The Persistence of Corruption
A Labor Market Approach

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Febrero 2002

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Abstract

The persistence of corruption has been explained by inherited reputation, collusion, and externalities. This paper offers an alternative explanation: workers self-select into jobs with or without bribes, depending on their propensity to corruption. Three single-period cases and one career choice model incorporating both risk and uncertainty are examined for the existence of separating equilibria. The effect of wages on bribery and possible implications for labor supply in distinct markets are considered.

1. Introduction

A number of economic studies have shown that corruption has negative effects on economic growth. There are two reasons for this relationship: bribes, in some cases, constitute an increase in costs for investors and importers; and corruption in general may introduce or increase uncertainty in the economic environment. With this knowledge in hand, many governments have tried to design policies aimed at reducing the level of corruption. Because corrupt practices are in many places reinforced through social institutions, however, these policies may be difficult to implement.

Corruption has begun once again to capture the imaginations of scholars, particularly economists, as developing countries begin to seek ways to reduce its incidence and, thus, its effect on economic growth. Even the World Bank is taking corruption seriously as a determinant of growth. While the topic received little attention during the 1980s, in the 1990s a number of articles concerned with corruption have been published. Mauro (1995) examines empirically the negative effects of corruption on growth. Other authors examine the determinants of corruption itself. In particular, an effort has been made to identify the factors that influence both the incidence of bribes and the equilibrium bribe (price), principally in a game-theoretic setting. [Shleifer and

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1 A recent search of www.ssrn.com (the Social Sciences Research Network homepage) yielded 166 “hits” for the keyword “corruption”. A quick scan of the bibliography in any recent corruption paper reveals relatively few sources written before the 1990s.
Vishny (1993), Bac (1996)] Bac and Bag (2000) study forms of combatting corruption. A few studies have concerned themselves with the difficulty of eradicating corruption: its persistence. This paper falls in the last category.

Corruption persistence has been explained in terms of reputation inherited by new workers in a given occupation [Tirole (1996)], by the possibility of collusion between supervisors and workers [Bac (1996)], and as a result of externalities caused when an increasing portion of workers are corrupt [Andvig and Moene (1990)]. Each of these models examines the decision of the worker to accept or demand a bribe, once in the position that enables him to do so. My model, by contrast, considers the labor supply decision: the choice between a job that offers opportunities for corruption and one that does not identify a separating equilibrium for each of four progressively complex models, in which “honest” workers take the job without bribery opportunities, while “corrupt” workers sort themselves into the “corrupt” job. Corruption persistence is explained by the matching of “corrupt” workers with the “corrupt” job each period.

While I do not examine what makes some workers “corrupt” and others “honest”—this lies more in the sphere of psychology and sociology— I do allow for “honest” workers to accept bribes that are attractive enough. As an extension, I consider the choice of fulfilling one's duties without a bribe, once in the “corrupt” job, for both types of workers, and examine the effects of wages on this decision.

The concept of self-selection is far from new. In most self-selection models, however, the distinguishing factor is heterogeneous skill: wage dispersion is explained as the outcome of diverse payoffs to distinct tasks, at which each worker is relatively skilled or unskilled. [See, e.g., Roy (1951), Heckman and Seldlacek (1985).] There are thus relative returns to higher-skilled labor. In the case of bribery, however, the returns are not to skill, but rather to an inherent “propensity to corruption”. Indeed, this analysis considers workers who are identical in all respects except for this propensity. Lazear and Moore (1984) offer a study of individuals self-sorting into self-employment based in part on risk aversion. The present is a model of self-sorting into jobs with or without bribery opportunities based on the individual's propensity for corruption, approximated by risk aversion.

The basic model and four special cases are described in Section 2. Section 3 examines the effect of raising the wage of government workers on the incidence of

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2 Chakrabarti (2001) offers an elegant model of the decision process regarding one’s own level of dishonesty. He finds risk aversion and societal corruption levels to be among the key factors.

3 The other possibility considered by Lazear and Moore is that of differing discount rates between workers. As indicated in Section 2, these two concepts may be closely related.
bribery. Implications for the supply of labor and relative wages for each job are studied in Section 4. General conclusions and extensions are offered in Section 5.

2. The Model

Consider two types of agents, one “honest” (H), the other “corrupt” (C) or corruptible. (In essence, both agents are corruptible, but C more so than H.) In all other respects the agents are identical. In particular, the agents are equally qualified for each job and their respective aversions to risk are privately known but unobservable to outsiders: if they both apply for either position, they are equally likely to be hired. The corruptibility of each agent is captured in his relative risk aversion: H is more risk-averse than C.4 To capture the disparity in risk aversion, I use the constant relative risk aversion (CRRA) utility function:

\[ U(v) = \frac{v^{1-\rho}}{1-\rho} \quad \text{if } \rho \geq 0, \rho \neq 1, \]  
\[ U(v) = \ln v \quad \text{if } \rho = 1 \]  

where \( v \) is the value of employment in a given job and \( \rho \) is a measure of risk aversion.

There are two employment options: a private sector job (\( J_P \)) and a government job (\( J_G \)), in which the employee exercises monopoly control over the provision of a license, permit, or other government service.5 Throughout the paper, the subscripts \( i=C,H \) and \( j=P,G \) designate the agent and the job, respectively. I assume that these are the only two employment opportunities, and that the wages offered for each job equal or exceed the agent’s reservation wage (normalized to zero).

For simplicity, consider the workers to have the following extreme utility specifications: \( \rho_H = 1, \rho_C = 0 \). (\( C \) is risk-neutral.) This may be generalized to a world in which a large number of agents lie on a continuum of risk aversion (corruptibility) and, in a separating equilibrium, those fulfilling the condition \( \rho > \rho_k \) (where \( \rho_k \) is the critical level of risk aversion, dependent on \( w_P, w_G, b, \) and \( X \), defined below) choose \( J_G \), while all others choose \( J_P \). (See Section 4.)

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4Beenstock (1979) also uses risk aversion as a measure of corruptibility. Chakrabarti (2001) separates risk aversion from an “dishonesty index” but demonstrates a negative correlation between the two. Although in the latter model, the agent chooses his level of dishonesty (based on societal factors and opportunities offered by corruption in each agent’s particular post), each individual’s risk aversion is taken as given.

5This stereotype is adopted for simplicity of exposition only. There are ample examples of private-sector corruption of this type and of government offices that are free of bribes.
2.1 Case 1: the simplest case.

In the simplest model, each job offers a fixed wage ($w_P$ and $w_G$, respectively) which is paid irrespective of performance. In addition, each period any worker in $J_G$ is offered and must accept a bribe of fixed amount $b$; if detected, the worker is fined $X$. The supervisor detects, charges, and fines one worker each period, so the probability of detection is $q = 1/N$.

**Proposition 1.** If every period a bribe of fixed value $b$ is offered, the probability of detection is fixed, and a one-time fine is imposed, a separating equilibrium exists if

$$\exp[(1-q)\ln(w_G + b) + q\ln(w_G - X)] \leq w_P \leq w_G + (1-q)b - qX$$

(2.3)

where $(1-q)b$ is the expected bribe and $qX$ is the expected punishment. In other words, $C$ chooses $J_G$ when the difference between the expected bribe and the expected punishment exceeds the wage gap. Thus in this simple model a corruptible agent will take $J_G$ and accept $w_G < w_P$ only when the bribe is high enough, the probability of detection low enough (there are many other workers), and the punishment imposed low enough. Under certain conditions, however, $H$ will also choose $J_G$ and the separating equilibrium falls apart.

**Proof**

$H$ chooses $J_P$ if and only if:

$$\ln w_P \geq (1-q)\ln(w_G + b) + q\ln(w_G - X)$$

(2.4)

$C$ chooses $J_G$ if and only if:

$$w_P \leq (1-q)(b + w_G) + q(w_G - X)$$

(2.5)

Solving (2.4) for $w_P$ and combining with (2.5) leads to (2.3).

2.2 Case 2: Bribe Offered with Fixed Probability

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6This corroborates Beenstock's (1979) conclusion that individuals may accept lower pay when they are able to engage in “benign corruption” like that considered in this paper. In the case considered by Beenstock, either $q=0$ or $X=0$ or both.
This is a simple modification of Case 1, in which a bribe is offered to the employee in $J_G$ with fixed probability $a$, $0 < a < 1$. All other parameters are unchanged.

Proposition 2. If the probability of receiving a bribe is less than unity, while the probability of detection when accepting a bribe is fixed (positive, and less than one) and a one-time fine is imposed, a separating equilibrium exists if

$$\exp\{(1-a)w_G + a[(1-q)\ln(w_G + b) + q\ln(w_G - X)]\} \leq w_p \leq w_G + a[b(1-q) - qX]$$

(2.6)

Proof
In this scenario, $H$ chooses $J_P$ if and only if:

$$\ln w_p \geq (1-a)w_G + a[(1-q)\ln(w_G + b) + q\ln(w_G - X)]$$

(2.7)

$C$ chooses $J_G$ if and only if:

$$w_p \leq (1-a)w_G + a[(1-q)(w_G + b) + q(w_G - X)]$$

(2.8)

which simplifies to

$$w_p \leq w_G + a(1-q)b - aqX$$

(2.9)

Note that (2.9) differs from (2.5) only in that the terms associated with a bribe are now subject to a probabilistic determinant. In this case, the acceptable wage gap, *ceteris paribus*, is lower. Thus any factor that leads the briber to reduce the frequency of offering bribes will also tend to require public sector wages to approach private sector wages.

2.3 Case 3: Bribe Drawn from a Distribution

Here $b$ is no longer fixed, but is drawn from a distribution $f(b) = b + \varepsilon$, where $\varepsilon$ is normally distributed about a zero mean. The workers know before taking the job what the wages are and they know the distribution $f(b)$, but they do not know the exact bribe that will be offered. Thus there is risk associated with the possibility of receiving a bribe and with detection, but *uncertainty* regarding the value of the bribe that may be offered.
**Proposition 3.** When the distribution of bribes is universally known but the exact bribe is only asymmetrically known, while the probabilities of receiving a bribe and of being detected are known and fixed and the punishment for taking a bribe is one-time and fixed, a separating equilibrium exists if

\[
\int \left( 1 - a \right) w_G + a \left( 1 - q \right) \int \ln(w_G + b) f(b) db + q \int \ln(w_G - X) f(b) db \right] \leq w_p \leq w_G + a \left( 1 - q \right) \int b f(b) db - aqX
\]

(2.10)

**Proof**

\[ H \] chooses \( J_P \) if and only if

\[
\ln w_p \geq \left( 1 - a \right) w_G + a \left( 1 - q \right) \int \ln(w_G + b) f(b) db + q \int \ln(w_G - X) f(b) db \]

(2.11)

\[ C \] chooses \( J_G \) if and only if:

\[
w_p \leq w_G + a \left( 1 - q \right) \int b f(b) db - aqX
\]

(2.12)

2.4 Case 4: Career Choice in the Face of Risk and Uncertainty

Usually, an individual choosing a job is making a decision for the next several years, perhaps a lifetime, especially where government employment is concerned. (Changing jobs is not costless.)

To model this lifetime choice, I incorporate uncertainty about future wages and bribes into the basic model, converting the maximization problem from one of single period earnings to one of lifetime income. The basic decision is

\[
\max_{J_P, J_G} V_i = \{ EU_i(J_P), EU_i(J_G) \}
\]

(2.13)

Where the expected utility of each job is determined by the prevailing wages and bribe, the wage and bribe distributions (for the formation of future wage expectations), the shape of the utility function, and a discount factor. Formally,

\[
\max \left\{ \frac{1}{1 - \delta} \int U_i\left( w_p \right) g(w_p) dw_p, \frac{1}{1 - \delta} \int \int U_i\left[ \left( w_G + a(1 - q)b - aX \right) h(w_G) f(b) db \right] dw_G \right\}
\]

(2.14)
or, accounting for the fact that not all future bribes will be acceptably high,

\[
\begin{align*}
\max & \left\{ \frac{1}{1-\delta} \int_{w_p} U_i(w_p) g(w_p) dw_p, \right. \\
& \left. \left\{ \frac{1}{1-\beta} \int_{w_G} \frac{b}{2} U_i(w_G) f(b) db + \frac{b}{2} U_i[(w_G + a(1-q)b - aX)f(b)h(w_G)]dw_G \right\} \right\}
\end{align*}
\]

(2.15)

where \(\delta\) is the individual's discount rate for future income\(^7\) and \(\beta\) is the probability each period of surviving to the next. Since this is simply the sum of the probability of not receiving a bribe plus the probability of receiving a bribe discounted by the chance of detection,

\[
\beta = (1-a) + a(1-q) = 1 - aq
\]

(2.16)

The minimum acceptable bribes \(b\) for \(C\) and \(H\) are as defined in equations (3.2) and (3.3) (below), respectively, when each holds with equality.

I assume that \(f(\cdot), g(\cdot), \) and \(h(\cdot)\) are normally distributed.\(^8\)

It is not obvious from this specification which job either of our two workers will choose, nor is it solvable. We can, however, make some general observations: (1) \(H\), being more risk-averse, will tend to prefer \(J_P\) as \(w_P - w_G\) and \(b\) decrease and as the variances of \(w_G\) and \(b\) increase. Therefore, if either the government wages or possible bribes become more uncertain, the honest agent will be less likely to want the government job. (2) \(C\), being, in this case, risk neutral, is ambivalent to any increases in uncertainty, and responds only to changes in the means of (expected) future wages and bribes. Therefore, (3) in a multi-agent continuum of risk aversion, higher variances in government wages or bribes accruing to government positions will result in a higher proportion of such employees being “corrupt”. Variances in wages might arise from perennial budget problems or change-or-regime phenomena, while variance in bribes could be caused by changing regulatory environments.

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\(^7\)I assume \(\delta_C = \delta_H\), although it might be argued that \(\delta\) is positively correlated with \(\rho\), i.e., \(\delta_C < \delta_H\).

\(^8\)Beenstock (1979) assumes a normal distribution of the probability of detection. I leave this extension for further research, as I am less convinced of its validity.
3. The Effects of Raising the Wage on Bribery

Once \( C \) has accepted \( J_G \), will raising \( w_G \) decrease corruption? Once the job choice has been made, \( C \) accepts a bribe if and only if

\[
(1 - q)(w_G + b) + q(w_G - X) > w_G
\]  

(3.1)

Rearranging terms, we find that the wage has no effect on the decision to accept a bribe:

\[
b \geq X \frac{q}{1 - q}
\]  

(3.2)

Thus an increase in the wage, so often prescribed by anti-corruption crusaders, cannot alone reduce bribery among those already employed, if there is a one-time punishment. Either an increase in the rate of detection or in the fine imposed is necessary to reduce the incidence of bribery.

On the contrary, if \( H \) is induced to take \( J_G \) and \( w_G \) is subsequently increased, the decision to accept a bribe is affected. \( H \) will accept a bribe if and only if the expected utility from accepting the bribe exceeds that derived from the wage alone:

\[
(1 - q) \ln(w_G + b) + q \ln(w_G - X) \geq \ln w_G
\]  

(3.3)

rearranging and taking anti-logs,

\[
b \geq w_G^{\frac{1}{1 - q}} (w_G - X)^{\frac{q}{1 - q}} - w_G
\]  

(3.4)

The effect of a wage increase on the minimum acceptable bribe can be seen by taking the derivative of (3.4):

\[
\frac{\partial b}{\partial w_G} = \left\{ \frac{1}{1 - q} \left( \frac{w_G}{w_G - X} \right)^{\frac{q}{1 - q}} - q \left( \frac{w_G}{w_G - X} \right)^{\frac{1}{1 - q}} \right\} - 1
\]  

(3.5)

The sign of this expression depends on \( w_G \) relative to \( X \), and on the expression in curly brackets relative to one. Since \( w_G \) and \( X \) are determined in the market and through legal and social institutions, respectively, the effect may vary from one place to another. The exact effect of a wage increase on the acceptable bribe is thus ambiguous.
4. Implications for Labor Markets

To study the implications of this self-sorting model in the private-sector and government labor markets, it is necessary to move away from the two-type model and consider a continuum of risk aversion on which an infinite number of agents lie. Each agent decides to take $J_P$ or $J_G$ dependent on the expected bribe offer and expected punishment in $J_G$. There exists a critical value of risk aversion (for a given expectation of bribe and punishment), $\rho_k$, above which all agents choose $J_P$ and those agents for whom $\rho < \rho_k$ choose $J_G$. The proportion of agents who prefer to work in $J_G$ is thus dependent on $w_P, w_G, f(b), q$, and $X$.

The equilibrium bribe (distribution) is determined in the market for “bent rules”. [See Carrillo (1995), Palifka (1997)] If the equilibrium bribe should increase, for example as a result of newly introduced regulations, then a larger proportion of agents—as more and more risk-averse workers are induced to switch—prefer $J_G$ and the supply of labor in the government sector increases, while that of the private sector decreases. This exerts some downward pressure on wages in the government sector (and upward pressure on wages in the private sector) which (1) contributes to the wage gap between the government and the private sectors and (2) reduces the tendency of more risk-averse workers to change sectors, ameliorating (1). The wage adjustments may completely offset the increase in bribes, depending on the relative elasticities of labor supply and demand (not considered here), in which case nothing changes except $b$ and $w_G$.

5. Conclusions and Extensions

This paper presents an alternative explanation for the persistence of corruption in certain occupations: when a separating equilibrium exists, the opportunity for bribery attracts a disproportionate number of “corrupt” workers, while “honest” workers avoid such jobs. When the corrupt job is in the government sector, regulations may raise the equilibrium bribe, attracting more risk-averse workers to that sector, depressing government wages and raising private sector wages, with the net effect of increasing the public-private wage gap that is often blamed for government officials turning to bribery in the first place. Nevertheless, the effect on bribes of raising government wages is ambiguous except under very specific conditions.

This analysis could be extended by including a distribution of detection, as suggested by Beenstock (1979). Other modifications of the model might include allowing for a (known) finite length of employment, which could vary between the
sectors; allowing for an exogenous probability of termination each period;\(^9\) allowing the hiring official to be corrupt; and allowing supervisors to be corrupt (thus reducing the “fine” to a bribe). Since the labor market implications are studied only on the supply side, it would be ideal to embed this into a larger determination of equilibrium, complemented by labor demand and including the market for “bent rules”; endogeneity of government regulations and anti-corruption enforcement\(^{10}\) might be included in an approximation to general equilibrium.

In the best of all possible worlds, data on wages and bribes would become available, enabling empirical testing of this theory. Some countries are beginning to collect such data. For the moment, however, we are confined to anecdotal evidence.

6. References


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\(^9\)This exogenous probability is often included in other studies of corruption. See, e.g., Carillo (1995).

\(^{10}\)See Dabla (1997) for endogeneity of enforcement.