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When Competition Corrupts

A Theoretical Analysis of Market Structure and the Incidence of Corruption

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Abstract

The paper develops a simple model to demonstrate that, paradoxically, greater competition may exacerbate the problem of corruption. Market participants engaging in corrupt practices enjoy lower production costs— maybe because they pay a bribe to avoid installing the environmental safeguards required by law—such that honest players are driven out of the market when the market becomes sufficiently competitive.

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1 Motivation

As economists, we normally associate competition with healthy and desirable market outcomes. This is so in terms of standard measures that economists use, such as efficiency and consumer surplus: competition enhances these. Similar claims are also often made for some social indicators. For example, Becker (1957) argues that discrimination of different kinds, including racial, falls as market competition increases.[1] In this paper we argue that, paradoxically, corruption will tend to flourish under competition and may be less pervasive when competition is less fierce.

Some prominent papers in the literature have previously analyzed the link between corruption and market structure (see, eg., Rose-Ackerman, 1975; Ades and Di Tella, 1999; Yoo, 2013) but the present paper provides a very different approach. In our analysis, corruption itself generates rents arising from lower costs, which implies that standard competition leads to higher, not lower, incentives for corruption. In this manner, our paper shares a loose connection with Tirole (1986) in the sense that higher degrees of competition force "agents" to collude with a "supervisor" in the environment of Tirole's paper. In contrast to the traditional argument made by Acemoglu and Verdier (2000), we posit the role of government in mitigating the undesirable effects of competition on corrupt practices.

2 Model with Two Types

The standard economic model of corruption and crime is entirely amoral: the fact that an action entails corruption means nothing to the individuals apart from its economic returns, which they consider in isolation when deciding whether or not to choose an action (Becker, 1968). Other work goes further and attributes this amorality also to the enforcers of the law, by assuming that police and magistrates will enforce the law or choose to take bribes depending only on their personal returns from such actions (Basu, Bhattacharya and Mishra,

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[1]One of us has elsewhere (Basu, 2010, Ch.5) argued that this may not be the case. There are strong theoretical explanations of how discrimination and racial prejudice can survive competition.

1992). In this paper we break from that tradition and assume that while there may be amoral people to whom breaking the law is appealing if and only if it is economically profitable, there are also people who find corruption distasteful, with some even refraining from being corrupt no matter what the returns to being corrupt are.

In this section, we consider the polar case in which there are two types of people: the honest and the corrupt. The corrupt are like the standard human being in the models of economists (make what you will of the economics profession) and the honest are those who will, given a choice, never choose the corrupt option (see Guha and Guha (2011) for a similar setting).[2] Following this, we will speak of firms as being corrupt or honest, meaning that firms are managed by corrupt entrepreneurs or by honest entrepreneurs.

Firms choose to enter a certain goods industry if they will earn positive profits.[3] Suppose the number of firms in the industry is exogenously constrained to n. If more firms desire to enter the industry than there are spaces available, firms who apply for entrance will be randomly selected to enter. Demand in the industry is linear, given by:

$$P = a - bQ \tag{1}$$

Once in the industry, the n firms have uniform fixed marginal cost c ($c < a$) and engage in Cournot competition. Denoting firm i's output by q_i and using a star to denote Cournot equilibrium, we obtain (from the first order condition) the following condition for each i:

$$q_i^* = \frac{a - b \sum_{j \neq i} q_j^* - c}{2b} \tag{2}$$

This means that the Cournot equilibrium price $P(n)$ and aggregate quantity $Q(n)$ will be functions of the number of firms:

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[2]This is in contrast to Myerson (2004) where honest behavior emerges in equilibrium from people who are fundamentally amoral and hence are fully corruptible.

[3]Note that this assumes that the outside option is equivalent for honest and corrupt managers. In practice, this may not be the case, but we assume this for simplicity.

$$Q(n) = \frac{n}{(n+1)} \frac{a-c}{b} \tag{3}$$

$$P(n) = \frac{a+nc}{n+1} \tag{4}$$

We will, in what follows, denote each firm's Cournot equilibrium output by $q(n)$. Clearly, $q(n) = \frac{a-c}{b(n+1)}$. Now assume that before starting operation, a firm is supposed to incur a fixed cost L to put in some environmental safeguards, but it is possible for the firm to avoid this by paying a bribe l. We assume of course that $l < L$ and without loss of generality, we will assume $l = 0$. Firms thus incur fixed cost hL, where $h = 1$ for honest firms and $h = 0$ for corrupt firms.

Proposition 1 *If the industry is sufficiently competitive (i.e. the number of firms in the industry is above a certain threshold level n^*) then all firms in the industry will be corrupt.*

Proof. Suppose there are n firms in the industry. Then profit earned by an honest firm is given by:

$$P(n)q(n) - cq(n) - L. \tag{5}$$

Using the definition of $P(n)$ and $q(n)$ from above, it is easy to see that the profit earned by an honest firm will be zero if:

$$n = \frac{a-c}{\sqrt{Lb}} - 1 \tag{6}$$

Denote the value of n that satisfies equation (6) by n^*. It follows that if $n > n^*$ then the industry will be populated only by corrupt firms. ∎

Suppose next that the number of firms in the industry is not exogenously given. Instead there is free entry of firms. If the total number of corrupt people in the economy is greater than n^*, it is obvious that in equilibrium with free entry, all firms in the industry will be

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corrupt. The argument is simple. As long as profits earned by corrupt firms are positive, corrupt firms will continue to enter. As this continues and the number of firms in the industry increases above n^*, only the corrupt firms will remain in the industry. Hence the next corollary:

Corollary 1 *In a competitive industry with free entry, corruption will be endemic.*

3   Generalization

It may appear at first sight that our result is driven by the binary nature of the attitude people have toward bribery. The result that a critical point exists beyond which corruption suddenly increases in a competitive industry seems especially to be a consequence of the assumption in the previous section of there being only two kinds of people, the honest and the corrupt. Interestingly, this is not so. Even with different kinds of behavior, the threshold effect will be present. So let us move to the more general case by assuming, as indeed is real, that people vary in the degree of their attitudes toward corruption and honesty (which, in the present paper is equated with the aversion to corruption), ranging from incorruptible to the completely amoral. We shall here denote a firm's (meaning its entrepreneur's) propensity for honesty by $h \in [0, \infty)$, which denotes the psychological cost to a person of being dishonest. If $h = \infty$, such a person will not be corrupt no matter how large the reward from corruption. Note that in this paper we are not distinguishing among different kinds of corruption. This is harmless here since the only corruption that occurs in this model is bribery to evade environmental regulations. We shall use $\phi(h)$ to denote the fraction of individuals whose propensity for honesty is less than or equal to h. Let us denote a firm's profit ignoring the fixed cost by $\tilde{\pi}$ and call this the variable profit. If there are n firms in the industry, then:

$$\tilde{\pi}(n) \equiv \left[\frac{a + nc}{n + 1}\right] \left[\frac{a - c}{b(n + 1)}\right] - c \left[\frac{a - c}{b(n + 1)}\right]$$

$$\text{or} \quad \tilde{\pi}(n) = \frac{(a-c)^2}{b(n+1)^2} \tag{7}$$

Clearly, a firm of type h will choose to enter the industry if and only if:

$$\tilde{\pi}(n) \geq \min\{h, L\} \tag{8}$$

If (8) holds and $h < L$, this firm will enter the industry and be corrupt. If (8) holds but $h \geq L$, it will enter the industry but not be corrupt. We used an arbitrary tie breaker rule for $h = L$, but that is innocuous.

It is now easy to describe the relationship between the degree of competition and the incidence of corruption. Note that as n goes to 1, $\tilde{\pi}(n)$ increases toward $\frac{(a-c)^2}{4b}$. Starting from n equal to one and increasing n, it is obvious that $\tilde{\pi}(n)$ declines monotonically. Define $\tilde{n}$ to be such that $\tilde{\pi}(\tilde{n}) = L$. If the number of firms allowed in the industry n is less than $\tilde{n}$, all firms will want to enter the industry and a random selection of firms will manage to do so. The fraction of firms in the industry that pay a bribe will be given by $\phi(L)$.

If $n > \tilde{n}$, then $\tilde{\pi}(n) < \tilde{\pi}(\tilde{n}) = L$. Now only those firms whose h is less than L will find it worthwhile to enter the industry. But if $h < L$, then it pays to give a bribe. Hence, the incidence of bribery will be total. In other words, all firms in the industry will be paying a bribe. Hence our fundamental result is unchanged: there is a critical level of competitiveness such that once an industry becomes competitive beyond this level, bribery and corruption will be ubiquitous. It is interesting to note that even if individual propensity toward corruption varies finely from the incorruptible to the totally amoral, the incidence of corruption rises abruptly beyond a certain level of competitiveness in the industry.

4 Observations

We believe our paper points to an important reason why corruption is so rampant in some industries. India's large system of ration shops has a high incidence of corruption (in

this case it takes the form of cheap grain received from the government and meant to be sold to poor households at a special low price instead being sold illegally at the higher market price). A little calculation shows that for a fully honest ration shop owner, the profit margin is so low that it is not worthwhile for a person to run a ration shop unless he or she is prepared to be corrupt (Khera, 2011). It is this idea that drives our theoretical model.

The model may give the impression that corruption is inevitable in competitive industries. That is, however, not true; our model was developed for an environment in which bribery is worthwhile for amoral individuals. The way to root out corruption is to make sure that this is not the case in society. If, for instance, we choose a police force by selecting innately honest people or by having punishment rules which make it not worthwhile for an officer to take a bribe, then even in competitive industries there will be negligible corruption. Further it is possible for societies to develop self-enforcement norms whereby bad behavior is collectively punished by all and where people punish bad behavior because not to punish bad behavior is itself bad behavior (Akerlof, 1976; Basu, 1986).

Finally, by moving away from the patently unrealistic textbook assumption that all human beings are amoral and by allowing for the fact that people incur psychological cost for being corrupt, the paper draws attention to the role of the distribution of morality in a society.

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