

Can corruption help reduce illegal economic activities?
A simple model with unusual results

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Abstract

This paper studies the effects of corruption on illegal economic activities in an economy where the government imposes a set of regulations on businesses and delegates the enforcement to public inspectors; where honest and corrupt inspectors differ in the frequency with which they monitor private firms. The results obtained in this context contrast with the standard notions regarding the effects of corruption on illegal behavior. In specific, the results of the model show that an increase in the level of corruption may lead to greater regulation compliance and less unofficial economic activity.

1 Introduction

Business agents sometimes choose not to comply with government mandated regulations and operate illegally. In such instances, business agents can escape punishment by either hiding into the "unofficial" economy and operating undetected; or, if detected, by bribing a corrupt official who is willing to ignore the infractions in exchange of a bribe. Thus, as the extent of corruption in the economy expands, the expected payoffs for businesses in the unofficial sector change and the level of regulation compliance is likely to change as well.

In this regard, most of the empirical studies available report a positive correlation between the level of corruption and measures of unofficial economic activity. Johnson et al. (2000), for example, use firm level data and report that "paying bribes is positively associated with hiding economic activity". Friedman et al. (2000) use estimates of country level production and report that a one-point increase in the index of corruption is correlated with a 9.7% increase in the share of the unofficial economy. The results of these papers are in line with several theoretical studies which also suggest that corruption induces illegal behavior (see, for example, Çule and Fulton (2005), Chander and Wilde (1992)).

This paper argues that the relationship between corruption, unofficial economic activity, and regulation compliance might be more complex. In particular, the paper presents a simple theoretical model in which the effects of corruption on such types of illegal behavior are ambiguous. In this model, the government imposes a set of regulations on all business activities and delegates enforcement to public inspectors. Some inspectors are honest and some are corrupt; they inspect private firms with different frequencies.

When corrupt inspectors monitor private businesses with more frequency than honest inspectors, an increase in corruption might lead to a reduction of the unofficial sector and to improved levels of regulation compliance. Moreover, because changes in the size of the

unofficial economy are not directly linked to changes in the level of regulation compliance, it is possible for these two measures of illegal activity to have opposite reactions to changes in corruption. That is to say, that an increase in corruption might lead to an increase in regulation compliance while inducing an expansion of the unofficial economy at the same time. Thus, the results of the model contrast with the standard notion regarding the effects of corruption on illegal economic activity.

2 An economy with corruption

The object of analysis is an economy in which the government regulates economic activity and individuals decide whether to comply with these regulations in an environment where some public officials are corrupt. The economy is populated with a continuum of agents of size N . Each agent derives a benefit R_i from the specific economic activity under regulation, where R_i is drawn from a distribution with c.d.f. $G(R)$.

The government imposes a set of regulations on economic activity. These regulations have a cost α to the individual who follows the regulations; where $\alpha \in (0, 1)$. Simultaneously, the government uses a total of P public officials to randomly monitor the individuals' regulation compliance. Officials are of two types. A proportion $1-p$ is honest and verify that regulations have been followed. If they have not, the honest official does not allow the business to operate and closes it down. The remaining p officials are corrupt and allow the violator to continue its economic activity in exchange for a bribe β .

Because public officials are not able to monitor all economic activities, individuals face a probability of detection d that is less than one. Given that an agent is detected, however, his probability of facing a corrupt official (d_c) can be different from the probability of facing an honest official (d_h); simply because corrupt and honest officials may monitor businesses with different frequencies. In specific, we assume that honest officials monitor \underline{n} cases and

that corrupt officials monitor \bar{n} cases.

With respect to the relative monitoring behavior of corrupt and honest officials, Mookherjee and Png (1995) use a theoretical model of bribery to show how "the prospect of a bribe encourages the inspector to monitor". Similarly, Chander and Wilde (1992) find that audit rates are generally higher in the presence of corruption than in its absence. Whether corrupt officials monitor more or less cases than honest officials is not explicitly addressed in this paper. We simply note that they might behave differently for a variety of reasons.

By taking the values of p , d_c and d_h as exogenous, the model abstracts from all the elements that determine the behavior of corrupt public officials. Such elements might include the moral disposition of public agents, their level of risk aversion, the penalties related to bribery, and other characteristics regarding the disutility of effort. Thus, instead of studying the determinants of corruption, the model concentrates on the consequences of potential changes in the levels of corruption.

When facing the regulations imposed by the government, individuals have two possible courses of action when conducting their economic activities: **1.** They may comply with the regulations and join the official economy. **2.** They may not comply with the regulations and hide into the shadow economy, where they might be detected. If detected by an honest official, illegal businesses are not allowed to continue their operations. If detected by a corrupt official, illegal businesses are allowed to continue their operations as long as they pay a bribe to the official.

Throughout the paper, the net expected value of following the regulations and joining the official economy is denoted by $v(1)$; and the net expected value of not following the regulations and hiding into the shadow economy is denoted by $v(0)$. In choosing whether to follow the regulations and whether to join the official economy, individuals maximize the

net benefits perceived from the economic activity. That is, individuals choose

$$v = \max\{v(0), v(1)\}.$$

Individuals with $v(1) > v(0)$ will choose to follow the regulations and enter the official economy. Individuals with $v(1) < v(0)$ will choose not to follow the regulations and hide into the unofficial sector.

With this in mind, the payoffs $v(1)$ and $v(0)$ can be described as follows:

$$\begin{aligned} v(1) &= R_i - \alpha \\ v(0) &= d[d_h(R_i - R_i) + d_c(R_i - \beta)] + (1 - d)(R_i). \end{aligned} \tag{1}$$

The payoff $v(1)$ represents the earnings derived from the economic activity minus the costs of following the regulations. This payoff is riskless since an agent who follows all regulations is not forced to pay any additional costs when detected. In turn, the payoff $v(0)$ represents the expected earnings derived from hiding into the unofficial economy. With probability dd_h , the agent is detected by an honest official and the business is closed down. With probability dd_c , the agent is detected by a corrupt official and the business is allowed to continue operations at the cost of the bribe. Finally, with probability $(1 - d)$, the business is not detected and all production (R_i) becomes earnings.

When an economic agent bribes a corrupt official, the amount of the bribe (β) is assumed to be determined by Nash bargaining, where the bargaining power of the official is given by $\theta \in (0, 1)$. When bargaining the bribe, the reservation value for the investor is zero because she faces the threat of having her business closed down. Thus, assuming that the reservation value of the official is also zero, the bribe can be determined by solving

$$\max_{\beta} (\beta)^\theta (R_i - \beta)^{1-\theta}. \tag{2}$$

The solution for the bribe follows a simple rule of surplus sharing between corrupt officials and investors. The solution to (2) is the solution for the bribe: $\beta = R_i \cdot \theta$.

2.1 Individual decisions and comparative statics

With a total of P officials and N investors, the probability of detection can be calculated as $d = \frac{P(p\bar{n}+(1-p)\underline{n})}{N}$. Similarly, for an individual who has been detected, the probability of facing a corrupt official can be calculated as $d_c = \frac{p\bar{n}}{p\bar{n}+(1-p)\underline{n}}$, and the probability of facing an honest official can be calculated as $d_h = \frac{(1-p)\underline{n}}{p\bar{n}+(1-p)\underline{n}}$. Individuals take all detection probabilities as given when making their decisions.

By substituting the values of d , d_c , and d_h into the set of equations (1) and comparing the payoffs, it can be shown that whether $v(1)$ is greater than $v(0)$ depends directly on the individual value of R_i relative to a value $R^* \equiv \frac{\alpha N}{P[\theta p\bar{n} + \underline{n} - p\underline{n}]}$. Specifically, it can be shown that individuals with $R_i > R^*$ will choose to follow the regulations and individuals with $R_i < R^*$ will choose not to follow the regulations.

The intuition behind this result is that agents choose not to follow the regulations only when the cost of following the regulations exceeds the expected cost of not following them (in terms of bribes and punishments). Since the cost of regulations α is independent of the level of ability R_i but both the bribe and the punishment are increasing functions of R_i , the result follows logically. The distribution and scope of all economic activity can be illustrated by the following graph:

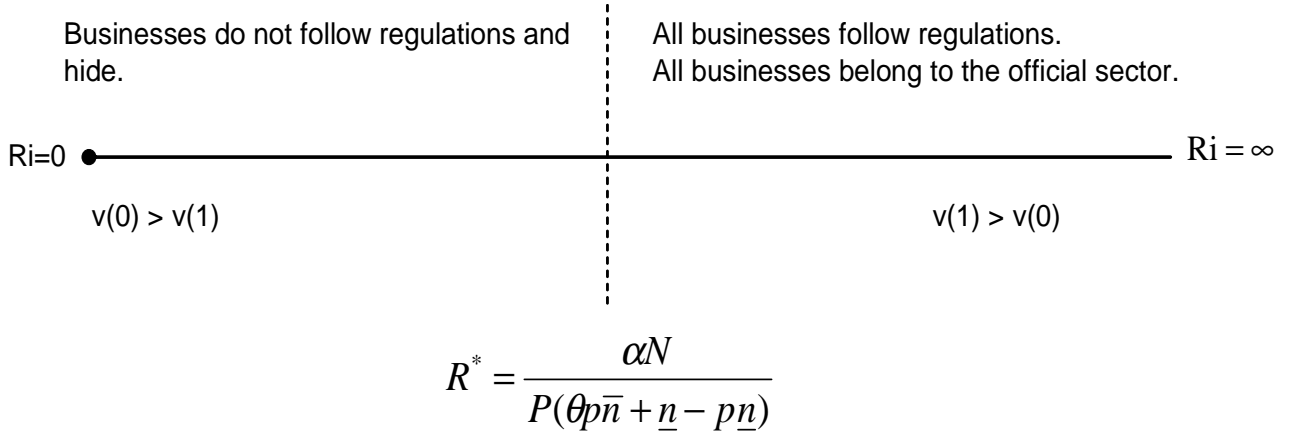


Figure 1: Individual Decisions

Before one can make any claims regarding changes on the level of regulation compliance and the size of the unofficial economy, however, one needs to be precise about how to measure them. In here, the degree of regulation compliance is measured by the fraction of all investment projects that comply with the regulations; which is given in the model by

$$C = [1 - G(R^*)].$$

In turn, the unofficial economy is measured by the fraction of all investment projects which did not follow regulations and operate undetected. In the model, this is given by

$$S = G(R^*)(1 - d) + G(R^*)dd_c.$$

The first component of this measure captures those individuals who hid and remained undetected. The second component captures those individuals who hid and were detected by a corrupt official, who did not report them.

One can now use the model to study the effects of corruption on illegal economic activities. Changes in the level of compliance (C) that result from changes in the level of corruption p ,

can be calculated by the derivative

$$\frac{\partial C}{\partial p} = -G'(R^*) \frac{\partial R^*}{\partial p} = G'(R^*) \frac{\alpha N [\theta \bar{n} - \underline{n}]}{P[\theta p \bar{n} + \underline{n} - p \underline{n}]^2}. \quad (3)$$

This expression can be positive or negative, depending on the sign of the term $[\theta \bar{n} - \underline{n}]$. If the difference between the number of cases that corrupt officials monitor (\bar{n}) and the number that honest officials monitor (\underline{n}) is big enough, then the effects of corruption on regulation compliance are positive.

Thus, in contrast with the standard notions regarding the effects of corruption, in this model an increase in the number of corrupt officials can lead to greater levels of regulation compliance. Intuitively, the impact of corruption on the level of regulation compliance depends on the relative weigh of two separate effects: On the one hand, as corruption increases, it becomes less likely for illegal businesses to be closed down if detected and their expected payoff for not following regulations ($v(0)$) increases. On the other hand, as corruption increases, the overall probability of detection (d) changes. If corrupt officials monitor businesses with greater intensity, then the probability d increases and the payoff for not following the regulations ($v(0)$) decreases.

Similarly, changes in the size of the shadow economy (S) that result from changes in the level of corruption p , can be found with the corresponding derivative. After some algebra, one obtains this derivative as follows:

$$\frac{\partial S}{\partial p} = G(R^*) \frac{P \underline{n}}{N} - \left(1 - \frac{\underline{n}}{N}\right) G'(R^*) \frac{\alpha N [\theta \bar{n} - \underline{n}]}{P[\theta p \bar{n} + \underline{n} - p \underline{n}]^2}. \quad (4)$$

The expression for $\frac{\partial S}{\partial p}$ in equation 4 can be positive or negative. The first term of this expression is positive and represents the increase in the volume of illegal business that results from having a greater number of corrupt officials. The more corrupt officials there are, the less illegal businesses are closed down when detected. The second term represents the change

in size of the shadow economy that results from having more (or less) business deciding to hide in the unofficial sector to begin with. This change might be positive or negative, depending on the value of the term $[\theta\bar{n} - \underline{n}]$. If the difference between the number of cases that corrupt officials monitor (\bar{n}) and the number that honest officials monitor (\underline{n}) is big enough, an increase in corruption can lead to a reduction on the size of the unofficial economy.

Noticeably, however, changes in the size of the unofficial economy are not directly linked to changes in the level of regulation compliance and, as a consequence, it is possible for these two measures of illegal activity to have opposite reactions to changes in the level of corruption. As an example, consider the case in the model when an increase in corruption leads to an increase on regulation compliance (when the term $[\theta\bar{n} - \underline{n}]$ is positive). In this case, even though more business choose to follow regulations, it is also possible for the size of the unofficial economy to increase at the same time; because a smaller fraction of illegal businesses gets closed down. That is to say, it is possible for the first term of equation (4) to dominate the second.

3 Conclusions

In a model where honest and corrupt public officials monitor businesses with different frequencies, it is possible for an increase in corruption to decrease illegal economic activity. In this paper the level of corruption was measured by the fraction of corrupt public officials and the level of illegal economic activity was measured by both, the level of regulation compliance and the size of the unofficial or shadow economy. This paper, however, ignores the links that may exist between the monitoring efforts of a corrupt official and the level of corruption in general.

4 References

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