Initiation of corrupt exchanges and severity of corruption

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Abstract

This paper examines the effectiveness of corruption control depending upon whether the bribe taker or the bribe giver initiates the corrupt interaction. The probability of corrupt exchanges depends upon the bribe and the corrupt market structure. The probability of apprehension is set but punishment can be influenced via bribes. Results show that the effectiveness of apprehension hinges on whether higher bribes invite harsher fines. Competition for favors intimidates the bribe giver into offering lower bribes, while greater agency competition has a similar effect on the bribe demanded. Consistent with intuition, better paid bureaucrats demand smaller bribes. Some implications for anti-corruption policy are discussed.

Keywords: corruption, bribe takers, bribe givers, competition, probability, penalty

1 INTRODUCTION

Attention to corruption has heightened in recent years among researchers, policymakers and the general public (see Aidt, 2003; Lambsdorff, 2006; Svensson, 2005; Treisman, 2007). This has occurred due to advances in information gathering and transmission mechanisms leading to greater awareness about corruption and to the relative ease of conducting empirical research. Some nations, such as transition countries and those endowed with certain natural resources, face special challenges in corruption control. However, formal research on corruption, especially at the micro-level, has lagged behind empirical macro analyses (Treisman, 2007).

This paper attempts to add to the literature by examining relative interactions between bribe givers (or favor seekers) and bribe takers (or government officials/bureaucrats). The novelty is in alternately examining whether bribe takers or bribe givers move first in initiating corrupt deals and the consequent impact on the magnitude of bribes or the severity of corruption. The focus of this paper also enables us to study whether the predetermined value of the corrupt "reward" makes a difference to corruption – when the bureaucrat solicits the bribe, the value of the license or permit is likely clear; on the other hand, when the bribe payer moves first by offering a bribe, the value of the favor sought is less likely to be preset. For instance, once the bureaucrat accepts the corrupt offer (or reveals that he's willing to "deal"), he could potentially offer a range of favors – a better job than the one sought for a higher bribe, admission to a better government college, etc. Understanding of the size of bribes should aid in understanding of the type of corruption – whether it is "petty" or "grand" – and, from a policy perspective, has equity and distributional implications.

Corruption can take many forms. Two common forms involve collusion among corrupt government officials and bribe givers, while extortion involves rent-extraction by bureaucrats with monopoly powers (see Mishra, 2006). Various factors

might determine whether the bribe taker or the bribe giver initiates a corrupt deal. For instance, the first mover in corrupt relations might be determined by the relative discount rates of the two parties, relative bargaining positions, degree of competition, socio-cultural norms, etc. (see Hunt, 2006; Lambsdorff and Teksoz, 2004; Rose-Ackerman, 1999). These factors also influence the magnitude or the size of bribes. For example, under collusion in corruption, either the bribe giver or the bribe taker might move first by offering to collude with the other party to misstate performance (e.g., an inspector approaching a government contractor to approve a substandard dam as meeting standards in exchange for a bribe or the contractor approaching the inspector to obtain the same outcome) or to obtain/offer favors out of turn (e.g., expedited housing permits; early approval of loan applications from public sector banks, etc.). Extortion in corruption occurs when government officials with monopoly powers move first by setting prices for their services (e.g., when they hold monopolies on the award of licenses; sanctioning eligibility for job promotions, etc.). Bureaucrats could also set price tags for performing routine services "after hours" – issuing licenses on weekends. These situations might also occur in hierarchical bureaucracies where officials have "hold-up" powers (Mishra, 2006; Rose-Ackerman, 1999). The scenarios envisioned in the formal model below are consistent with these situations and exhibit many prevalent forms of corruption; however, we cannot claim to cover all possible interactions between bribe givers and bribe takers (see Bertrand et al., 2007; Cadot, 1987; Guriev, 2004 and Manion, 1996) for examples of alternate settings. For instance, while we do not explicitly model information asymmetries across bribe takers and bribe givers, unaware bribe givers might offer bribes to obtain services that they are routinely entitled to (see Manion, 1996).

As with other forms of illegal activity, the first mover in corruption (a favor seeker or a favor giver) is uncertain whether the proposal to engage in a corrupt deal would be accepted by the other party. Favor seekers might initiate bribe offers to gain preferential treatment (e.g., obtaining expedited or undeserving services) but they run the risk of their bribe offer being rejected for being too low or the potential recipient (government official) being honest.[1] Bertrand et al. (2007), Goel (2005), Guriev (2004), Lambsdorff (2002) and Lambsdorff and Teksoz (2004) have noted issues related to formation of corrupt relations (also see Andrianova, 2001). Larger bribe offers, *ceteris paribus*, could also induce greater scrutiny and harsher penalties. This is illustrated in figure 1, where the bribe giver is unsure whether the potential recipient (government official) is corrupt or honest. Examples include favor seekers bribing to obtain underage driving licenses (see Bertrand et al., 2007) for an interesting experiment related to corruption in the award of driving licenses) or to acquire false identifications.

[1] While instances involving qualification requirements of potential bribe givers (e.g., driver license seekers (Bertrand et al., 2007), job or admissions seekers) are not explicitly modeled in our setting, one could envision that unqualified applicants would be bribe givers who would move first by offering bribes (also see Cadot, 1987).

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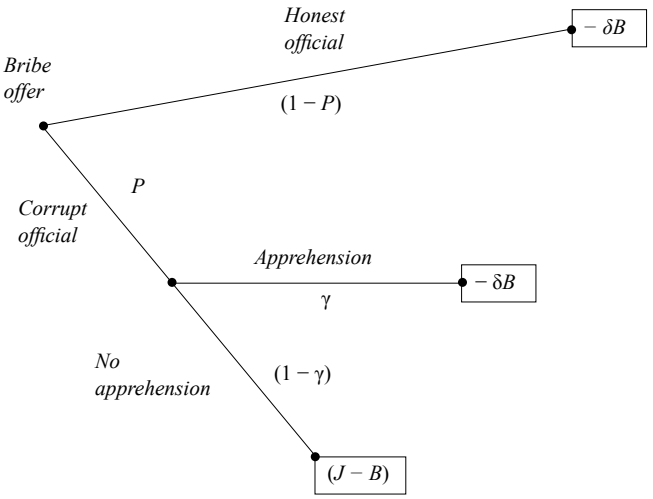
On the other hand, government officials, especially those with some monopoly powers in the disbursement of favors, might initiate corrupt deals by putting a "price tag" on different services (see Shleifer and Vishny, 1999).[2] For instance, officials might drag their feet (increase red tape (see Guriev, 2004)) to grant approvals for pollution permits or property registration deeds. They too have to do a cost-benefit calculation – high bribe demands might induce some potential favor seekers to operate in the shadow economy or go to different (competing) government agencies (Bliss and Di Tella, 1997; Shleifer and Vishny, 1993; Rose-Ackerman, 1999); also, higher bribe demands might invite greater scrutiny and harsher penalties. Figure 2 shows the different steps when the bribe taker bureaucrat moves first. In this instance, the government official moving first by setting prices for services offered is unsure whether a corrupt deal would eventually materialize.

FIGURE 1
Corruption: bribe giver moves first



Note: J = payoff; B = bribe offer; P = probability of corrupt deal; γ = probability of apprehension; δ = penalty.

Both bribe givers and bribe takers in corrupt deals have to contend with the chances of getting caught and, upon apprehension, the expected punishment for corruption – apprehension without credible punishment is not very effective (see Banerjee, 1997; Becker, 1968; Becker and Stigler, 1974; La Porta et al., 1999; 2004). These apprehension chances (probability of getting caught) and punishment might be set (exogenous) or the judicial mechanism itself might be corrupt (Benson, 1988; Goel and Nelson, 2007; Mookherjee and Png, 1995; Priks, 2011). In our

[2] This scenario is similar to the case of a corrupt auction by a monopolist bureaucrat. Some scholars have considered the case where the auctioneer, rather than the buyer or the seller, might be corrupt (Lengwiler and Wolfstetter, 2006).

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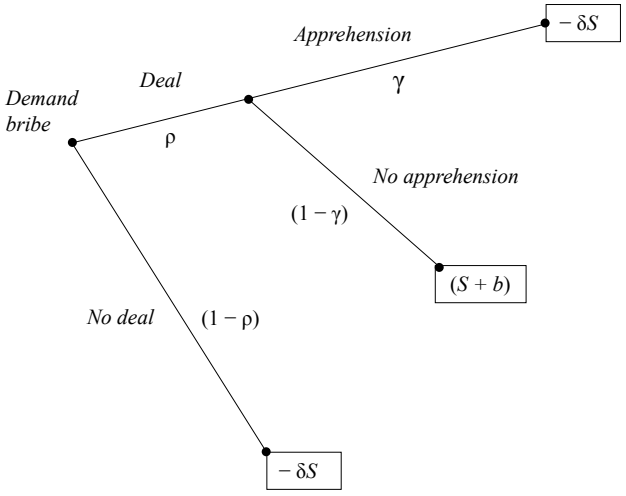
analysis, the detection rates and punishments are assumed to be the same whether the bribe taker or the bribe giver moves first – the anti-corruption bodies in charge of checking corruption are mainly interested in reducing corruption and are generally less concerned with (or largely unable to detect) who initiated the corrupt deal.

FIGURE 2
Corruption: bribe taker moves first



Note: S = bureaucrat's salary; b = bribe demanded; ρ = probability of corrupt deal; γ = probability of apprehension; δ = penalty.

Besides contributing to the literature, this work has some policy value – in the absence of the ability to eradicate corruption entirely, under what conditions can government actions make corruption less severe (by reducing the magnitude of bribes)? The severity of corruption is the other dimension of corruption research that has mainly focused on the prevalence of corruption. The magnitude of bribes strikes at fairness issues associated with corruption – lower bribes make corrupt acts affordable to a larger set of potential favor seekers. The formal model follows.

2 THE MODEL

We consider two scenarios – allowing the bribe giver (denoted by superscript *g*) and the bribe taker (denoted by superscript *T*) alternately to initiate the corrupt deal, each party unaware whether the offer would be acceptable to the other party.[3]

[3] Both the giver and taker are assumed to have similar attitudes towards risk and are assumed, for analytical tractability, to be risk neutral.

The probability of apprehension or detection for corrupt acts, γ, is exogenous – the bribe taker and the bribe giver are unable to influence their chances of being apprehended. However, the severity of punishment for corrupt acts once caught, δ, is sensitive to the size of the bribe (both bribe offered and bribe received). In a largely corrupt economy with a corrupt judiciary, the derivative of δ with respect to the bribe would be negative, but it would be positive when the authorities have a zealous attitude towards eliminating corruption and it would be zero in a case in which the punishment is set – akin to a *per se* illegality clause. The punishment can be a monetary fine or it may be thought of as the monetized (present-discounted) value of incarceration (alternately, demotion or suspension from a job). The probability of detection is determined by the efficacy of policing, while corrections and judicial employment determine and enforce penalties.[4] See figures 1 and 2 for various scenarios facing the bribe giver and the bribe taker, respectively.

2.1 SUPPLY-PUSH BRIBERY: BRIBE GIVER MOVES FIRST

In this instance the bribe giver or the favor seeker initiates the corrupt deal by offering a bribe. The paper by Guriev (2004) examines a related, somewhat narrower, aspect where a bribe is offered to a bureaucrat to reduce the degree of red tape. The bribe offer is denoted by $B > 0$ and is assumed to be one-shot or a one-stop corrupt shop of the corrupt bureaucrat.[5] Potential payoff from the corrupt deal is denoted by J, such that $J(B)$, $J_B > 0$, $J_{BB} < 0$, and $J(0) = 0$. In other words, larger bribes can increase the payoffs and there are no corrupt returns without bribe offers – the corrupt payoffs are contingent upon successful corrupt contracts. $J > B$ makes engaging in corrupt activity worthwhile for the giver and it follows then that $J_B > 1$ – i.e., the marginal return to a bribe is greater than one. The payoffs might include awarding oil-drilling rights to firms who are not qualified or giving construction permits to blacklisted contractors, etc. Larger bribes, for example, might enable one to procure rights to larger, more lucrative drilling tracts.

The giver is unaware whether the bribe would be acceptable to the government official – not all government officials are corrupt. Let P denote the probability that the bribe offer will be accepted by the government official. Higher bribe offers increase the chances of acceptance $P_B > 0$, and $P_{BB} < 0$. To introduce competition for favors, the probability P is also dependent on the given number of favor seekers (N), such that a giver's probability of striking a corrupt deal diminishes with more seekers ($P_N < 0$, and $P_{NN} \geq 0$).[6] The cross-effects term P_{BN} might be positive, negative or zero depending upon whether the competition for favors increases, decreases or leaves unchanged the marginal effect of a bribe on the probability of a successful deal.

[4] Goel and Nelson (2007) empirically consider the relative effects of these types of government employment on corruption in the United States. Also see Alt and Lassen (2008).

[5] A dynamic analysis with multiple points of bribe payoffs would involve a much more complex analysis that could also allow for the possibility of a bureaucratic hold-up at some stage(s) of the process.

[6] One specific functional form that satisfies the marginal conditions is $P = B^{\alpha}/N$, with $0 < \alpha < 1$. Further, one could alternately have the bribe offer depend directly on the number of givers, although that would require greater informational requirements on the giver.

Given this background, the bribe giver tries to maximize the payoff from the one-shot bribe offer by weighing the relative costs and benefits of success. The expected payoff (π^g) is the sum of expected net returns from striking a corrupt deal, which are the sum of expected payoff (loss) from detection and consequent punishment, $P\gamma B(-\delta)$, and the payoff from escaping detection, $P(1-\gamma)(J-B)$; minus the penalties in case of no deal, $\delta B(1-P)$. It is assumed that the deal falls through mainly because the government official is honest (or pretends to be so because the bribe is too low) and all honest officials report the bribe giver to the appropriate authorities.[7] Figure 1 illustrates the options of the bribe giver.

Formally, the bribe giver chooses the bribe size B to maximize payoff π^g

$$\begin{aligned} \underset{B}{max}\ \pi^g &= P\{\gamma B(-\delta) + (1-\gamma)(J-B)\} - \delta B(1-P) \\ &= P(J-B)(1-\gamma) - \delta B z1) \end{aligned} \tag{1}$$

$$[J > B \rightarrow (1 - J_B) < 0;\ z1 \equiv \{P\gamma + (1-P)\} > 0]$$

Simplification of the corresponding first-order condition ($\pi^g{}_B = 0$) yields

$$B^* = [[(1-\gamma)\{JP_B + P(J_B - 1)\}] - \delta z1]/[P_B(1-\gamma) + \delta_B z1 + \delta P_B(\gamma - 1)] \tag{2}$$

Recognizing that, given the general functional forms used here, B^* is not in a reduced form, a sufficient condition for B^* to be positive requires $\delta_B \geq 0$; $\delta < 1$; and $\delta < (1-\gamma)[JP_B + P(J_B - 1)]/z1$. In other words, for a positive bribe offer to be forthcoming, the potential punishment should be relatively low.

Further, sufficient condition for satisfaction of the second-order maximization condition (i.e., $\pi^g{}_{BB} < 0$) requires that $\delta_B \geq 0$; $\delta_{BB} \geq 0$; $P_{BB} \leq 0$; and $\varepsilon_P \equiv P_B B/P \leq J_{BB}B/2(J_B - 1)$.[8] For a maximum, the punishment should be fixed or incremental and the probability of the deal should be somewhat inelastic or unresponsive to the bribe. Intuitively, from the bribe giver's perspective, the probability of acceptance of the corrupt deal is likely to increase when the bureaucrat (bribe taker) is facing the end of her tenure due to retirement or a change in political leadership.[9] Then a small increase in the bribe offered would, *ceteris paribus*, be more likely to elicit a positive response from the official.

[7] One could, without loss of generality, introduce another possibility in the model by introducing an exogenous probability where the government official who rejects the bribe chooses to report the bribe giver. In a multi-period corrupt relation, the honest official might choose to not report the bribe offer in anticipation of a future corrupt deal or to not harm her "corrupt reputation". The official might also reject and not report if an alternate bribe offer has been accepted – this aspect is somewhat captured by $P_N < 0$.

[8] In the special case $P = B^{\alpha}/N$, $\varepsilon_P = \alpha$.

[9] Bureaucrats facing retirement could accept bribes when they play "end period games" with relatively less chances of punishment or retribution.

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We determine the comparative-static effects on the equilibrium bribe offers of changes in the number of bribe givers (N) and probability of detection (γ). How does the bribe offered respond to changes in the number of potential givers and detection rates?

2.1.1 Effect of a change in competition for favors

Changes in the number of qualified bidders or increases in population can increase the competition for favors. A greater number of favor seekers induce some to offer bribes to jump the queue. By employing the implicit-function rule, the comparative-static effect of a change in N is denoted by

$$(\partial B/\partial N) = -\pi^g_{BN}/\pi^g_{BB} \tag{3}$$

Given that the second-order condition is satisfied (i.e., $\pi^g_{BB} < 0$), the sign of $(\partial B/\partial N)$ will be the sign of π^g_{BN}.

$$\pi^g_{BN} = P_{BN}(1-\gamma)[(J-B)+B\delta] + P_N(1-\gamma)[(J_B-1)+\delta+B\delta_B] \tag{3A}$$

π^g_{BN}, and consequently, $(\partial B/\partial N)$ would be negative when $P_{BN} \leq 0$.[10] When the impact of greater competition on the marginal probability of the deal is negative ($P_{BN} < 0$) – i.e., greater competition dampens the marginal effect of a higher bribe on the probability of the deal, the optimal bribe offered declines with competition. Intuitively, greater competition sufficiently lowers the expected benefits (via a decrease in the likelihood of a corrupt deal) that the bribe giver is induced to offer a lower bribe. There is some empirical support for the competition for favors where studies of corruption determinants have included population as a regressor, although the statistical significance of the estimated effect is mixed (Fisman and Gatti, 2002; Glaeser and Saks, 2006).

2.1.2 Effect of a change in the probability of detection

The chances of being caught for engaging in corrupt acts might change when new governments come to power with corruption control on their agendas or greater attention is paid to enforcement. International mandates might also induce nations to bolster their anti-corruption efforts. Further, technological advances, such as the Internet, might empower anti-corruption efforts by making it easier to detect corrupt acts as locational monitoring constraints are somewhat mitigated in the cyberspace. Proceeding in a fashion similar to that noted above, the effect of a change in the given probability of detection is given by

$$(\partial B/\partial \gamma) = -\pi^g_{B\gamma}/\pi^g_{BB} \tag{4}$$

Here
$$\pi_{B\gamma} = -P_B[(J-B)+B\delta] + P[(1-J_B)-\delta-B\delta_B] \tag{4A}$$

[10] In special cases, $P_{BN} < 0$ with $P = B^\alpha/N$; and $P_{BN} = 0$ when $P = B^\alpha + 1/N$.

π_{By} would be negative when $\delta_B \geq 0$, or with the satisfaction of the second-order maximization conditions. Greater apprehension probability lowers the size of the bribe offered when the punishment is set (non-negotiable) or progressive.

We see that the magnitude of bribe offers is sensitive to the change in parameters. Under certain conditions, competition for favors lowers bribe offers. Apprehension is effective in reducing bribe sizes when punishments are predetermined or progressive according to the magnitude of bribes.

2.2 DEMAND-PULL BRIBERY: BRIBE TAKER MOVES FIRST

Now we shift focus to the bribe taker by allowing for explicit rent-extraction. Public officials with monopoly powers over disbursements of contracts and other favors are in a position to set bribes or prices for their services (e.g., see Cadot, 1987). The solicited bribe is denoted by b and it affects the probability of the corrupt deal ρ, which is also dependent upon the number of competing government agencies (n); i.e, $\rho(b; n)$ and $\rho(0; n) = 0$.[11] For instance, there may be more than one agency capable of awarding leases on government lands (Rose-Ackerman, 1999; Shleifer and Vishny, 1993; 1999). This occurs when government agencies have overlapping jurisdictions. Interestingly, the spread of the Internet has enabled some people to bypass government officials by conducting some government business in cyberspace (see Goel et al., 2012). In this case, for a government official seeking a bribe, the presence of the Internet can be seen as a competing government agency that undermines his/her power to solicit a bribe.

Other things being the same, a higher bribe demand lowers the probability of a corrupt deal by making bribes unaffordable for some favor seekers ($\rho_b < 0$, with $\rho_{bb} < 0$), and greater agency competition lowers the bribe demanded (otherwise, an agency would lose to competing agencies) $\rightarrow \rho_n < 0$, with $\rho_{nn} \geq 0$. Further, there is no a priori good fix on the sign of the cross effects term ρ_{bn} – it could be positive, negative or zero. As noted above, the probability of detection (γ) and the severity of punishment (δ) are the same, irrespective of who initiates the corrupt deal.

In demanding a bribe, the bureaucrat has to weigh the expected benefits from a corrupt deal against the expected costs from detection and punishment. Failure to arrive at a deal can result in the corrupt bureaucrat being reported, resulting in the loss of the set bureaucratic (lawful) salary S. The reporting of the bureaucrat seems especially plausible in a one-period case considered because of the absence of a threat of future backlash. The bribe taker's options are illustrated in figure 2.

Formally, the bribe taker seeks to maximize π^T by choosing the bribe demand (b), where

[11] It is likely that the number of favor seekers (N) is generally greater than the number government agencies (n).

$$\begin{aligned} \max_{b} \pi^T &= (1-\rho)S(-\delta) + \rho[\gamma S(-\delta) + (1-\gamma)(S+b)] \\ &= -S\delta z2 + \rho(1-\gamma)(S+b) \end{aligned} \tag{5}$$

Where $z2 \equiv [(1-\rho) + \rho\gamma] > 0$.

Here $(1-\rho)S(-\delta)$ is the expected payoff (loss) with no deal and $(S+b)\rho[1-\gamma]$ is the expected payoff when the corrupt deal is made and the bribe received, while $\rho\gamma(-\ddot{o}S)$ is the penalty upon apprehension.

The corresponding first-order condition, $\pi^T_b = 0$, yields

$$b^* = [S\{\delta_b z2 - \delta\rho_b(1-\gamma)\} - (1-\gamma)(\rho + S\rho_b)]/(1-\gamma)\,\rho_b \tag{6}$$

A positive bribe is demanded ($b^* > 0$) when the bureaucrat's salary is sufficiently low or when

$$S < \rho(1-\gamma)/[M-(1-\gamma)\rho_b]; \text{ where } M \equiv \delta_b z2 - \delta\rho_b(1-\gamma) > 0 \text{ when } \delta_b \geq 0.$$

The second-order condition for a maximum, $\pi^T_{bb} < 0$, is satisfied when $\rho_{bb} \leq 0$; $\delta_b \geq 0$; and $\delta_{bb} \geq 0$. Turning to the comparative-static effects on the magnitude of the solicited bribe, we consider first the effect of agency competition.

2.2.1 Effect of agency competition on the bribe demanded

As mentioned above, agency competition can change when more government services are transacted on the Internet. Also, the restructuring of government agencies and their responsibilities has been especially prevalent in transition nations, particularly in the early transition years. Employing the implicit function rule, gives the following relation

$$(\partial b/\partial n) = -\pi^T_{bn}/\pi^T_{bb} \tag{7}$$

Given the second-order condition, the sign of $(\partial b/\partial n)$ would be the same as the sign of π^T_{bn}. From (7)

$$\pi^T_{bn} = (1-\gamma)[\rho_n(S\delta_b + 1) + \rho_{bn}(S\delta + (S+b))] \tag{7A}$$

$\pi^T_{bn} < 0$ when $\rho_{bn} \leq 0$. Under these conditions, greater agency competition reduces the magnitude of solicited bribes – competition works, even in markets for corrupt deals.[12] Competition lowers the probability of a deal and affects the marginal effect of the bribe demanded on the deal probability (see Shleifer and Vishny, 1993). Accordingly, an increase in competing agencies (a greater number of jurisdictions) sufficiently lowers the expected payoffs from corruption and induces the

[12] See Priks (2012) for theoretical arguments regarding the different effects of agency competition.

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bureaucrat to demand a lower bribe. While Svensson (2005) and others (e.g., Goel and Nelson, 2011) have discussed why corruption might diminish with greater competition, this research focuses on the severity of corruption.

2.2.2 Effect of higher probability of apprehension on bribe demanded

Effective internal affairs departments can increase apprehension probabilities for corrupt police departments. To determine the effect of higher apprehension probability (γ) on the bribe demanded, we have

$$Sign\ (\partial b/\partial \gamma) = Sign\ \pi^{T}_{b\gamma} \tag{8}$$

where

$$\pi^{T}_{b\gamma} = -\rho(S\delta_b + 1) - \rho_b\,(S + b + S\delta) \tag{8A}$$

$$\pi^{T}_{b\gamma} < 0 \text{ when } [(S\delta_b + 1)b/(S\delta + b + S)] > -\varepsilon_\rho > 0$$

In other words, harsher punishments lower the bribe demanded when the elasticity of deal (acceptance) probability is modest. Intuitively, the bribe taker might expect a lower bribe demand to generate a smaller response (relative inelasticity) in the probability of a corrupt deal when the bribe giver expects a political regime change that might yield more favorable future outcomes (read cleaner government). For instance, "lame duck" bureaucrats can expect lower responsiveness to their bribe demands.[13]

2.2.3 Effect of a change in bureaucratic compensation

Next we study the effect of an increase in the bureaucrat's salary on the size of the bribe demanded. Bureaucratic salaries are often set and changes have often to be approved by legislatures. Proceeding in the same manner as before

$$Sign\ (\partial b/\partial S) = Sign\ \pi^{T}_{bS} \tag{9}$$

where

$$\pi^{T}_{bS} = -\delta_b z2 + \rho_b(1-\gamma)[1 + \delta] < 0 \text{ with } \delta_b \geq 0, \tag{9A}$$

or with second-order conditions.

Higher salaries make bribe demands less attractive – there is some substitution between legal income and corrupt earnings. Goel and Rich (1989) provide some related evidence from the United States.

[13] Alternately, the probability of securing the deal might not change very much with the bribe demanded when the favor offered by the bureaucrat is uniform and each favor seeker can obtain fixed units – e.g., one permit/license per person, one preferred parking permit, etc.

To summarize, we have considered different cases allowing the bribe giver to initiate the corrupt relation by offering a bribe, and then alternately allowing a bureaucrat to initiate by soliciting a bribe. In all scenarios, the focus has been on determining the severity of corruption. We find that anti-corruption policies are effective in reducing the severity of corruption under certain circumstances. The concluding section follows.

3 CONCLUDING REMARKS

Formal economics research on criminal behavior dates back to the seminal work of Becker (1968); however, research on corruption is more recent (see Lambsdorff, 2006; Treisman, 2007). In this context, theoretical work has somewhat lagged behind empirical investigations of corruption. This paper develops a simple model to examine the effects on the severity of corruption when bribe takers or bribe givers initiate corrupt deals. While the extant literature has largely focused on the prevalence of corruption (e.g., Priks, 2012; Svensson, 2005), rather than its severity, these scenarios are consistent with collusion among bribe takers and bribe givers and with extortion by bureaucrats (Ahlin and Bose, 2007; Mishra, 2006; Rose-Ackerman, 2010; Shleifer and Vishny, 1993; 1999). For instance, the first mover in corrupt relations might emerge due to numerous factors including the relative discount rates of the two parties, relative bargaining positions, degree of competition, socio-cultural norms, etc. Both parties weigh the relative costs and benefits of their actions including factoring in that the corrupt relation might not be acceptable to the other party and that there is some risk of apprehension and consequent punishment (figures 1 and 2).

Two scenarios of corrupt dealings are considered: (1) a competitive bribe giver moves first (e.g., bribes offered to buy a place in the queue); and (2) a competitive bribe taker moves first (e.g., offers by bureaucrats to collude with bribe givers). Generally, the timing of bribes is not empirically observable, unless one has access to data on individual bribe transactions. In an interesting recent study, Goel et al. (2013) were able to analyze such data from Croatia. Besides this novelty, corruption issues in Croatia are interesting due it being a transition country. The authors show how a monopolist bureaucrat is able to affect the timing and the nature of bribes.

Results show that positive bribes are forthcoming when punishments and bureaucratic salaries are low. When the bribe giver initiates the corrupt deal, greater competition among favor seekers lowers the bribe offered provided the marginal effect of the bribe is somewhat insensitive to competition. In the context of the literature, we are able to show the effect of competition on the severity of corruption, rather than on its prevalence (Svensson, 2005). Apprehension is shown to be effective in reducing bribe offers.

With the bribe taker initiating the corrupt deal, greater competition among government agencies (competing jurisdictions) lowers the bribe demanded again when the deal probability is relatively inflexible to agency competition.[14] Greater apprehension probability lowers the bribes demanded when the probability of securing the corrupt deal is somewhat unresponsive (inelastic) to the bribe demanded. The probability of securing the deal might not change very much with the bribe demanded when, with a given number of jurisdictions, the favor offered by the bureaucrat is uniform and each favor seeker can obtain fixed units – e.g., one permit/license per person, one preferred parking permit, etc. Alternately, a "lame duck" bureaucrat can expect lower responsiveness from the bribe giver to her bribe demands.[15] Finally, consistent with intuition, higher bureaucratic salaries reduce bribe demands.

Besides contributing to the literature, this work has some policy value. In the absence of the ability to eradicate corruption universally, policymakers might look to make it somewhat benign by lowering its severity. Greater competition among bribe takers and bribe givers reduces the bribes – thus making bribes more affordable for more givers.[16] In general, apprehension is shown to be effective no matter who initiates the corrupt deal. However, for this to happen, a "clean" judiciary seems necessary. Similar results are also seen with greater agency competition, although it may be more expensive in some cases to maintain competing agencies. Further, increases in bureaucratic salaries to keep them at somewhat on a par with their private sector counterparts seem to constitute an effective counter-corruption strategy (see Goel and Rich, 1989).

In closing, some potential extensions to this work are suggested. One limitation of this analysis is that repeated corrupt interaction between the parties is not considered, which might lead to reputation effects (Andrianova, 2001; Basu et al., 1992; Buccirossi and Spagnolo, 2006; Dixit, 2004; Yoo, 2008). One could also include a middleman in corrupt dealings (see Bertrand et al., 2007; Guriev, 2004; Lambsdorff and Teksoz, 2004). Second, the model considered in this study is a partial equilibrium one and social welfare implications of changes in corruption are not formally considered. Further, access to micro-level data might enable one to test some of the assumptions of this study (see Goel et al., 2012; 2013; Mocan, 2008). Finally, a simplification is the consideration of a single window for the bribe. In practice a series of bribes might have to be paid to accomplish one corrupt deal.

[14] In different settings, Bliss and Di Tella (1997) and Priks (2012) have shown that greater competition might not necessarily lower corruption.
[15] As a practical matter, however, this elasticity may be difficult to observe for enforcement bodies, although one can expect the elasticity to change when bureaucrats face the end of their tenures, voluntarily or otherwise.
[16] This policy implication is somewhat tempered by the fact that in practice not all anti-corruption agencies might be completely independent or have corruption reduction as their sole objective – i.e., they might themselves be interested in garnering rents.

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