How Business Community Institutions Can Help Fight Corruption[*]

Avinash Dixit, Princeton University

This version March 11, 2015

Abstract

Collective action by the business community to counter corruption in the award of government licenses and contracts is analyzed, by analogy with contract enforcement institutions studied by economic historians and contract law scholars. The suggested anti-corruption institution comprises a no-bribery norm, a system to detect violations, and a multilateral ostracism penalty upon conviction in a tribunal. In combination with formal state law, a business institution of sufficient quality—probability of detection and severity of punishment—can eliminate corruption; a less good institution helps reduce it. The legal and communal institutions together achieve substantially better outcomes than either by itself.

JEL classification codes: D02, D73, K42, P37, P48

Author's contact information
    E-mail: dixitak@princeton.edu
    Web page: https://www.princeton.edu/~dixitak/home/wrkps.html
    Mail: Department of Economics, Princeton University, Princeton, NJ 08544, USA

---

1 Introduction

Corruption in dealings between business firms and government officials and politicians is a complex problem that needs to be tackled from multiple angles. Most anti-corruption strategies that have been proposed in policy forums and studied by researchers have two features. First, they are controlled by governments: either the general apparatus of police and courts, or special anti-corruption agencies. Second, their main target is what may be termed the demand side, namely detection and punishment of officials who demand bribes, whether for granting some special treatment to those who meet their demand, or as extra extortion payments for taking actions to which the applicant was entitled either without charge or for some nominal fee. Indeed, some researchers have suggested an asymmetric treatment where punishment for the latter kind of bribery should fall entirely on the demand side; suppliers of such bribes should not be punished, or should even be rewarded, for whistle-blowing. See Basu (2011), and formal modeling and extensions in Basu, Basu, Cordella and Varoudakis (2014).

The government's formal anti-corruption efforts face a very basic and formidable obstacle. Many officials and politicians, and often even the government in aggregate, stand to gain from corruption. The financial gains are large; political gains from reducing corruption may not be large enough to offset these. Therefore anti-corruption measures and their enforcement are often halfhearted, and any actions by one branch of the government are obstructed by other branches or departments with parallel or independent powers. The incentives of the business community as a whole are better aligned to resist corruption. In some situations business may collude with government officials to increase costs of public projects so both of these parties gain at the expense of the taxpayers. But on the whole the politicians' and officials's take is a direct hit to the bottom line of business.

A bribe acts as a tax on business, and an uncertain and inefficient tax, that reduces the incentive to invest and innovate; Ayyagari, Demirgüç-Kunt and Maksimovic (2014) provide evidence bearing on this. Some may argue that business will simply pass on such a tax to consumers through higher prices, but such recovery will in general be much less than full. If the bribe is for a permit to operate the business per se, that is a fixed cost, and does not alter the pricing decision. Any market power would already have been exercised to the same extent and reflected in prices even without the existence of a bribe, so the bribe is a pure subtraction from profit. A payment that affects marginal cost will impact prices. But again, if the original price was optimally chosen to maximize profit, the added cost of the

bribe can only lower the net profit.[1] There are conditions pertaining to the elasticity of the slope of market demand for an oligopolistic industry, under which a higher marginal cost leads to such a large increases in the equilibrium price that each firm's profit goes up; see Seade (1983) and Dixit (1986). However, these circumstances are unlikely to be relevant in the present context. If they were, the oligopolists would have many more plausible and legitimate avenues to raise their costs. For example, they could arrange some costly industry-wide regulation that even purports to serve a social purpose such as health promotion or environment protection, instead of relying on bribery. And one never hears businesspeople propose anything resembling bribery as a way of increasing profits for whole industries!

Thus we may conclude that a corrupt system is likely to reduce profitability and growth prospects for the business community as a whole. Of course a firm that wins a government license or contract through bribery will benefit at the expense of other competing firms. Therefore individual firms are tempted to engage in bribery even when the business community as a whole stands to lose from the corrupt system. This is a prisoners' dilemma: individually rational choices lead to a collectively bad outcome. Like all such dilemmas, collective action is needed to resolve it.

Here I explore the potential of one such non-governmental institution that operates on the supply side by detecting and punishing givers of bribes, following an initial suggestion in Dixit (2013). If several major and respected firms and businesspeople can become persuaded to take a leadership role in launching and sustaining a collective anti-bribe-giving effort, then they, in alliance with some political and governmental leaders, have a better chance of success than either side on its own.

The concept is similar to the institutions of contract enforcement studied by Greif (1993), Bernstein (1992) and others. Their communities of businesspeople or traders sustain a norm of good behavior in contractual performance using a threat of multilateral punishment. Even though any two given members of the community may not have sufficiently frequent bilateral interaction to support an honest equilibrium outcome in their repeated game, the prospect that if member B cheats in dealing with member A, then C, D, E, ... will punish B on A's

---

[1]If the profit is

$$\Pi = \max_p \ (p - c) \, D(p)$$

in obvious notation, then by the envelope theorem

$$\partial \Pi / \partial c = -D(p^*) < 0$$

where p^* is the profit-maximizing price.

behalf in their future interactions makes it a repeated game for B in his dealings with the community as a whole.

The mechanism requires the community to have a reliable apparatus for detecting and investigating violations of the norm, and a credible and sufficiently severe punishment for proven contract violations and defiance of any stipulated remedies. The usual punishment is ostracism, which is very drastic since it wipes out the industry-specific capital of the guilty party and essentially takes away his livelihood. The prospect of efficient application of this severe punishment keeps most participants honest; there are few contractual disputes and the punishment has to be inflicted only rarely.

In the case of Greif's Maghribi traders, the detection apparatus was the system of communication—letters exchanged among the members of this relatively small and closed community. The enforcement of ostracism was credible because it was more costly for a member to enter into a relationship with an ostracized trader than one with a good reputation— the former feared no further punishment and was therefore more likely to cheat. In the case of Bernstein's diamond merchants, detection is simple because an aggrieved member brings a complaint to the arbitration tribunal, which can investigate it rapidly and efficiently using the members' experience and detailed inside knowledge of the industry.

In the context of corruption, the norm would be not to give bribes to public officials in order to win licenses or permits, or to speed up the process of getting these. The sanction would be that any businessperson who is found to have violated this norm will be ostracized by the rest of the community. Since the winner of a license will need contact with many other members of the community of various essential purposes—supply, subcontracting, marketing, trade credit from other firms, longer-term credit from banks and other financial institutions, accounting services, and so on—a boycott from all or even many of these providers will severely reduce the values of the illicitly-won license and of future business opportunities. If this threat is sufficiently severe, winning the license by bribery becomes worthless. The model of Section 2.4 derives the conditions for this to work. I find that in combination with the government's own demand-side enforcement efforts, it can make a significant contribution to reducing the level of corruption.

At first the scheme may seem too idealistic or even naïve to be practical. But there are some closely related precedents of collective action by the business community that have achieved some measure of success. Therefore I believe it deserves further study and even some experiments in implementation.

I should emphasize that I do not expect such a scheme to achieve in real life anywhere near the 100% success it can under certain conditions in the theoretical model of this paper. However, the problem is so pervasive and costly for economic development that even a 50% or even 25% success is worth having. Waiting for 100% merely guarantees getting 0%.

1.1 Practical Precedents

Community activists in India have attempted to counter petty bribery by meeting demands with a specially printed zero-rupee note.[2] The idea is partly to shame the official demanding a bribe, but more importantly, making him aware that the resisting client belongs to an organization, so any reprisal against him will have more serious consequences for the official than if the client were an isolated and unsupported individual. This institution claims to have achieved some success, but hard statistical evidence to support these claims awaits serious research.

Other organized private efforts to increase anti-bribery compliance include TRACE International; see their web site `http://www.traceinternational.org` .

Even more remarkable is the Sicilian community organization AddioPizzo that has attempted, with some success, to resist the Mafia's extortion. The collective action has made it harder for the Mafia to target retribution that they would have easily inflicted on any individual unorganized resisters. See the account and analysis in Superti (2009).

Business leadership in corporate governance reform has a long and distinguished history. To give just one prominent example, J. Pierpont Morgan and his partner Elbert Gary who founded Federal Steel "took the then unusual step of issuing quarterly reports" because "both men believed that corporations issuing publicly traded securities had to account for their financial performance" (Strouse 2000, p. 398). Only later was the idea picked up by the progressive movement and made into a legislated requirement. Prominent firms in modern sectors of India and some other developing countries are similarly taking leading roles in reforming corporate governance, albeit with limited success so far (Khanna and Palepu, 2004). A similar community effort to fight corruption would be a valuable and welcome extension of these initiatives.

---

[2]See `http://www.5thpillar.org` and `http://en.wikipedia.org/wiki/Zero_rupee_note`.

1.2 Literature on Corruption

The literature on corruption is too huge to survey here. I will only mention the seminal work of Becker and Stigler (1974) and Rose-Ackerman (1978), and the surveys by Aidt (2003) and Rose-Ackerman (2011). In all this work, anti-corruption policies are assumed to be the government's job, using its formal legal apparatus. The modeling is very detailed and sophisticated. But my focus is on the extra role a non-governmental business community association can play; therefore I will keep the government side quite simple and in a reduced form.

2 A Formal Model

Suppose a permit or license or contract (henceforth called "license" to avoid constant repetition) lasting one period has value L to a person or firm (henceforth simply "firm" for brevity). I assume L to be exogenous and the same for all potential recipients, like the common value assumption in auction theory; variations and extensions are left for future research. A bureaucracy, which I shall model as a single decision-maker called "the bureaucrat," decides whether to grant the license. I shall consider both the competitive case where there is only one license and many firms would like to get it, and the non-competitive case where any qualified person or firm can have one. Many other cases can be considered: the license can last more than one period, it may be partially competitive in the sense that its value to one firm depends on how many others have one. These are left for future research.

There will be two key variables in the model: the bribe B relative to the value of the license, denoted by $\beta = B/L$, and the degree of favoritism shown by the bureaucrat to a firm that pays a bribe, which I shall model as a ratio $\pi = p_B/p_0$, where p_0 is the probability of getting the license without paying a bribe and p_B the probability of getting it with a bribe. The cases $p_0 = 0$ and $p_B = 1$ are not excluded a priori. Both β and π are endogenous, to be determined in the various cases under consideration. Other formulations, such as faster service to a bribe-paying firm, are conceivable and should yield qualitatively similar results.

I model the bribe as a kickback, i.e. it is to be paid if and only if the firm wins the license. Modeling it as an advance payment without refunds to losers (like an all-pay auction) changes some of the algebra but the qualitative results remain the same.

Note also that the model is "partial" or "reduced-form." I am considering the interaction between just one firm and the bureaucracy. Considering all firms together will enable some

of the above parameters to become endogenous variables; for example, if n identical firms are competing for just one license, in absence of bribery we could have a random allocation mechanism, so $p_0 = 1/n$ where n is the number of firms. But the main points can be made without the added considerations like solution of a general game equilibrium with all firms and the bureaucracy as players, so I will keep everything as simple as possible.

I begin with separate treatments of the bureaucrat's decision (the "demand side" of corruption) and a firm's decision (the "supply side"), and then put the two together to characterize the overall equilibrium or outcome of their interaction.

2.1   The Demand Side

The bureaucrat would of course like to extract as much of the value of the license as possible. What constrains him is the risk of being detected and punished. Detection need not be the result of monitoring by a formal anti-corruption agency or some other government body. It could come about from investigative journalism, or complaints by aggrieved client firms or internal or external whistleblowers. I specify all this monitoring technology in a simple reduced form, writing the probability of detection as a function $D(\beta, \pi)$. The idea is that if the fraction of the license fee that is demanded as a bribe is small, it is unlikely to elicit complaints or whistle-blowing, but if the fraction is higher, such activities are more likely. Similarly, if the probability of winning the license with bribery is substantially higher than getting it without bribery, this is more likely to be blatant and visible to anti-corruption inspectors or investigative journalists. I assume a linear form

$$D(\beta, \pi) = g\,\beta + h\,(\pi - 1). \tag{1}$$

This makes the calculations simpler and yields insights based on plausible numerical values; the qualitative results will persist for more general functional forms. Of course a probability cannot be a linear function over a large domain, but linearity can be a locally valid approximation, and the qualitative results will generalize to plausible nonlinear functions.

Suppose that, when detected, the bureaucrat is punished by having to give up the bribed amount and in addition paying a fine F. Then his expected payoff from the bribe is

$$\begin{aligned} EP \;&=\; D(\beta, \pi)\,(-F) + [1 - D(\beta, \pi)]\,\beta\,L \\ &=\; -\,[\,g\,\beta + h\,(\pi - 1)\,]\,F + \{\,1 - [\,\beta + h\,(\pi - 1)\,]\,\}\,\beta\,L\,. \end{aligned} \tag{2}$$

Setting this expression equal to a constant c and solving for π, we get the equation of a typical iso-expected-payoff (IEP) contour:

$$\pi = 1 + \frac{1}{h} \left[- g\,\beta + \frac{\beta\,L - c}{F + \beta\,L} \right] \tag{3}$$

Then

$$\frac{\partial \pi}{\partial \beta} = \frac{1}{h} \left[- g + \frac{(F + c)\,L}{(F + \beta\,L)^2} \right] \tag{4}$$

and

$$\frac{\partial^2 \pi}{\partial \beta^2} = - \frac{2\,(F + c)\,L^2}{(F + \beta\,L)^3} < 0 \,.$$

Also

$$\frac{\partial \pi}{\partial c} = - \frac{1}{h\,(F + \beta\,L)} < 0 \,.$$

Thus the IEP contours are concave, and those lower down correspond to higher expected payoff levels. Figure 1 shows some of these contours. The intuition is that an increase in the favoritism variable π holding the rent extraction ratio β constant (i.e. a vertically upward move in the figure) always makes the bureaucrat worse off by raising the risk of detection, but an increase in β holding π constant (i.e. a horizontal rightward move) creates a tradeoff between bribe revenue and risk of detection, therefore the contours peak in that direction.

**** Figure 1 about here ****

Of course the bureaucrat can always act honestly and award the license to any qualified applicant in the non-competitive case and the best-qualified applicant in the competitive case. This will yield him zero expected payoff in the formula (2).[3] Therefore a corrupt bureaucrat will choose only points in the region in Figure 1 below the contour labeled EP_0 where $c = 0$; this is shown shaded. Note that it starts at the point where $\beta = 0$ and $\pi = 1$, i.e. the "honesty point" with no bribes and no favoritism.

---

[3]That is simply the choice of origin of the expected payoff. It would matter in models that considered government policies of paying efficiency wages or similar bonuses to deter corruption, but that is not my focus here.

2.2 The Supply Side without the Business Institution

An applicant for the license is willing to pay the bribe if $p_B(L - B) \geq p_0 L.$[4] Using the definitions

$$\pi = p_B / p_0, \qquad \beta = B/L,$$

this becomes

$$\pi \geq 1/(1 - \beta). \tag{5}$$

The boundary of this, defined by an equality in (5), is an increasing convex curve in (β, π) space, passing through the honesty point (0,1) and asymptotic to the vertical line $\beta = 1$. Figure 2 shows this curve, and the shaded region above it is the set of points satisfying (5) where the firm is willing to pay the bribe.

**** Figure 2 about here ****

2.3 The Outcome without the Business Institution

Figure 3 brings together these curves. On or above the curve labeled $\pi = 1/(1-\beta)$, applicants are willing to pay the bribes demanded. At points on or below the curve labeled EP_0, the bureaucracy has positive expected payoff from its corrupt strategy. The intersection of these two regions, shown shaded, is therefore the feasible set. I assume that the bureaucrat states the terms of the bribe demand, to maximize his expected payoff EP subject to feasibility.[5] This occurs at the point B of tangency between the frontier of the feasible set (5) and an IEP contour labeled EP*. Note that at B we have $0 < \beta < 1$ and $\pi > 1$.

**** Figure 3 about here ****

The bureaucrat's choice of π may be subject to one other constraint. The firm's competence or quality may imply that in a bribe-free setting it would get the license with a given probability p_0 that is not under the bureaucrat's control. Since $p_B \leq 1$, the bureaucrat's choice must satisfy $\pi \leq 1/p_0$, i.e. it must be on or below a horizontal line like the one labeled U in Figure 3. I have shown a case where this line is above the point B and therefore this

---

[4]In the alternative case of an all-pay bribe, this would change to $p_B L - B \geq p_0 L$. Readers who prefer that formulation can easily rework the algebra and the figures.

[5]This seems more realistic in the context, but alternative solution concepts like Nash bargaining, or the bribe-giver's leadership to make the offer, will have qualitatively similar properties.

constraint is irrelevant, but if p_0 is high enough the constraint may bind; then the solution will be at the corner where the line intersects the firm's willingness-to-pay frontier.

Both curves have the honesty point in common, and the only way the government's detection and punishment system can eliminate corruption is if there is a corner solution at this point. For that to happen, the EP_0 contour has to be flatter than the frontier of the feasible set. The slope of the former is given by (4) setting $c = 0$ and $\beta = 0$, and that of the latter can be found by differentiating its equation $\pi = 1/(1 - \beta)$. This yields the condition for a corner solution:

$$\frac{1}{h}\left[-g + \frac{L}{F}\right] < 1,$$

or

$$F / L > 1/(g + h) \tag{6}$$

Let us consider plausible numerical values. To make the condition (6) easier to satisfy, g and h should be as high as possible. The most we can expect for g is a value like 2 (which means that a bureaucrat who demands half the value of the license for his bribe is sure to be caught). For h, about 0.1 seems as high as we can expect (which means that a bureaucrat who favors bribe givers by a factor of 10 is sure to be caught). Then the condition becomes $F > 0.476\,L$: even with the optimistic assumptions about detection probabilities, fines have to be close to half the value of the license. Financial fines of this magnitude seem infeasible in cases of highly valuable licenses or contracts, because bureaucrats typically would not have that much wealth to be confiscated. Unless a regime can impose non-monetary penalties that are equivalently sufficiently harsh—long imprisonments or even death—demand side policies will be insufficient to eliminate corruption. The best that can be done is to increase F as high as possible, lowering and flattening the IEP curves and thereby shifting the bureaucracy's tangency optimum to the south-west (with lower β and π) along the boundary of the clients' participation constraint. This is essentially the same solution as we have from Becker (1968) for deterrence of crime in general.

2.4   The Supply Side with the Business Institution

Now suppose the business community forms an institution that can detect and punish firms that pay bribes. The punishment consists of ostracism that reduces the values of the current license and of future opportunities. Suppose that when a firm is convicted of bribery by a tribunal of the business community, the value of the license falls from L to $\theta\,L$, and the

continuation value of being in the business falls from V to ϕV, where θ and ϕ lie between 0 and 1. A perfect punishment system would have $\theta = \phi = 0$, but I allow for a less than perfect system as is likely to exist in reality. The detection mechanism is not perfect either; let q denote the probability that a firm that is actually guilty of bribery will be convicted by its peers in the association, and r the probability that an innocent firm will be wrongly convicted, where $1 > q > r > 0$. Let δ denote the discount factor.

Note once again the "reduced form" nature of the model: the parameters q, r, θ and ϕ are taken to be exogenous. A fully rigorous model would specify a detection technology from which q and r emerge endogenously, and a repeated game that endogenizes θ and ϕ. Unfortunately we have little intuitive understanding of the deep structural parameters, so to get some insight into plausible numerical answers it is better to start with parameters that do have intuitive magnitudes. Also, the reduced form enables me to capture the intuitively appealing idea of partially effective enforcement (θ and ϕ strictly between 0 and 1); in most tractable structural models, enforcement is either perfect ($\theta = \phi = 0$) or totally ineffective ($\theta = \phi = 1$).

Kingston (2008) constructs a structural model where a no-bribe equilibrium is sustained in a repeated relationship by trade links among the bribers, but does not consider any interaction with the formal state law and does not obtain numerical magnitudes. Thus his paper and this one offer usefully complementary models.

In reality, q can be an increasing function of β and π similar to the supply-side detection probability function (1) above; I will omit this algebraic complication.

Consider one firm's decision whether to pay a bribe. By the standard recursion reasoning, it is willing to comply with the bureaucrat's demand if

$$
\begin{aligned}
V &= (1 - q)\left[p_B\left(L - B\right) + \delta V\right] + q\left[p_B\left(\theta L - B\right) + \delta \phi V\right] \\
&\geq (1 - r)\left[p_0 L + \delta V\right] + r\left[p_0 \theta L + \delta \phi V\right]
\end{aligned}
$$

The equality implies

$$
V = p_B \frac{\left[(1 - q) + \theta q\right] L - B}{1 - \delta\left(1 - q + \phi q\right)}
$$

and the inequality implies

$$
p_0 L\left[1 - r\left(1 - \theta\right)\right] \leq p_B\left\{L\left[1 - q\left(1 - \theta\right)\right] - B\right\} - \delta V\left(q - r\right)\left(1 - \phi\right).
$$

11

The latter simplifies to

$$\pi \geq \frac{1 - r(1 - \theta)}{1 - q(1 - \theta) - \beta} \frac{1 - \delta + \delta q(1 - \phi)}{1 - \delta + \delta r(1 - \phi)}, \tag{7}$$

using the same notation $\pi = p_B/p_0$ and $\beta = B/L$ as before.

Introduce the abbreviations

$$m = [1 - r(1 - \theta)] \frac{1 - \delta + \delta q(1 - \phi)}{1 - \delta + \delta r(1 - \phi)} \tag{8}$$

and

$$k = 1 - q(1 - \theta). \tag{9}$$

Obviously $k < 1$; also $q > r$ ensures $m > k$, or $m/k > 1$. Then the condition (7) becomes

$$\pi \geq \frac{m}{k - \beta} \tag{10}$$

**** Figure 4 about here ****

Figure 4 shows the frontier of this, defined by equality in (10), as the thick increasing convex curve that starts at $\beta = 0$ and $\pi = m/k$, and is asymptotic to the vertical line $\beta = k$. At the points on or above it, the firm is willing to pay the bribes demanded by the bureaucrat, even at the risk of being detected and ostracized by the business community. Compare it with the corresponding curve without the business institution, defined by equality in (5), and shown in Figure 4 by the thinner curve. For given β, the ratio of π with the business institution to that without is

$$m \frac{1 - \beta}{k - \beta} = m \left[1 + \frac{1 - k}{k - \beta} \right].$$

This equals $m/k > 1$ when $\beta = 0$, then increases monotonically as β increases, and $\to \infty$ as $\beta \to k$. Therefore the frontier of willingness to bribe with the institution lies uniformly above that without the institution, as shown in Figure 4. The prospect of the community's punishment shrinks the region of the firm's willingness to pay bribes.

Figure 5 brings together the bureaucrat's IEP curves with the region where a firm is willing to comply. Most importantly, it shows a case of an empty intersection between the set of points where the firm is willing to pay the bribe and the set below the EP $= 0$ curve where the bureaucracy has positive expected payoff (both these regions are shown shaded).

12

The bureaucracy does best by abandoning its attempts to demand bribes and being content with zero payoff.

**** Figure 5 about here ****

We can now consider various ranges of parameters for the business community institution, and compare the resulting numbers with the those for the state's formal system on its own. Table 1 shows a sample of such calculations. For each set of parameter values q, r, θ and ϕ, the fine on the bureaucrat (as a fraction of the value of the license, F/L) that is needed to achieve a corruption-free outcome is shown in the last column. The first row shows an institution that does a good job of detection: the probability of convicting a guilty firm is high ($q = 0.75$) and that of wrongful conviction of an innocent firm is low ($r = 0.01$). But enforcement is poor: a convicted firm loses only 20% of its current and future profits ($\theta = \phi = 0.8$). We have $F/L = 0.145$, much less than the 0.476 that was needed without the business institution. The second row shows the opposite situation: good enforcement ($\theta = \phi = 0.1$) but poor detection ($q = 0.25$, $r = 0.1$). Here we have $F/L = 0.207$, not quite as good but still a big improvement over 0.476. In the third row we have case where detection and enforcement are both intermediate; here we have a much better $F/L = 0.101$. The final row shows an institution where both detection and enforcement are quite good. Then the needed F/L is very low; the value 0.0046 means that for a license worth a million dollars, a fine on the bureaucrat of only $4600 is needed to get a corruption-free outcome. This good institution is still not quite as good as a combination of the best in the first two rows ($q = 0.75$, $r = 0.01$, $\theta = \phi = 0.1$), but when I tried that, the required F/L had too many starting zeroes!

Thus we see that the business institution in combination with the state's imperfect legal institutions is much more effective than the latter on its own. Also, the business institution's detection and enforcement capabilities appear to be mutually reinforcing (strategic complements).

To get these numerical results, for each parameter set I start with a low value of F/L and increase it gradually until the two regions in Figure 5 separate. For a fairly wide range of parameters, at the separation point I find that β is in a neighborhood of 0.1. This is in a sense the range of bribery that is most robust against punishments, and it is interesting to note that in many countries with prevalent corruption 10% is indeed the "norm" for bribes.

Table 1: Sample numerical calculations for corruption-free equilibrium

| | Detection | | Enforcement | | Needed fine |
| | q | r | θ | ϕ | F/L |
Institution quality					
Good detection	0.75	0.01	0.8	0.8	0.145
Good enforcement	0.25	0.10	0.1	0.1	0.207
Both medium	0.50	0.05	0.5	0.5	0.101
Both good	0.65	0.03	0.25	0.25	0.0046

Even if the intersection between the set of points where the firm is willing to pay the bribe and the set below the EP $= 0$ curve where the bureaucracy has positive expected payoff is non-empty, there is a third constraint that may come into play and rule out deviations from a corruption-free equilibrium.

Suppose there are n firms, and their competence or quality is such that in a corruption-free equilibrium their probabilities of winning the license are p_i for $i = 1, 2, \ldots n$. If the license is exclusive and only one firm will get it, the p_i must sum to 1. If it is not exclusive, for example any restaurant that meets the health and safety standards will qualify for a permit to operate, then there is no such restriction. Intermediate cases of congestion-like interactions, where each p_i depends on how many and which other firms receive the license, are also possible. Anyway, I will take the p_i as exogenous.

Firm i and the bureaucrat will be able to deviate and upset the candidate corruption-free equilibrium if they can find a corrupt deal, i.e. pair (β, π), that leaves both of them better off. For this, the intersection of the firm's willingness-to-bribe set, the bureaucrat's non-negative EP set, and the constraint $\pi \leq 1/p_i$ must have a non-empty intersection. Conversely, a corruption-free equilibrium requires an empty intersection for all firms. The first two constraints are the same for all firms, but the third is firm-specific.[6] A non-empty intersection is most likely where that constraint is least relevant, i.e. for the firm with the smallest p_i. Suppose this is firm 1. Then the corruption-free equilibrium requires an empty

---

[6]It is easy to generalize the analysis to the case where the willingness-to-pay constraint is also firm-specific, for example if the true and false conviction probabilities q and r are different for different firms. The only added complication is a proliferation of cases and conditions for corruption-proofness.

intersection of the three constraints taking the third to be $\pi \leq 1/p_1$. Figure 6 shows such a case.

<center>**** Figure 6 about here ****</center>

As intuition would suggest, the firm least likely to get the license in a corruption-free situation is the one most likely to accede to a bribe demand. Conversely, firms that have the best chances in the corruption-free situation are the best candidates for launching the institution to sustain the clean equilibrium.

Thus far we have found conditions for none of the firms to violate the no-bribery norm, given the threat of ostracism. Finally, we need to check that the threat is credible, i.e. that other firms are willing to go along with the ostracism imposed on a firm that the community has found guilty of bribery. This is in the context of Nash equilibrium: given that other firms are complying with the ostracism, would it pay any one firm to break away and deal with the miscreant? In emerging countries where our analysis is most relevant, inter-firm dealings are on a relational basis, and the analysis of Greif (1993, Proposition 2, p. 535) applies. Suppose firm A is already ostracized. It now fears no worse penalty; therefore it is more likely to cheat in inter-firm dealings. To offset this temptation, Firm B contemplating dealing firm A must give it more of the surplus from the deal. Therefore it is more costly for B to deal with the ostracized firm A than with others such as say C, D, ... that have a clear history. In other words, it is not in any firm's interest to deviate from the community's sanctions on the original briber. Once the institution gets going, it will also develop its culture that will reinforce the material incentive to conform with the sanctions.

2.5   Partial Reduction in Corruption

Even when the community institution is not good enough (the value of m is not high enough and/or that of k is not low enough), it can make a contribution to reducing corruption in combination with the formal legal apparatus. Consider the case shown in Figure 7. (Ignore the dashed curves for the moment.) The set of (β, π) combinations where businesspeople are willing to comply with demands for bribes has a non-empty intersection with the set that gives positive expected payoff to the bureaucracy; this feasible set is shown shaded. The outcome is at the point C of tangency between the feasible frontier and an IEP contour labeled EP'. As was discussed in connection with Figures 3 and 6, if the worst-placed firm's competence or quality give it a probability p_1 of getting the license in a bribe-free system,

<center>15</center>

then π is subject to a further constraint $\pi \leq 1/p_1$, which may bind and further reduce the possibility of corruption. I will omit this possibility to save space and taxonomy.

**** Figure 7 about here ****

Let us consider some comparative statics of the partial reduction outcome as various aspects of the formal and the community institutions improve.

Any improvement in the formal institution—an increase in the detection probabilities g and h or the fine F – flatten the IEP contours. To see this, use the implicit function theorem to derive the slope of a typical IEP contour

$$- \left[h \left(\pi - 1 \right) + g \, \beta \right] F + \left\{ 1 - \left[h \left(\pi - 1 \right) + g \, \beta \right] \right\} \beta \, L = c \, .$$

This yields

$$\frac{\partial \pi}{\partial \beta} = \frac{L - Lh(\pi - 1) - g \left(F + 2\beta L \right)}{h \left(F + \beta L \right)} \, . \tag{11}$$

It is easy to see that an increase in F or g reduces this. The effect of h is a bit more complicated. Writing

$$\frac{\partial \pi}{\partial \beta} = \frac{L - g \left(F + 2\beta L \right)}{h \left(F + \beta L \right)} - \frac{L \left(\pi - 1 \right)}{F + \beta L} \, ,$$

we have

$$\frac{\partial}{\partial h} \left[\frac{\partial \pi}{\partial \beta} \right] = - \frac{L - g \left(F + 2\beta L \right)}{h^2 \left(F + \beta L \right)} \, .$$

When $\partial \pi / \partial \beta > 0$ as is the case in the relevant part of the space,

$$L - g \left(F + 2\beta L \right) > Lh(\pi - 1) > 0,$$

so

$$\frac{\partial}{\partial h} \left[\frac{\partial \pi}{\partial \beta} \right] < 0 \, .$$

In Figure 7, what happens as the formal enforcement improves is that the IEP contours become flatter, and the point of tangency C moves to the south-west along the feasible frontier, resulting in lower β and π, i.e. reduced corruption.

Next consider improvements in the business community institution, i.e. an increase in the probability q of being convicted when guilty, and/or a decrease in the probability r of being wrongly convicted. When m increases and/or k decreases, the feasible frontier defined

16

by equality in (10) obviously shifts up, but we need to know what happens to its slope. Along it, we have

$$\frac{\partial \pi}{\partial \beta} = \frac{m}{(k - \beta)^2} = \frac{\pi^2}{m}.$$

Therefore the shifted frontier becomes steeper as we move vertically up by increasing m or decreasing k at given β, but flatter as we move horizontally to the left by increasing m, and keeps the same slope when k decreases, at given π.

The slope of IEP curves changes the opposite way. We see from (11) that moving vertically up at given β makes IEP curves flatter, and moving horizontally to the left at given β makes them steeper.

Therefore, as the feasible frontier shifts up, in Figure 7 the tangency outcome must move somewhere between vertically upward and horizontally leftward to a point like C to the north-west, with lower β but higher π. (The figure shows such a comparison of C and the outcome B with no (or totally ineffective) business institution that was derived in Figure 3 and is now shown as the tangency of the two dashed curves.) Improvement of the business community institution reduces the magnitude of bribes the bureaucrats demand, but the chances of winning the license through bribery improve. Intuitively, as the business community increases its own expected penalties for winning a contract through bribery, the bureaucracy has to make it more attractive for businesspeople to comply with their demands, and they do this by combining smaller bribes and greater probability of success through bribery.

Thus a small improvement in the business community institution has a mixed outcome. However, when the improvement progresses far enough, eventually the feasible set becomes empty and corruption is eliminated.

3 Practical Considerations Outside the Model

The formal model of the previous section was highly simplified in a reduced form. Moreover, it studied only the equilibrium of the suggested institution, i.e. how it would maintain itself once it got going. Therefore the formal analysis must be supplemented by some informal discussion of practical matters of implementation. Here is a brief statement; for a more detailed discussion see Dixit (2013).

3.1 Requirements

The work of Ostrom (1990, 2007) and others has clarified some conditions that are necessary for successful operation of self-sustaining communal institutions of collective action. In our context, the following seem the most important ones.

3.1.1 Boundaries

The set of members, and their rights and duties, should be clearly defined. Here the business association imposing the sanctions may have a set of members who have publicly declared themselves to be bound by the norm. That will be valuable in ways mentioned later. These members should also declare themselves to be bound by the sanctioning procedure, agreeing to ostracize any firm that the association finds guilty of bribery, whether or not the guilty firm has itself joined the association. That is, firms should not think themselves immune from sanctions if they stay outside the group that has signed the no-bribery pledge.

3.1.2 Detection and adjudication

Monitoring and sanctioning is best done by members of the association through their delegated representatives, using their local and insider knowledge, expertise and experience. They can admit and interpret evidence on using broader criteria than can a general court. As in Bernstein (1992) and Greif (1993), this will be conducive to a faster, less costly, and more accurate process. Klitgaard (2012) discusses the comparative advantage of the business community and the role of public-private partnerships for detecting and exposing corruption. The business association can also pursue more pro-active strategies, for example sending its agent-provocateurs to entrap corrupt officials and exposing them. However, in the context of corruption, internal adjudication carries the danger that the association becomes an insiders' clique, using the sanctioning power illegitimately to exclude newcomers and to preserve an oligopoly of incumbents. This is indeed a serious risk, because cooperation in the anti-corruption institution can facilitate collusion or cartelization in the business community. To maintain the integrity of the mechanism, it is crucial not only that the procedure is untainted, but that it is seen to be untainted. For this, the adjudication tribunal should have some representation of respected outsiders and of new firms, and its process should have sufficient transparency to allay suspicion. Integrity and objectivity of the tribunal is also important to reduce the risk that a firm is sanctioned because of false accusations by rival firms.

3.1.3 Graduated sanctions

In most game-theoretic models of repeated prisoners' dilemmas, good behavior is best sustained by the harshest self-enforcing punishment. In practice, however, punishments that are small for a first offense and only gradually become harsh are found to work best. This seems equally valid in the context of corruption, especially because it reduces the risk of wrongful conviction leading to permanent ouster from business. It may also help prevent the morphing of the anti-corruption institution into one that deters new and innovative entry; if a novice firm gains a foothold through bribery, it would not be immediately booted out but be given a warning or a slap-on-the-wrist punishment like a small fine, and given a second chance to stand on its own merit.

As sanctions are ratcheted up against persistent offenders, the business association may strengthen then further by inviting consumers to join the ostracism or boycott against the guilty firm.

3.1.4 Official recognition

We saw that the business institution has to work together with the government's own anti-corruption efforts, although it does greatly increase the effectiveness of the latter. Conversely, the government's legal system should accept the business association's verdicts, much as courts show forbearance for verdicts of recognized private arbitration systems, standing ready to enforce their verdicts and not hearing the cases again. The government can do more. Many private firms and government departments that regularly award contracts have lists of approved bidders. A preliminary scrutiny is carried out to put a firm on this list, and in the competition for any specific contract only bids from firms on this list are considered. The government can make it a requirement for being on the approved vendors' list that the firm is not ostracized for previous bribery by the business association. Of course, if such a rule is adopted, that makes it all the more important that the association's procedure minimizes the risk of false conviction, and does not become a means of deterring entry to preserve the insiders' oligopoly.

3.2 Launching the Institution

Shifting an equilibrium is always difficult, and unfortunately, shifting from a good equilibrium to a bad one is easier than shifting from a bad one to a good one. A rumor or some local difficulty can start a bank run; creating or restoring confidence in the banking system is much

harder. Similarly, launching an anti-corruption institution is a difficult task, requiring much effort in reputation-building and creating confidence that the system is going to function sufficiently well. Here are just a few thoughts in this matter; more are sure to occur to others as thinking and experimenting along these lines progresses further.

3.2.1 Selecting launch members

If the new institution is to get sufficiently rapid recognition and respect, it is essential that several of the most respected leaders of the business community publicly declare their active support and participation by becoming launching members and urging others to join. In countries like India and China, these are most likely to come from the modern sectors of the economy—information and communication technology, web-based businesses, consulting etc.—who also do business in other countries with higher standards of governance and have some incentive to maintain similar reputation and standards in their own countries. See Khanna and Palepu (2004) for further discussion of such interactions. Once a sufficient mass of respected members exists, others who stay out can be named and shamed into joining; the media can be very helpful here. The government can also help recruitment by requiring that a firm be a member in good standing of the business association as a condition for it to be on the government's list of approved vendors or bidders for government supply contracts and licenses.

3.2.2 Earning and maintaining reputation

The worst thing that can happen to an anti-corruption organization is being tainted by a scandal. The association in its early phases will have to be especially vigilant in its detection and sanctioning, ready to expel and ostracize any members, no matter how important, who are found in violation of the no-bribery norm. It will also have to be especially careful to avoid any suspicion of being seen as a clique of big firms or insiders. To avoid the risk, the community will have to make special efforts to recruit new, small, and innovative firms, not only as members but as active members with representation on the adjudication and decision-making bodies of the association. It should also get some outside experts and respected citizens from outside business to serve as consultants or observers on these bodies.

3.2.3 Overcoming opposition

Businesses with relational capital invested in existing system will resist the new institution; this resistance can take many forms and needs to be countered by all available means, including the use of allies in the press and other media to name and shame the firms that refuse to take the pledge. Resistance will also come from within the government, as many of its politicians and officials stand to lose lucrative bribe incomes. Media campaigns can help; proactive strategies to maintain good relations with the media will help deflect false accusations of improprieties and attempts to create scandals to discredit the institution. More generally, a recent comparative case study (Innovations for Successful Societies, 2014) of how various governments' anti-corruption agencies fared in building and maintaining reputations can be useful here.

4   Concluding Comments

Corruption is endemic and entrenched in many countries. The community institution operating on the supply side of bribery that I have proposed here cannot by itself eliminate or even greatly reduce it. But it can significantly strengthen the effectiveness of the government's formal system of detection and punishment that operates mostly on the demand side.

The analysis applies only to relationships between business firms and officials for awards of government licenses and contracts. But the hope is that if such an institution becomes established, that will help change the general culture of corruption in the country, and thereby also help reduce corruption in other contexts such as extortion by officials and the police in their dealings with individual citizens.

Therefore I hope the idea will be further scrutinized in research and attempted in some country whose business community is sufficiently well organized and sufficiently adventurous to experiment with novel ideas that have the potential to free it from the yoke of extortionate demands of politicians and officials.

References

Aidt, Toke S. 2003. "Economic analysis of corruption: A survey." *Economic Journal* 113, November, F632–F652.

Ayyagari, Meghana, Aslı Demirgüç-Kunt and Vojislav Maksimovic. 2014. "Are Innovating Firms Victims? Bribe Payments as a Tax on Innovation in Developing Countries." Working paper, Washington, DC: The World Bank.

Basu, Karna, Kaushik Basu, Tito Cordella and Aristomene Varoudakis. 2014. "Asymmetric punishment as an instrument of corporate control." Working Paper, Washington, DC: The World Bank.

Basu, Kaushik. 2011. "Why, for a class of bribes, the act of *giving* a bribe should be treated as legal." Working paper, Ministry of Finance, Government of India. Available at
`http://www.kaushikbasu.org/Act_Giving_Bribe_Legal.pdf`

Becker, Gary S. 1968. "Crime and punishment: An economics approach." *Journal of Political Economy* vol. 76, no. 2, March-April, pp. 169–217.

——— and George J. Stigler. 1974. "Law enforcement, malfeasance, and the compensation of enforcers." *Journal of Legal Studies* 3(1), January, 1–18.

Bernstein, Lisa. 1992. "Opting out of the legal system: Extralegal contractual relations in the diamond industry." *Journal of Legal Studies* 21(1), 115–157.

Dixit, Avinash. 2006. "Comparative statics for oligopoly." *International Economic Review* 27(1), February, 107–122.

——— . 2013. "Corruption: Supply-side and demand-side solutions." Text of Silver Jubilee Lecture at the Indira Gandhi Institute for Development Research, Mumbai, India. To be published in Mahendra S. Dev et al. (eds.), *Development in India: Micro and Macro Perspectives,* Springer. Available at
`https://www.princeton.edu/~dixitak/home/IGIDR_01.pdf`

Greif, Avner. 1993. "Contract enforceability and economic institutions in early trade: The Maghribi traders' coalition." *American Economic Review* 83(3), June, 525–548.

Innovations for Successful Societies. 2014. "From underdogs to watchdogs: How anti-corruption agencies can hold off potent adversaries." Princeton University. Available at `https://www.princeton.edu/successfulsocieties`

Khanna, Tarun and Krishna G. Palepu. 2004. "Globalization and convergence in corporate governance: Evidence from Infosys and the Indian software industry." *Journal of International Business Studies* 35(6), November, 484–507.

Kingston, Christopher. 2008. "Social Structure and Cultures of Corruption." *Journal of Economic Behavior and Organization* 67(1): 90–102.

Klitgaard, Robert. 2012. "Public-Private collaboration and corruption." In Mark Pieth (ed.) *Collective Action: Innovative Strategies to Prevent Corruption,* Zurich/St. Gallen: Dike Verlag AG, 41–66.

Ostrom, Elinor. 1990. *Governing the Commons.* New York, NY and Cambridge, UK: Cambridge University Press.

——— . 2007. "Collective action theory." In Carles Boix and Susan Stokes (eds) *Oxford Handbook of Comparative Politics,* Oxford: Oxford University Press, 186–208.

Rose-Ackerman, Susan. *Corruption: A Study in Political Economy.* New York: Academic Press.

——— . 2010. "The law and economics of bribery and corruption." *Annual Review of Law and Social Science* 6, 217–238.

Seade, Jesús K. 2003. "Prices, profits and taxes in oligopoly." University of Warwick, UK: Research Paper in Economics No. 260.

Strouse, Jean. 2000. *Morgan: American Financier.* New York: HarperCollins.

Superti, Chiara. 2009. "Addiopizzo: Can a label defeat the Mafia?" *Journal of International Policy Solutions* 11, Spring, 3–11.
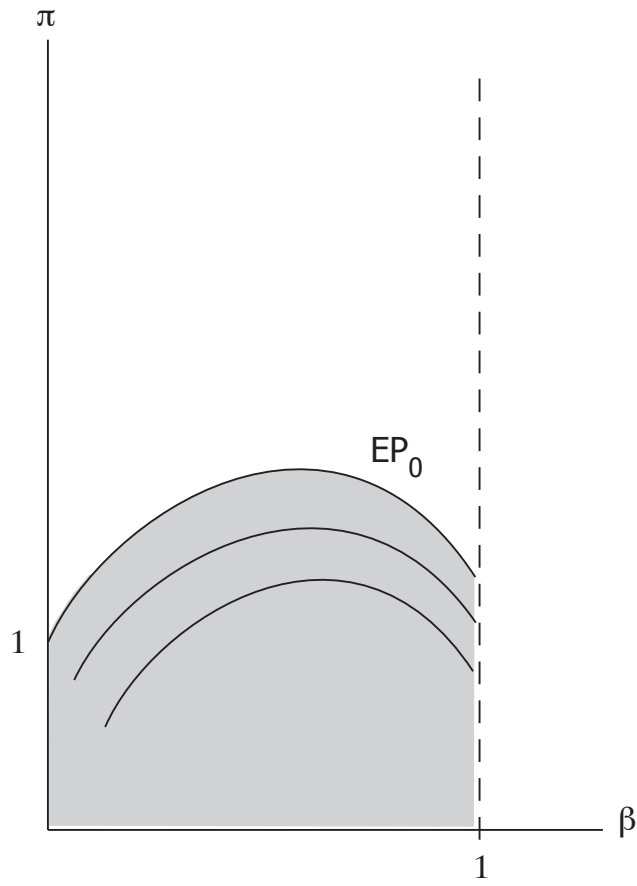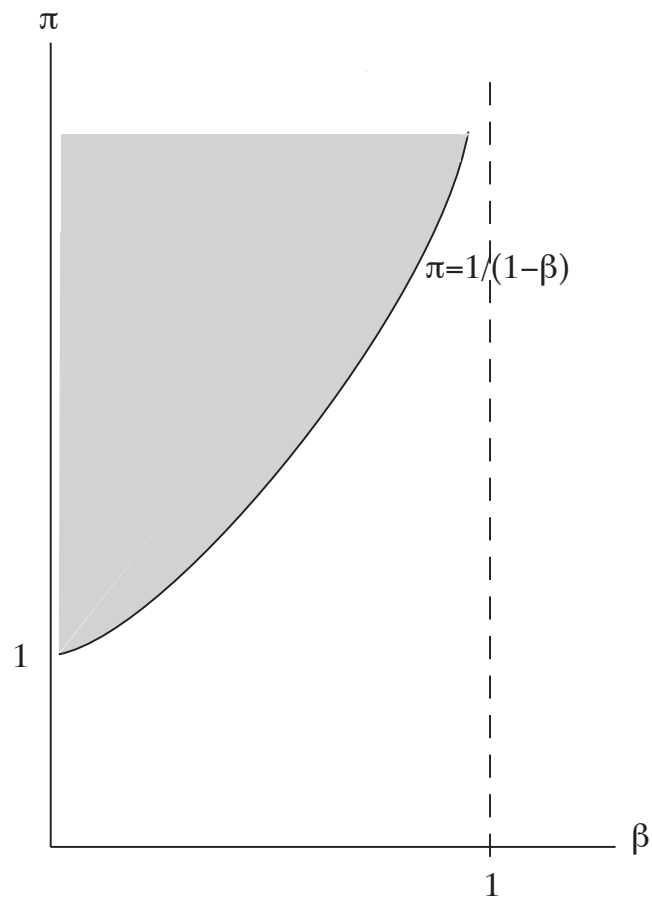
Figure 1: Bureaucrat's Payoff Contours

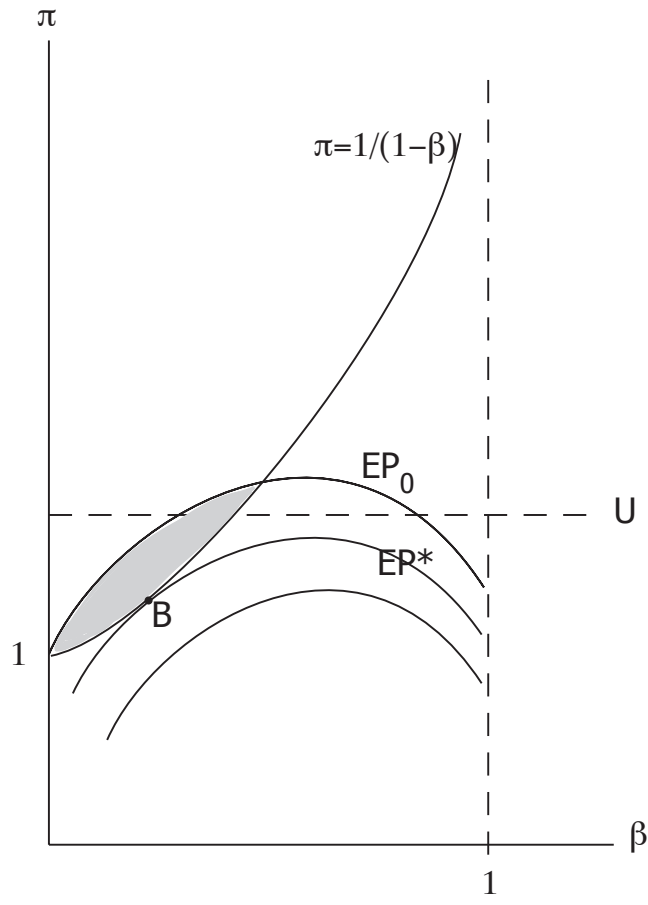Figure 2: Willingness to Pay Bribe without Institution

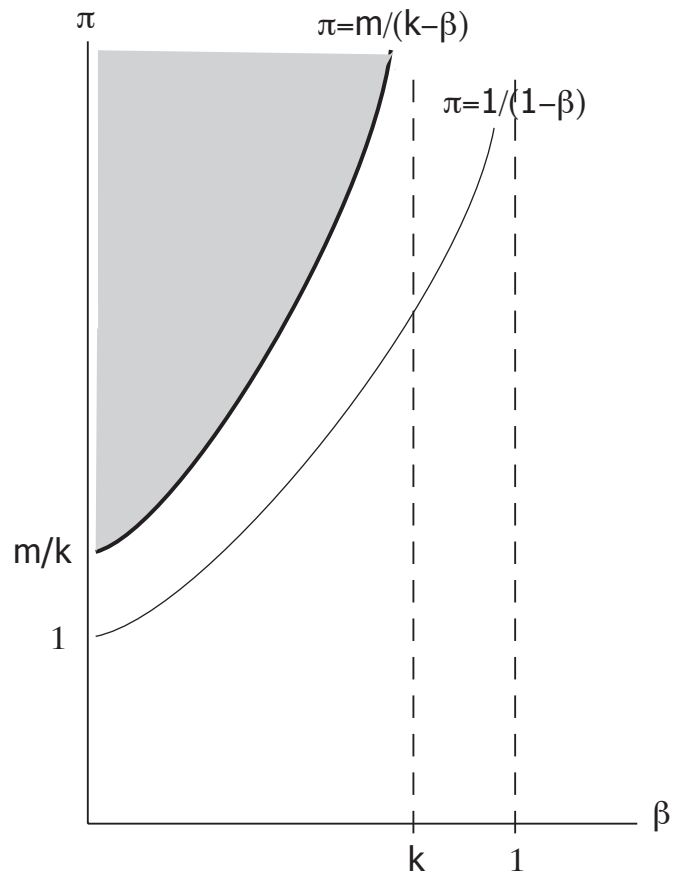Figure 3: Outcome without Institution
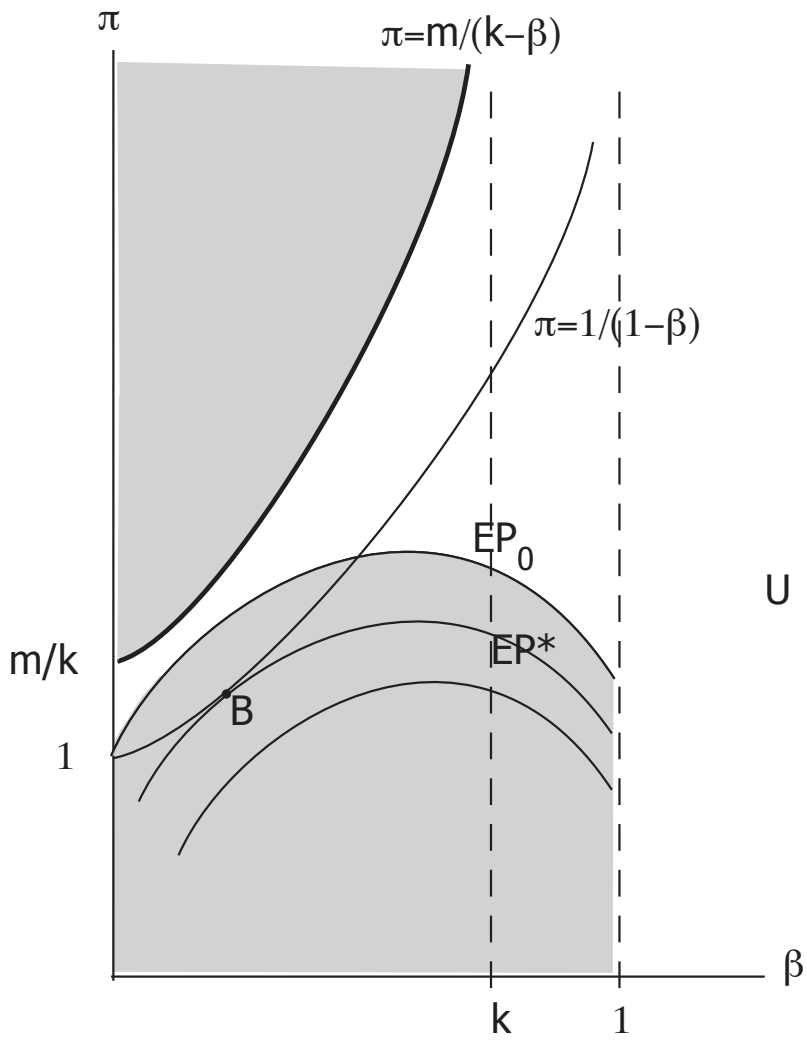
Figure 4: Willingness to Pay Bribe with Institution

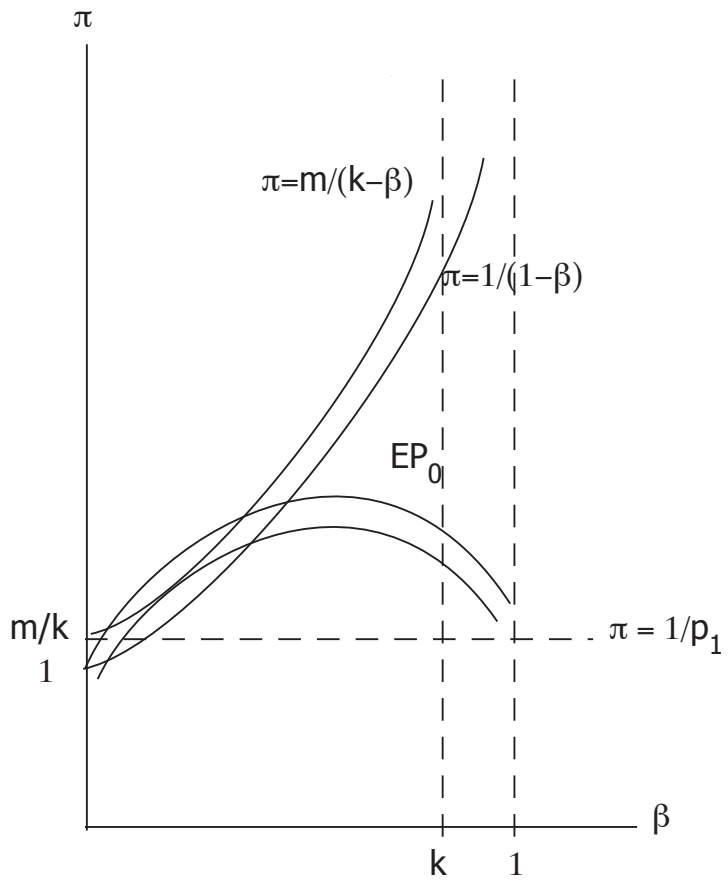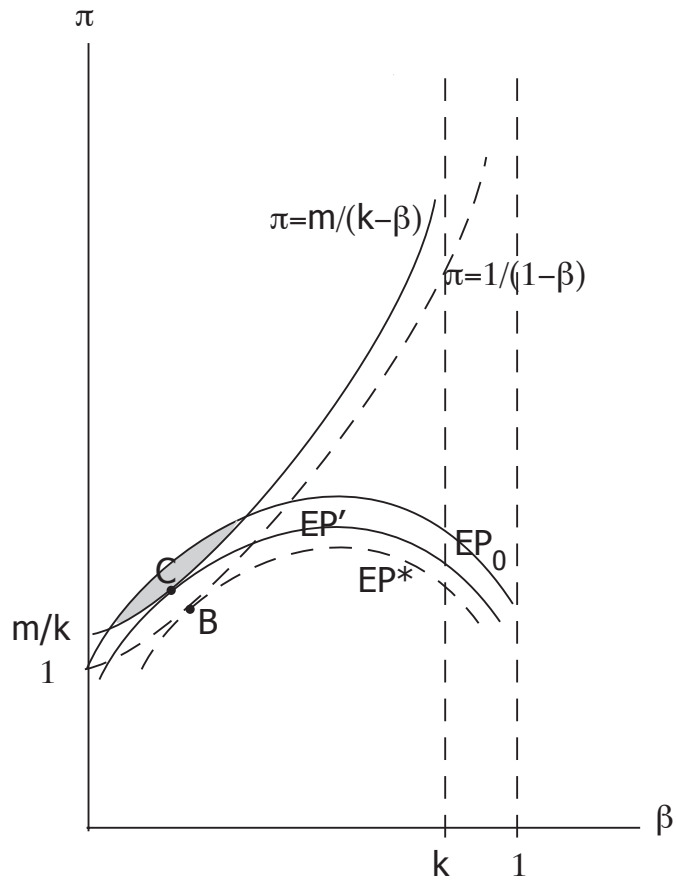Figure 5: Corruption-free Outcome with Institution – 1

Figure 6: Corruption-free Outcome with Institution – 2

Figure 7: Partial Reduction in Corruption