) The parties can, at no cost, exhibit sufficient evidence of their own actions. Assumption (i) says that corrupt deals are secret. Assumption (ii) guarantees that there exist equilibria of the whole game with corruption (of the type described above) but without extortion.\textsuperscript{24}

\textsuperscript{21} When the favor and the bribe are exchanged simultaneously, both parties have an incentive to cheat. We are then in a Prisoner-Dilemma situation.

\textsuperscript{22} This is based on private communication from a French arms dealer (who wishes to stay anonymous). Similar assessments have been made by other agents engaged in public markets.

\textsuperscript{23} Interestingly, this example suggests that there might be a moral hazard issue, motivating the ex-post success fee. Indeed, the official’s effort to “promote” a project is not observable—and not always successful.

\textsuperscript{24} Assumption (ii) guarantees that firms can challenge false claims. They can either exhibit own evidence or require that the bureaucrat does so. Otherwise, the bureaucrat would have an incentive to pretend that a firm cheated even when it paid. He could also falsely pretend that he delivered a favor when he did not.
3. Enforcing occasional bribes

We now consider the two games described in Sections 2.1 and 2.2 simultaneously. We also introduce the following new features. At time $t=5$ of the corruption game, the bureaucrat has the additional option to make a valid complaint to the network.\footnote{A complain about cheating is valid if it is truthful. We simply assume that the firms always challenge false claims which they can do at no cost by Assumption (ii).} In the next period, the firms respond by either boycotting the cheating firm or not. The bureaucrat then chooses whether to stay in the network or to exit.

Of key significance in the modified game is that the bureaucrat may use the option to exit (i.e. of ending his contribution to the network) as a (credible) threat to induce firms to discipline each other, i.e. to punish (by exclusion) the cheating firms. A cheating firm is defined as a firm that did not honor a corruption agreement, i.e. failed to pay the agreed-upon bribe after the favor was provided. Our main result here is:

\textbf{Proposition 3.} In an economy where network cooperation between firms is sustained with sufficient slack: $\Delta > \max \left\{ \frac{(1 - \delta)}{(1 - \varepsilon)} C, \pi_k \right\}$, there exists a subgame perfect equilibrium with occasional corruption where all firms $j$ such that $\pi_j \leq \pi_k$ are offered illegal deals.

\textbf{Proof.} See Appendix.

The intuition is that, as we connect the two games, the enforcement slack on the network can be used as a punishment resource to secure the payment of bribes. If the slack ($\Delta$) is large enough, the level of the enforceable bribe (relying on the threat of exclusion) is sufficient to establish the profitability of corrupt deals. A condition, however, is that the cheating firm does not contribute more to the network than the bureaucrat, i.e. $\pi_j \leq \pi_k$. In the opposite case, the other firms could prefer to keep the cheating firm even at the cost of losing the bureaucrat.\footnote{The condition $\pi_k \geq \pi_j$ is sufficient. It becomes necessary as $\varepsilon$ tends to zero. The value of “keeping” the bureaucrat (while excluding the cheater) reduces to $\pi_k - \pi_j$, i.e. no future illegal deals are then accounted for.} The bureaucrat’s (credible) threat to exit in response to a single deviation from the collective boycott forces each single firm to choose between his or the cheating firm’s contribution.

\textbf{Comments}

The basic point in Proposition 3 is that the firms’ dependance on network information strengthens the bureaucrat’s retaliation power in corruption. In the absence of a network, the bureaucrat could be retaliating in both fields, i.e. he could also stop revealing information to the cheating firm. In the presence of network interaction, however, the bureaucrat cannot selectively close out one firm because information is public within the network. To be effective, the punishment must be collective. This very feature opens up for the possibility of using a much more powerful indirect mechanism. If the bureaucrat can have the firm excluded, the punishment corresponds to losing all of the network’s information. The crucial issue is therefore whether the network firms will be willing to administer the punishment. If
the cheating firm’s contribution is not of great value, there are good reasons why the bureaucrat might actually “succeed” in having the firms punish the cheating member of the network. Firstly, the corruption equilibrium strictly Pareto dominates the equilibrium with no corruption, i.e. when the firms refuse to discipline each other. This is because all the firms have a positive probability of engaging in corrupt transactions in the future. Next, a remarkable feature is that, in our set-up, the slightest uncertainty (about the others’ play) selects the corruption equilibrium as the only pure strategy equilibrium.27

How should we interpret this result? The situations we have in mind are the following. When a bureaucrat complains, he asks other firms to “exert pressure” on the cheating firm to comply with the agreement. If the cheating firm still refuses to pay, the bureaucrat lets it be understood that, if that firm is not sanctioned, then he will have to “look for other partners”. If the cheating firm’s contribution is less valuable than that of the bureaucrat, the firms are likely to coordinate on some sanction that would satisfy the bureaucrat. We know from the sociology literature that firms are able to coordinate on sanctions (see “enforceable trust,” Kadushin, 1995, p. 204). Similar evidence is provided in the economic history literature. For example, “Maghribi traders managed their agency problem by forming coalitions whose members ostracized and retaliate against agents who violated their commercial codes” (Greif et al., 1994, p. 746).

4. Policy implications

A contribution of the analysis is to highlight links between the legal economy characterized by the enforcement slack $\Delta$, and the extent of occasional corruption. In a discussion of policy implications, it is interesting to distinguish between the bureaucrat’s contribution to the enforcement slack, $p_k$ and the firms’ collected contributions. The first determines the set of firms from which bribes can be enforced, the second affects the type of deals that can be enforced.

**Proposition 4.** The larger $p_k$ is, the larger the set of firms $j, j \in M$, that can be involved in occasional corrupt deals.

**Proof.** According to Proposition 3, occasional corruption is sustainable with any $j, j \in M$ (i.e. $j$ cooperates within the network), provided that $\pi_j \leq \pi_k$. Hence, the larger $p_k$ is, the (weakly) larger the set of firms that can be offered profitable corrupt deals. \(\Box\)

**Comments**

We interpret $p_k$ as a reflection of the opacity of public administration to the firms. Proposition 4 provides an argument in support of the claim that instability and complexity are factors that favor corruption. In a country with unstable and complex rules, well-
informed “advice” from the bureaucrat about how to formulate procurement bids, apply for a permit, etc., is highly valuable. As earlier discussed (Section 2.1), the bureaucrat may not be able to directly exploit his private information. Proposition 4 says that, in a context where the value of the bureaucrat’s private information is large, because the regulatory environment is unstable and complex, we have reasons to expect that more firms will be engaged in corrupt deals. It should be stressed that we are dealing with an asymmetry of information between the firms and the bureaucrat.\textsuperscript{28}

**Corollary 1.** Improving the provision and the quality of information about the firms’ legal and administrative obligations and rights can reduce the extent of occasional corruption.

**Proof.** This follows directly from the fact that the set \( \{ j \in M; \pi_j \leq \pi_k, \pi_j \in [\pi, \pi] \} \) tends to \( \emptyset \), as \( \pi_k \) tends to \( \pi \).

**Comments**

It can be quite costly to reform laws so as to remove all opportunities for illegal favors. This may require moving toward a more bureaucratic public administration, i.e. increasing costly red-tape. Our analysis suggests that an alternative policy, when bribes are enforced relying on network interaction, may be to provide better information to the firms, i.e. to reduce the value of \( \pi_k \). This is due to the fact that although there may still exist a stake for occasional collusion, i.e. \( C < F \), the gain from collusion cannot be obtained. The bribe is not enforceable. Specific measures include developing information services to the private sector, for example, free access to “client friendly” publications, public consulting services, etc. Clearly, moving toward simpler and stable rules is highly desirable.

It should be emphasized that the argument for increasing transparency and promoting simple stable rules is not that it reduces the opportunities for offering illegal favors, i.e. the civil servant’s discretionary power. In fact, I am suggesting that one can reduce corruption while preserving flexibility (and thus discretionary power) in public administration. The argument for increasing transparency is that it contributes to tightening the enforceability constraint.

**Proposition 5.** Let \( C \in [C, \overline{C}] \) be the cost of providing favors. Then, the smaller the firms’ collective contribution to the network, the lower the level of occasional corruption.

**Proof.** In the proof of Proposition 3, we show that a firm \( j, \pi_j \leq \pi_k \), prefers to pay its bribe \( \hat{B} \) rather than to cheat if \( \hat{B} \leq \frac{(1 - \varepsilon)A^*}{(1 - \delta)} + \varepsilon F \); \( A^* = \delta(\sum_i \pi_i) - g \). Let an illegal favor \( x \) be such that \( C_x \in [C, \overline{C}], C_x = \frac{(1 - \varepsilon)A^*}{(1 - \delta)} + \varepsilon F \). Since \( \frac{\partial \hat{B}}{\partial A^*} > 0 \), we have that when \( A^* \) diminishes (because the \( \pi_i(s) \) go down), favor \( x \) cannot longer be the object of an occasional corrupt deal. The largest bribe that satisfies the firm’s incentive constraint does not cover the cost \( C_x \).

---

\textsuperscript{28} In contrast, asymmetry of information between the principal and the bureaucrat creates discretion to provide illegal favors. The asymmetry in information bears then on firm specific data, relevant to how the rules should be applied. This asymmetry is addressed in the theory of regulatory capture (Laffont and Tirole, 1993).
Comments
The intuition is straightforward. When the firms do not profit much from belonging to the network, the network’s potential to enforce bribes is accordingly small. The interpretation is that the firms’ contributions to the network reflect the level of development of the market economy. The more developed the market, the more business-relevant information is conveyed through prices and the less dependant the firms are on “good connections”, i.e. on network interaction to do business. One example of this is the management of business risks. In the absence of reliable arbitrage courts, firms are not protected against the risk that the partner fails to fulfil its contracted obligations. Doing business then requires a lot of information to evaluate those risks, including for instance information about how the candidate partner behaved in the past. To obtain this information you need the kind of good connections characteristic of network interaction. Next, the cost $C$ captures expenditures related to making the deal hard to detect. It could also capture expected sanctions. Where $C \in [c, \bar{C}]$, some deals are easier to hide than others. In such a situation, the larger $\Delta^*$ is, the larger the class of deals that can be enforced, that is, even high-risk deals.

Propositions 4 and 5 capture the main findings of the paper. The extent of corruption depends on the functioning of the legal sector. An economy is expected to be more vulnerable to corruption when market relationships are under-developed and/or when firms are poorly informed about the legal framework. These results square with the stylized facts that transition and LDC economies are plagued by corruption to a larger extent than developed economies. According to TI’s Corruption Index for 1998 (http://www.transparency.org), the highest corruption ranking developed economy is Italy (39). Above that level (up to 85), one only finds LDC (Cameroon stands last, rank 85) and transition economies (Russia ranks 76). These countries are often characterized by an unstable system of rules and by under-developed markets (see Levin and Satarov, 2000). Both factors of opacity provide large value to “good connections”, i.e. to interaction within a network. Although occasional corruption is not the only form of corruption, it may act as a port of entry. Where occasional corruption is not enforceable one also expects a lesser extent of repeated corruption relationships.

Before leaving this section, I briefly develop a heuristic argument showing that enforcing bribes using network punishments does not open up opportunities for a simple regulatory response that would undermine corruption. In particular, (i) it only marginally increases detection risks and (ii) it does not facilitate the use of payment schemes to elicit information about corruption.

First note that information about membership in a network is no signal of corruption. The value of the legal interaction between firms suffices to justify membership. Even the termination of membership can only be viewed as a fairly noisy signal. In the model, a firm is also excluded when it free-rides from cooperation or from a boycott. In reality, one would expect a wide variety of reasons for a firm to leave a network.29

Next, we note that it may be prohibitively expensive to elicit information about corrupt deals from firms. This may be so when a firm that denounces the bureaucrat expects to be excluded from the network. Indeed, since it has behaved disloyally against a network

29 A firm may not be satisfied with the way a conflict has been resolved within the network. Or its interests may have changed so the network has lost value to the firm.
member (the bureaucrat), why should anyone trust that firm? On the other hand, encouraging the bureaucrat to denounce firms creates perverse incentives (but this is not specific to our context).\textsuperscript{30} It remains, however, an open question for further research to determine whether and how the mechanism of network punishments can be exploited in more sophisticated schemes to combat corruption.

5. Concluding remarks

This paper has developed a simple argument showing that there may exist strategic complementarities between occasional corruption and interaction within a business network: punishment opportunities in the network are exploited to enforce bribes. As a result, the extent of occasional corruption reflects weaknesses in the legal sector. This theory produces sensible predictions that square with cross-country empirical data. Corruption tends to be greater in countries where the legal and administrative framework is unstable and complex and where the market still is under-developed. The study suggests ways to exploit the Achilles’ heel of occasional corruption, i.e. the lack of self-enforceability. It tells us that the value of the bureaucrat’s insider information should be reduced, to weaken his extortion power. Also suggested is the benefit to a society from developing institutions supporting the private sector, so that market competition can supplant the connection economy.

Acknowledgements

I am grateful for helpful comments from Jonas Häckner, Sten Nyberg, Pierre Picard and Hans Wijkander, Philippe Jehiel and from two anonymous referees. Financial support from the Swedish HSFR is gratefully acknowledged.

Appendix

Proof of Proposition 1. First note that “no cooperation” is a Nash equilibrium. So if a firm free-rides from a collective boycott, the other firms have no incentive to deviate from the “no cooperation” response. If firm $j$ defected in the first period, then it also defects in the next period (under the boycott). This is because whatever it does, it can, at best, only benefit from the network under the current period (if the boycott fails). But then there is no incentive for any firm to free-ride from the boycott since firm $j$ does not contribute. Therefore, a firm $j$ that defects saves $g$ in the current period but loses access to the pool for the future. If $g \leq (\delta/(1 - \delta))((\bar{\Pi} + \bar{\pi}_k - g)$ defection is not profitable.\hfill \Box

Proof of Proposition 2. Assume that the firm cheats and the bureaucrat does not terminate the relationship. Then, the firm would cheat him once more since its incentives are the same in any future deal. So the bureaucrat terminates the relationship and the firm’s payoff

\textsuperscript{30} The bureaucrat would have an incentive to fool uninformed firms into corrupt deals to pocket the reward.
when cheating is the saving of the bribe $\hat{B}$ and zero afterwards. But if $\varepsilon \geq (\hat{B}/F)$ which is equivalent to $(\varepsilon/(1-\varepsilon))(F-\hat{B})>\hat{B}$, the value of continuing the relationship exceeds the bribe. So when $\varepsilon \geq (\hat{B}/F)$, the firm chooses not to cheat. \hfill \Box

**Proof of Lemma 1.** Assume by contradiction that the firm pays the bribe first. Then, if the bureaucrat cheats, he saves the cost $C$ in the current period. In the next period, the (next) firm refuses to deal with the bureaucrat, it earns 0 payoff from corruption. If it accepts, it earns $(F-B) > 0$ in the current period and each time it is offered a deal. Hence, it is optimal for the firm to accept the favor and to promise to pay. Assume now, as in the Lemma 1, that the payment of bribes can be enforced relying on outside punishment. The bureaucrat’s payoff when cheating in the first period is $B + (\delta/(1-\delta))(B-C)$ which is strictly larger than the largest payoff he can obtain when postponing cheating, $B-C+\delta B + (\delta^2/(1-\delta))(B-C)$. So he cheats in the first period. Hence, no firm ever trusts him, which contradicts the first assumption. So the bureaucrat always offers the favor first and the firm pays afterwards. \hfill \Box

**Proof of Proposition 3.** Consider the following strategy profile. In phase 1, all firms cooperate and pay their bribes. The bureaucrat ($k$) contributes and offers deals to some of the firms, and if cheated, he complains. A phase 2 is initiated after some firm $j$ cheated and the bureaucrat complained. If $\pi_j \leq \pi_k$, the firms boycott the cheating member $j$, while if $\pi_j > \pi_k$, they do not. After one period of phase 2, a phase 3 is initiated. If $j$ has been boycotted, we start a new phase 1 with one firm less. If some firm(s) free rides the boycott, $k$ exists. After a failed boycott a phase 4 is initiated. Cooperation between the firms is restored unless $j$ also defected, in which case the network disintegrates.

We show that the strategy profile above yields corruption in equilibrium under the conditions stated in Proposition 3. In phase 4, Proposition 1 applies for $A-\pi_k \geq 0$. In phase 3, $k$ earns zero payoff whether he stays or exits. If he did not, no firm would ever pay bribes, so in phase 3 the bureaucrat exits. In phase 2, if the cheating member ($j$) also defected, he is excluded according to the network equilibrium strategy. If $i$ contributed, any firm $i \neq j$ faces the choice between cooperating with $j$, in which case the bureaucrat exits but the cheating firm stays. Or $i$ boycotts $j$, in which case the cheating member is excluded but the bureaucrat stays. Note that being alone to boycott has no effect on any player’s payoff. In contrast, free-riding the boycott triggers the bureaucrat’s exit. Boycotting is thus a dominant strategy in any subgame where $j$ has cheated $\pi_j \leq \pi_k$. In phase 1, Proposition 1 applies to network interaction. Hence, any firm $i$; $\pi_j \leq \pi_k$ complies with the deal if $\hat{B} \leq (1-\varepsilon)A^* + \varepsilon F$; $A^* = \delta \left( \sum_{j=1}^{n} \pi_j \right) - g$, ($A^*$ is the value of firm $i$ such that $\pi_i = \pi_k$). The bureaucrat never offers deals to $j$; $\pi_j > \pi_k$, because they would not be excluded if they cheated. Where $((1-\varepsilon)A^*/(1-\delta)) > C$, there exist enforceable and profitable deals with all firms $j$; $\pi_j \leq \pi_k$. \hfill \Box

**References**


