

# Corruption and Competition<sup>\*</sup>

**Franklin Allen**

Finance Department  
The Wharton School  
University of Pennsylvania  
[allenf@wharton.upenn.edu](mailto:allenf@wharton.upenn.edu)

**Jun “QJ” Qian<sup>†</sup>**

Finance Department  
Carroll School of Management  
Boston College  
[qianju@bc.edu](mailto:qianju@bc.edu)

August 1, 2007

Preliminary, comments welcome

## Abstract

An interesting aspect of corruption is that its damaging effects on economic growth seem to differ significantly across countries. In large and regionally diverse countries such as China and India, rampant corruption has not slowed down growth; in many African and South American countries corrupt officials severely retard growth. We examine corruption associated with the provision of government goods and services. Corruption occurs when the government cannot raise sufficient revenues to finance the costly provision, and bribes can be regarded as user fees. With multiple officials providing the same good or service, the user fee is determined competitively and the pernicious effects of corruption are minimized. We also examine how economic agents and the central government can restrain corrupt officials.

**Keywords:** Corruption, institutions, competition, taxes, user fee.

**JEL Classifications:** O0; H0; P5.

---

<sup>\*</sup> We appreciate helpful comments from Pierluigi Balduzzi, Frank Gevurtz, Ning Gong, Ed Kane, Phil Strahan, and seminar/session participants at Boston College, China International Conference in Finance (Chengdu), and the Symposium on “Rethinking Corruption” at the McGeorge School of Law, University of the Pacific. Jason Xu provided excellent research assistance. Data on country-level corruption indexes and bribes paid by firms provided by Martha Dye of Transparency International and financial support from Boston College and the Wharton Financial Institutions Center are gratefully acknowledged. The authors are responsible for all remaining errors.

<sup>†</sup> Corresponding author: Finance Department, Carroll School of Management, Boston College, Chestnut Hill, MA 02467. Phone: 617-552-3145, fax: 617-552-0431, E-mail: [qianju@bc.edu](mailto:qianju@bc.edu).

# Corruption and Competition

August 1, 2007

## Abstract

An interesting aspect of corruption is that its damaging effects on economic growth seem to differ significantly across countries. In large and regionally diverse countries such as China and India, rampant corruption has not slowed down growth; in many African and South American countries corrupt officials severely retard growth. We examine corruption associated with the provision of government goods and services. Corruption occurs when the government cannot raise sufficient revenues to finance the costly provision, and bribes can be regarded as user fees. With multiple officials providing the same good or service, the user fee is determined competitively and the pernicious effects of corruption are minimized. We also examine how economic agents and the central government can restrain corrupt officials.

**Keywords:** Corruption, institutions, competition, taxes, user fee.

**JEL Classifications:** O0; H0; P5.

## **I. Introduction**

Corruption has many damaging effects in any economy, including the distortion of incentives and misallocation of resources (e.g., Shleifer and Vishny 1993). In its worst form, corruption is essentially outright theft and robbery done on a massive scale by high-ranking government officials. Corruption is also a pervasive and persistent problem, and takes on many different forms.<sup>1</sup> It occurs in almost all countries, including the most developed countries, and seems very difficult to eradicate.

Despite ample evidence at micro-levels on the prevalence, scale and damaging effects of corruption, researchers generally do not find a negative and significant relation between corruption, measured by a number of indexes provided by international organizations (most notably the Corruption Perception Index, or the CPI, published by the Transparency International), and economic growth in cross-country studies (e.g., Mauro 1995; Svensson 2005). One reason for this interesting and perhaps puzzling fact is that these indexes are imperfect measures for the multiple facets of corruption. Another reason is that the negative effects of corruption on growth differ significantly across countries. For example, in countries like China and India, rampant corruption has not slowed down growth (e.g., Allen et al. 2005, 2006); but in many African and South American countries, its effects seem far more damaging (e.g., Fisman and Svensson 2007).

Why does corruption occur and why is it so difficult to eradicate? How to explain the cross-country variations on the impact of corruption? In this paper, we address these questions by focusing on corruption associated with the provision of government goods and services. We first argue that corruption arises when the government is unable to raise enough tax revenues to fund the socially optimal level of these goods and services. Hence, bribes paid to officials in charge of the

---

<sup>1</sup> Extrapolating from firm and household survey data, the World Bank estimates that total bribes paid to officials around the world are about US\$1 trillion per year, or 3% of world GDP (Rose-Ackerman 2004). For descriptions on the severity of corruption in individual countries, see reports from IMF, World Bank and Transparency International.

provision can be regarded as user fees to cover the costs. In this regard, we define corruption as officials receiving excessive amounts of bribes over and above the costs of supplying the socially optimal level of goods and services. In the long run, the way to eliminate corruption of this type is to raise more revenues directly through taxes.

With insufficient tax revenues in the short run, however, can anything be done to minimize the damaging effects of corruption? We next show that if the goods and services are provided in a competitive environment, so that multiple officials compete to provide the same good or service (e.g., issuing licenses for start-up businesses), then the pernicious effects of corruption can be significantly reduced. In this case, the bribe an official charges is similar to a user fee that is competitively determined (e.g., through Bertrand competition) and substitutes for taxes. As a result, the level of public goods and services provision can approach the first best (socially optimal) level. On the other hand, when a government official is the monopolist in the provision of public goods or services, a much higher user fee will be charged, leading to a lower level of provision of the goods or services and slower economic growth.

One reason for the damaging effects of corruption is that corrupt officials try to keep their activities (including fees charged and bribes received) in secret, which leads to more distortions of incentives and resource allocations (e.g., Shleifer and Vishny 1993). Having a competitive environment in the provision of government goods and services alleviates this problem, since each official has the incentive to disclose his fee structure (for granting the goods and services) in order to attract more clients. In Asian countries such as China, there are usually ‘market’ prices for government goods or services, and with transparency in pricing bribes can facilitate the provision of goods and services.

To ensure that there is competition among officials, economic agents demanding the good or services must be able to move from one provider to another (or credibly signal that they can do so)

to exploit the differences in user fees. In a more general and realistic setting with transaction costs (for switching), we show that an imperfect Bertrand competition yields an output level that is below the first best level (with perfect competition) but higher than that of monopoly. An implication of this result is that economic agents can alleviate the damaging effects of corruption through reducing their own transaction costs. For example, small firms are easier to relocate than large firms; firms operate in industries that require small scales of investment in fixed assets can also relocate at low costs. Therefore, the size and choice of assets makes it more difficult for corrupt officials in any region to extract rents from firms.

The main policy implication from our analysis is that setting up the provision of government goods and services in a competitive environment reduces the damaging effects of corruption and promotes growth. One way to implement this would be to decentralize the provision of goods and services to local government officials or agencies. A potential problem with the delegation of the provision to local officials or agencies is quality control (e.g., driving tests before issuing a driver's license), and thus monitoring may be necessary to ensure that quality is not compromised under decentralization. In large and diversified countries a competitive environment can also be created by encouraging inter-regional economic activities and lowering the costs (and bureaucracy) of relocation across regions, while in small and homogeneous countries this can be done by encouraging international trade and lowering the costs of relocation across countries. Since the total amount of bribes received by a monopolist official is much higher than a counterpart in a competitive environment, officials have an incentive to increase their monopoly power by, for example, blocking information about similar goods and services provided in other regions/countries, or by increasing the transaction costs for agents to relocate. Solving problems of this sort must involve the central government. For example, the central government can reward officials whose regions have shown the fastest economic growth and attracted the largest amount of economic

activities (and investment) from *non-local* sources. These policies encourage inter-regional competition among officials and induce more government goods and services supplied.

Our results are broadly consistent with evidence on corruption and growth and provide new predictions. First, corruption is more likely to occur in countries whose governments have low taxing ability and tax income – most of these countries are poor and developing countries. Researchers also find that corruption is more prevalent in developing countries or regions with higher tax rates or higher federal transfers, all of which proxy for lower government taxable income, while corruption is less prevalent where government activities are more decentralized (e.g., Fisman and Gatti 2002a,b; Fisman and Wei 2004). Second, in large and regionally diverse countries such as China and India, there is a limited amount of bribes officials can extort because of regional competition. In some African and South American countries with homogeneity across regions (in part due to historical reasons from colonial eras), corrupt officials effectively have monopoly power and this allows them to extract much larger amounts of rents, which in turn significantly reduces the level of economic activities. Third, consistent with the implications of our model, there is cross-country evidence on the negative relation between “openness” of an economy (e.g., exports/GDP) and corruption, and a positive relation between corruption and excessive regulation of entry of new firms (e.g., Djankov et al. 2002; Svensson 2005).

Fourth, our model shows that corruption has less damaging effects on industries and firms that can be easily relocated. Consistent with this prediction, in both China and India, the sectors that have witnessed the fastest growth are small- and medium-sized firms from services and labor- and technology-intensive industries (e.g., Allen et al. 2005, 2006), while in Russia, an economy dominated by large corporations in heavy manufacturing industries, firm-growth in a large number of industries has lagged behind other countries. Further empirical studies can systematically examine the impact of corruption on different industries across countries or different regions within

the same country.<sup>2</sup> Finally, in China, one of the key yardsticks in measuring the performance of local officials is economic growth and the amount of investment from non-local sources (e.g., Li 1998); in other countries the most corrupt government officials hold the highest positions in the government, making it impossible to implement incentive-aligning policies for lower level officials.

Our paper contributes to the related strands of literature on political economy, institutions and economic growth. Proponents of institutional development argue that a country's institutions restraining the government and powerful elites, determine the country's long-run economic growth (e.g., Rajan and Zingales 2003a, b; Acemoglu and Johnson 2005). Unlike this line of research and most of the literature on corruption that focuses on its negative impact on growth, we show that, because of competition among officials, lack of corruption is *not* a necessary condition for economic growth. We also propose different degrees of competition (among officials) as the new rationale to explain cross-country (and regional) differences of corruption and growth. In addition, our model shows corruption occurs because the government cannot raise sufficient revenues to finance the provision of socially optimal levels of goods and services. Therefore, during early phases of economic development, policies aiming at eliminating corruption of this type (e.g., through levying punishment on corrupt officials) are not likely to succeed, while policies to increase the degree of competition among officials in providing the same goods and services can be much more effective in reducing the damaging effects of corruption.

The rest of the paper is organized as follows. In Section II, we review related work and present empirical evidence on corruption, governments' taxing ability and economic growth. Section III presents a model of corruption based on standard models of industrial organization and market power. Section IV provides model extensions and discussions, and Section V concludes.

---

<sup>2</sup> With survey data on firms from Uganda, Svensson (2003) finds that firms with less sunk costs (of capital stock) pay smaller amount of bribes, consistent with our model prediction.

## II. Related Work and Facts about Corruption

The ideas that corruption does not necessarily slow down economic growth, and conceivably certain forms of “efficient corruption” can actually promote growth, can be traced back to at least Leff (1964) and Huntington (1968). These authors argue that corruption is more likely to occur during periods of rapid economic and social development and modernization. They also argue that through bribing corrupt officials economic agents can bypass bureaucracy and bad, rigid laws and regulations and expedite activities that lead to faster economic growth. Subsequently, researchers formalized these ideas by modeling *competition among economic agents* (e.g., firms applying for licenses) in submitting bribes to officials (e.g., Lui 1985; Bliss and Di Tella 1997; Ades and Di Tella 1999). However, this type of competition may not be enough to reduce the damaging effects of corruption, because corrupt officials may favor more distortions and secrecy than granting the license to the most efficient agent (e.g., Shleifer and Vishny 1993).<sup>3</sup> In our model, we take the competition among agents as given and focus on *competition among officials* in providing the same good or service, and show that this latter form of competition is more important in terms of reducing the damaging effects of corruption.

While Shleifer and Vishny (1993) focus on reasons why corruption can have a significantly negative impact on economic development, we focus on how competition among officials can minimize these damaging effects. Like their paper, we show that the ‘industrial organization’ of the provision of government goods and services is an important determinant of the effects of corruption. Unlike their paper, we argue that the fundamental reason for the occurrence of corruption is the government’s inability to collect sufficient taxes to finance the provision of goods and services, while competition among officials can yield the same outcome as the first best situation where the government has sufficient tax income. We also argue that competition among officials is a robust

---

<sup>3</sup> Most of the literature focuses on the negative impact of corruption on economic development. See, for example, Svensson (2005) for a review of the literature.

mechanism in dealing with corruption, even if the central government cannot monitor the process through which the goods or services are provided by local officials (e.g., officials can lie about the quantity of goods sold or the amount of money they have collected).

There is a strand of literature examining how the central government can control corrupt officials at local levels providing goods and services. Following Becker and Stigler (1974), most of the literature regards the relation between central and local government officials in the framework of a principal-agent relationship, and study ways to motivate the ‘agent’ (local officials) to carry out their tasks congruent with the goals of the ‘principal’ (central government) that is to promote economic growth. We do not consider the principal-agent problem in our model, but rather focus on what policies and performance evaluation measures the central government can come up with to motivate competition among officials. We argue that these policies are of first order importance relative to other policies aiming at increasing the honesty among officials or punishing excessively corrupt officials.

Finally, there is also a recent literature on institutions and long-run economic growth. For example, Rajan and Zingales (2003a, b) and Acemoglu and Johnson (2005) argue that institutions restraining the government and the powerful elites promote economic growth. In this regard, the evidence in China and India provides important counterexamples to this literature, in that despite powerful elites and corruption these countries have achieved impressive growth records. In this regard, our model provides a new rationale on why lack of corruption is not a necessary condition for economic growth among emerging economies.

**Insert Tables 1 and 2 here.**

Table 1 lists the largest twenty economies in the world as of 2006 using both (unadjusted) simple exchange rates and those that are based on purchasing power parity (PPP); the table also lists the top twenty economies that have the highest growth rates (GDP and per capita GDP) during the

period 1990-2006. As shown in Table 3-B below, some of the most corrupt countries (measured by the CPI and highlighted in bold) are also among the largest and fast growing economies, led by China and India. These facts reinforce our research goal that understanding how corruption affects economic growth differently across countries is an important question for the world economy and development. Table 2 presents the results of Bribe Payers' Index (BPI) in 2006, published by the Transparency International. The BPI is based on the responses of 11,232 business executives from companies in 125 countries to questions about the propensity of *foreign* firms that do the most business in their country to pay bribes or to make undocumented extra payments. The answers are converted to a score between 0 (bribes most frequent) to 10 (bribes never occur), and the ranking of 30 of the leading exporting countries (combined global exports represented 82% of world total in 2005) listed shows the average score of a country. Consistent with the rankings of CPI, firms from the three largest developing countries (using PPP), China, India, and Russia, have the lowest BPI rankings or the highest propensity of paying bribes.

Tables 3-A and 3-B compare government's taxing ability, measured by total taxes collected over GDP, economic growth and income level, measured by both GDP growth and per capita GDP, across three subgroups of countries ranked by corruption. As mentioned above, the corruption measure we adopted is the CPIs of Transparency International, which provides the most comprehensive (both in terms of number of countries covered and time horizon; using other corruption measures produced very similar results; see, e.g., Svensson 2005). Consistent with prior research,<sup>4</sup> countries in the most (least) corrupt group are on average poor (rich) and have low (high) taxing abilities proxied by a smaller (larger) fraction of total taxes collected by the government of GDP. These results motivate our model assumptions that the reason corruption occurs (in an

---

<sup>4</sup> There is a strand of literature documenting the scale of shadow economies around the world (e.g., Friedman et al. 2000; Schneider and Enste 2000, 2002). Researchers find that the size of the shadow economy is larger (relative to GDP) in poor countries, especially where the tax rates are high, and that there is a positive correlation between size of shadow economy and corruption.

emerging economy in particular) is because the government cannot raise enough tax revenues to cover the costs for providing goods and services at socially desirable levels.

Tables 3-A and 3-B also show that while the average GDP growth rate (during the 1981-2005 period) for the most corrupt group is lower than that of the least corrupt group, this difference is small; perhaps not surprisingly, the standard deviation of growth rates is much higher in the most corrupt group than for the least corrupt group. In most of the regression analysis (e.g., Mauro 1995; Svensson 2005), researchers generally do not find a statistically significant relation between corruption and GDP growth after controlling for other standard growth factors (such as human capital, initial growth conditions, etc). While this puzzling fact may be explained by measurement errors of corruption, we interpret it as evidence showing that the forms and damaging effects of corruption vary significantly across countries. The main purpose of our model is to provide a rationale for this interpretation and draw policy implications.

Table 3-B furthers our interpretation of the lack of significant relation between corruption and growth. Panel A compares government's taxing ability and economic growth (measured by both GDP growth and per capita GDP) across the most corrupt countries in the world, while Panel B lists the least corrupt countries in the world. There are significant variations in terms of economic growth among the countries with lowest scores on corruption in Panel A. China appears to be the most significant 'outlier' in the group: While its corruption index/score (based on Transparency International's CPI index, ranges from 1 to 10 with 1 being the most corrupt) had improved from 2.2 in 1995 to 3.2 in 2005, its annual GDP growth rates (using PPP measures) of almost 13% during the period 1981-2005 is the highest in the world; in PPP terms it currently has the second largest economy in the world (behind only the U.S.); and per capita GDP increased from US\$512 in 1981 by 14 fold to almost \$7,200 in 2005. Similar (but less spectacular) cases are other large and regionally diversified countries such as India and Indonesia, in that despite rampant corruption,

these countries have done quite well in terms of economic growth. At the other extreme, many countries in Africa and South America with similar scores on corruption have basically stagnated and there is no growth in sight. Finally, a large and regionally diversified country with rampant government corruption, Russia, has done poorly in terms of economic growth during the same time period. Our model will try to explain all of these facts about corruption and economic growth across countries.

### **III. A Simple Model of Government Goods and Services Provision and Corruption**

We develop the simplest possible model for conveying our main message that competition among officials reduces the damaging effects of corruption. We consider a government's problem of providing a good (or service) to the public. We analyze how this can be done with different structures of supplying the good and raising funds to cover the costs associated with the production and supply. We first examine the case where the government has sufficient tax revenues to cover the costs (first best). Next, we analyze different cases where the government does not have sufficient funds to cover the costs and hence must rely on the official(s) supplying the good to raise funds themselves.

#### **III.1 Elements of the Model and First Best Solution**

We assume that the government good or service is homogeneous, in that there is no difference in quality of the good provided by different officials in different regions (of the same country or different countries). We also assume that the demand for this good among economic agents from different regions can be characterized by a downward sloping demand function. For simplicity, we assume this function to be linear, and takes on the form of  $P(Q) = W - aQ$ , where  $Q$  is the equilibrium level of the good supplied in the economy,  $W$  indicates highest possible consumer surplus (agent obtaining the good with price 0), and the parameter  $a$  ( $> 0$ ), indicates the sensitivity

of quantity demanded when price changes.<sup>5</sup> We further assume that the provision of the government good is costly, and the costs can be described as  $C(Q) = C_0 + \frac{1}{2}cQ^2$ , where  $C_0$  is a constant, so that the marginal cost for producing and supplying each additional unit is  $MC(Q) = cQ$ .

With our model setup, it is straightforward to derive the First Best level of this government good,  $Q^*$ . This is achieved by increasing the supply of the good until the marginal cost of supplying the last unit equals the marginal benefit of the buyer of the final unit, or

$$MC(Q) = P(Q). \quad (1)$$

Solving for  $Q$  in (1) above gives  $Q^* = \frac{W}{a+c}$ , and the associated total costs in supplying the good is

then  $G^{FB} \equiv C(Q^*) = C_0 + \frac{c}{2} \left( \frac{W}{a+c} \right)^2$ . From standard demand theory we also know that at this

output level there is no deadweight loss and social welfare is maximized.

Denote the amount of the government's tax revenues (e.g., from the taxation of private activities and agents' personal income) allocated for the provision of this government good  $T$ ; assume for now that  $T \geq G^{FB}$ . The financing of the good in the economy can be implemented as follows: An account (for this government good) is set up with exactly  $G^{FB}$  in it to cover the supply of exactly  $Q^*$  units of the good by one or a group of government officials. In particular, an amount of  $cQ$  (marginal cost) can be reimbursed for the provision of each successive unit, till all the remaining funds in the account are used for the last unit. This is our First Best benchmark and it is summarized in the following Lemma.

---

<sup>5</sup> Our assumptions on the demand function for the government good can be restrictive for two reasons. First, the consumption (and thus demand) for the use of some public goods by one agent can have a positive (or negative) externality on other agents. This is not captured by the above demand function. Second, one agent may need to purchase multiple government goods in order to undertake her own activity, in which case the joint determination of the provision of all the goods and services becomes important. We consider these cases in the next section.

**Proposition 1** *With sufficient tax revenues ( $T \geq G^{FB}$ ), the government will spend  $G^{FB}$  to supply  $Q^*$  units of the good in the economy.*

It is worth pointing out that the implementation of the First Best output level when the government has sufficient tax revenues requires that the minimum level of monitoring of officials supplying the good is trivial. First, the officials do not need to raise any funds (and thus have no reason to demand any bribes) to cover the costs; and second, the total amount of funds in the account and total units supplied can be easily verified.

### **III.2 Insufficient Tax Revenues: Monopoly vs. Perfect Bertrand Competition**

Now suppose that  $T < G^{FB}$ . For simplicity suppose  $T = 0$ . Since the government does not have sufficient funds to cover the costs of provision of the good, the official(s) actually in charge of the supply of the good must raise  $G^{FB}$  themselves. Clearly, the most direct way to raise funds would be to charge the buyers of the goods a user fee. We assume that the monitoring of officials' fundraising and the provision of the good is imprecise, so that the supervisor of the officials providing the good cannot differentiate the reasons why the total quantity supplied in the economy is below  $Q^*$ : This can be induced by officials charging excessive fees and thus reducing demand, or because the officials lie about the amount that can be raised in the economy to cover the production/supply costs (this can be due to the fact that there is some uncertainty in the economy about how much funds can be raised for different purposes). The lack of effective monitoring implies the officials providing the good have the discretion to restrict the quantity of the good that is supplied so as to maximize their own benefits. This is our definition of corruption, with the user fees charged by officials corresponding to bribes.

Next, we examine different structures of the government goods market, focusing on the supply side while taking as given the demand for the good. We first examine the case where the

provision of the good is carried out by one official so that he has monopoly power. This case can be associated with the scenario that in one region there is only one government branch/office that the good can be purchased. In countries with multiple regions where the same good is supplied, this case corresponds to the situation in which it is impossible for agents from one region to move to another, so that the official in each region is a monopolist in providing the good

Given the monopoly and assuming that the demand function is relatively inelastic ( $a \gg 0$ ), the official has an incentive to cut back the quantity supplied, raise the user fee (assuming he cannot price discriminate buyers of the good so he can only set one fee for all units) and maximize his total fees from providing the good. To do this, the monopolist official supplies the government good until the marginal cost of supplying the last unit equates that of his marginal revenue of selling the unit, which is below marginal benefit of the buyer of the final unit:

$$MC(Q) = MR(Q) \equiv \frac{dP(Q)}{dQ} \cdot Q = W - 2aQ. \quad (2)$$

Solving for  $Q$  in (2) yields  $Q^M = \frac{W}{2a + c}$ , and the corresponding user fee for each unit of the government good charged by the monopolist official is given by:

$$f^M \equiv P(Q^M) = W - aQ^M = \frac{a + c}{2a + c} W. \quad (3)$$

Again, from standard industrial organization and market structure models, we know that the output level under monopoly,  $Q^M$ , is strictly below the First Best level,  $Q^*$ , derived in (1). The comparison of output levels under different structures are illustrated in Figure 1, which also depicts the profits earned by the monopolist official as well as the deadweight loss generated by the less-than-optimal level of provision of the government good.

**Insert Figure 1 here.**

The profits earned by the official, net of the costs of supplying  $Q^M$  to the agents in the

economy, is indicated by the shaded area in Figure 1, while the deadweight loss is indicated by the dark triangle. The size of the loss, indicated by the shaded area of the triangle, is proportional to the product of the differences in output levels ( $Q^* - Q^M$ ) and the profit margin ( $P(Q^M) - MC(Q^M)$ ):

$$DWLoss^M \equiv \frac{1}{2} \times (Q^* - Q^M) \times [P(Q^M) - MC(Q^M)] = \frac{a^2 W^2}{(2a + c)^2 (a + c)}, \quad (4)$$

where the last equality is derived by plugging in the expressions for  $Q^*$  and  $Q^M$ . Proposition 2 summarizes the results for the monopolist case.

**Proposition 2** *With a monopolist official providing the government good, the user fee for each unit is set at  $f^M$ , resulting in a total of  $Q^M$  units supplied in the economy, and  $Q^M < Q^*$ . The deadweight loss of the monopolist supplier is given in (4), and increases when: i)  $a$  decreases; ii)  $W$  increases; and iii)  $c$  decreases.*

The comparative statics on the size of the deadweight loss are intuitive. First, a smaller slope coefficient of the demand function ( $a$ ) indicates that the demand is more inelastic (insensitive to price increases) for the government good. This implies that by cutting quantity and raising the user fee the monopolist official can raise his profits more; but this also results in a larger decrease in output level as compared to the First Best level and larger welfare loss. Second, a higher  $W$  indicates higher consumer surplus from consuming the government good, and hence a greater loss if quantity of the good supplied is cut by the official. Finally, a lower marginal cost ( $c$ ) in supplying the good implies that the monopolist has more to gain by raising the user fee and cutting back quantity, resulting in a greater loss for the economy.

Next suppose that the government sets up two suppliers for provision of the good (results would be very similar if there are more than two suppliers). This can occur if in any region where

the good is provided there are two government branches/offices from which agents can purchase the good. This can also occur that agents can move from one region to another (to exploit differences in fees) without any costs. In either case there is competition among officials. Since in most cases the officials set and announce the user fees to all potential buyers, we assume that Bertrand competition ensues for the provision of the same good.<sup>6</sup>

Given that there are no costs in resetting prices and that the pricing information becomes immediately known to all agents in the economy, similar to standard one-period Bertrand competition models, there is a unique Nash equilibrium in this case, where each supplier will set the user fee to be the marginal cost of supplying the last unit. But this is exactly the same condition in the First Best, indicated in (1). Hence the total units supplied in the economy is the First Best level,  $Q^*$  again. Since each official is earning zero profits under Bertrand competition, it does not matter how they split the total supply between them; without loss of generality we assume each official provides exactly half of  $Q^*$ . Hence Bertrand competition generates outcomes that are identical as the First Best solution in Figure 1, and the equilibrium user fee can be found by equating the marginal cost function to the demand curve. The key for the above results is that, if the user fee set by one of the officials is higher than marginal cost of producing the last unit, by undercutting the user fee by  $\varepsilon$  the other official can capture the entire market (recall that all agents can move to another region without costs) and maximize profits, in the process of doing so also driving the demand for the official with the higher user fee to 0.

**Proposition 3** *With two or more officials providing the same government good, the unique*

*equilibrium user fee for each unit is set at  $f^B = \frac{c}{a+c}W$ ,  $f^B < f^M$ , resulting in a total of  $Q^*$  units*

---

<sup>6</sup> Alternatively, government officials may choose the quantity to sell and the same (per unit) fee for the good is determined in the market place. In this case we have Cournot competition and the output level is higher than the monopoly case but lower than the Bertrand competition case.

*supplied, same as the First Best solution.*

Bertrand competition not only yields the First Best output level for the provision of the government good, it also requires almost no monitoring of the officials. This is because the market mechanism of competition is self-enforcing due to each official's incentive to undercut the user fee set by other officials and capture the entire market demand for the same good.

### **III.3 Insufficient Tax Revenues: Imperfect Bertrand Competition with Transaction Costs**

In the previous subsection we considered two extreme cases of how the government good is provided. More generally, the industrial organization structure in the provision of the good lies between monopoly and perfect Bertrand competition. In this subsection, we consider imperfect Bertrand competition, in that the agents from each region can move to another region at a constant cost  $K$  (assume that  $K < \frac{aW}{2a+c}$ ). Since now agents cannot move from region to region to explore differences in user fees for free, each of the two officials has some monopoly power in setting the user fee. In particular, each official knows that, in order to capture the entire market of demand for the same government good, he must undercut the other's user fee by at least  $K$ , as any smaller cut would not attract any agents to move from the high-fee region to his region. On the other hand, if there is room to cut the user fee by  $K$  dollars (or other monetary unit) and still left with positive profit margin, then an official will indeed cut the fee by  $K$  dollars.

Given the above intuition, it is then straightforward to show that the equilibrium pricing strategy for is to set the user fee  $K$  dollars above the marginal cost of providing the last unit:

$$MC(Q) + K = P(Q), \quad (5)$$

which yields a lower total quantity supplied (with each of the two officials supplying half of the

total),  $Q_K^B = \frac{W - K}{a + c}$ , than that under perfect Bertrand competition ( $Q^*$ ), and a higher user fee

$f_K^B = \frac{cW + aK}{a + c}$ , than that under perfect Bertrand competition ( $f^B$ ). The equilibrium user fee and

quantity (relative to the perfect Bertrand competition) are illustrated in Figure 2. The current structure of government good provision will also result in a deadweight loss (shaded area):

$$DWLoss_K^B \equiv \frac{1}{2} \times (Q^* - Q_K^B) \times K = \frac{K^2}{a + c}. \quad (6)$$

**Insert Figure 2 here.**

**Proposition 4** *With imperfect Bertrand competition and transaction cost  $K$ , a total of  $Q_K^B$  units will be supplied, and  $Q^M < Q_K^B < Q^*$ , while the user fee,  $f_K^B$ , satisfies  $f^B < f_K^B < f^M$ . The deadweight loss is given in (6), and increases when: i)  $a$  increases; ii)  $W$  increases; and iii)  $K$  increases.*

Comparative statics of the impact of transaction cost  $K$  and marginal cost  $c$  are intuitive. In particular, as  $K$  increases the current case approaches the monopoly case explained in Proposition 2 (and if  $K = \frac{aW}{2a + c}$  these two cases are identical). However, the price-demand sensitivity parameter

$(a)$  now has the opposite impact on the size of the deadweight loss as compared to the monopoly case (Proposition 1). This is because with the pricing strategy of each official fixed at marginal cost plus  $K$  dollars, an elastic or flat demand function (lower  $a$ ) actually results in a larger reduction of quantity supplied than with an inelastic or steep demand function; or, the negative impact of transaction cost  $K$  is smaller when the consumers' demand is not affected much by a price increase.

#### IV. Discussions

The premise of our model is that the reason for the occurrence of corruption is because the government does not have sufficient tax revenues to finance the provision of government goods and services (at the First Best level). Our model implies that in the short run the elimination of the pernicious effects of corruption requires setting up the provision of government services so that there is competition. In this way corruption becomes a user fee and is a substitute for lump sum taxes. In the ideal case of perfect Bertrand competition (without transaction costs), corrupt officials (by charging a user fee for the provision of the good or service) do not have any distortionary effects. In more general cases with imperfect Bertrand competition while the outcome is not First Best, but competition among officials still yields a better outcome than having a monopolist official providing the good, which is the worst case.

An important reason for the damaging effects of corruption is the secrecy of corrupt officials' activities (including fees charged and bribes received) in secret, leading to more distortions of incentives and resource allocations (e.g., Shleifer and Vishny 1993). As shown in our model, having a competitive environment for the provision of government goods and services lessens this problem, because each official providing the goods and services has the incentive to disclose his fee structure for granting the goods and services so as to attract more clients. In Asian countries such as China, there are usually publicly known 'market' prices for government goods or services, and with such transparency bribes can 'grease the wheels' and improve the process of providing these goods and services (refs).

The results of our model are broadly consistent with evidence on corruption and growth. First, consistent with existing research, corruption is more likely to occur in countries whose governments have low taxing ability and tax income, most of which are developing countries. There is also evidence that corruption is more prevalent in developing countries or regions with higher tax rates or higher federal transfers, all of which proxy for lower government taxable income,

while corruption is less prevalent where government activities are more decentralized (e.g., Fisman and Gatti 2002a,b; Fisman and Wei 2004). Second, in large and regionally diverse countries such as China, India and Indonesia, there is a limited amount of bribes officials can extort because of regional competition. The bribes are user fees and substitute for taxes, and incentives are efficient. In some African and South American countries with homogeneity across regions (in part due to historical reasons from colonial eras), corrupt officials effectively have monopoly power. As a result we get the bad equilibrium with under supply of the government good and overcharging by officials and extracting much larger amounts of rents, which in turn significantly reduces the level of economic activities. In fact, consistent with the implications of our model, there is cross-country evidence on the negative relation between “openness” of an economy (e.g., exports/GDP) and corruption, and a positive relation between corruption and excessive regulation of entry of new firms (e.g., Djankov et al. 2002; Svensson 2005).

The main policy implication from our analysis is that setting up the provision of government goods and services in a competitive environment reduces the damaging effects of corruption and promotes growth. In large and diversified countries this can be achieved by encouraging inter-regional economic activities and lowering the costs (and bureaucracy) of relocation across regions and entry barriers for firms and agents. In small and homogeneous countries this can be done by encouraging international trade and lowering the costs of relocation across countries and entry barriers in different countries. These policies are more effective in promoting economic growth in emerging countries than those intending to eliminate corruption, because the root of corruption, as our model assumes, is the lack of funding by the government to provide socially desirable levels of goods and services. This problem cannot be solved until the country’s economic conditions have been significantly improved (in the long run) and the government has the ability to raise sufficient tax revenues in covering the costs of providing the goods and services.

Our model also implies that corrupt officials have an incentive to increase their monopoly power, since the total amount of bribes received by a monopolist official is much higher than a counterpart in a competitive environment. They can regain market power by, for example, blocking information about similar goods and services provided in other regions/countries, or by increasing the transaction costs for agents to relocate. Solving problems of this sort must involve the central government. For example, the central government can reward officials whose regions have shown the fastest economic growth and attracted the largest amount of economic activities (and investment) from *non-local* sources. These policies encourage inter-regional competition among officials and induce more government goods and services supplied and higher levels of growth. In China, one of the key yardsticks in measuring the performance of local officials is economic growth and the amount of investment from non-local sources (e.g., Li 1998); in other countries the most corrupt government officials hold the highest positions in the government, making it impossible to implement incentive-aligning policies for lower level officials.

The situation depicted in Proposition 3 with imperfect Bertrand competition is perhaps a more general case. With transaction costs, each of the officials providing the goods or services captures some rents by setting prices above marginal costs of supplying them by exactly the size of the transaction costs (of agents). But the distortion is less than that of a monopolist official creates. An implication of this result is that economic agents can alleviate the damaging effects of corruption through reducing their own transaction costs. For example, small firms are easier to relocate than large firms; firms operate in industries that require small scales of investment in fixed assets can also relocate at low costs.

Consistent with this prediction, in both China and India, the sectors that have witnessed the fastest growth are small- and medium-sized firms from services and labor- and technology-intensive industries (e.g., Allen et al. 2005, 2006). On the other hand, as Table 4 indicates, Russia's economy

is dominated by large corporations in natural resources (“other” industry in the last column) and heavy manufacturing industries. Firms in these industries face much higher relocation costs and hence the damaging effects of corruption may be one of the reasons that economic development in post-Soviet Union era (of Russia) has been lagging behind that of many smaller former socialist countries in Eastern Europe. Further empirical studies can systematically examine the impact of corruption on different industries across countries or different regions within the same country.

We close this section by pointing out some limitations of our simple model (we also plan to extend the model to consider these questions). First, each agent may need *multiple* goods and services from various government offices and agencies (e.g., an entrepreneur is required to deal with numerous government offices to set up a new firm). In this situation, ensuring coordination among various officials is perhaps as important as creating a competitive environment to reduce user fees set by each official. Second, the cost structure for providing the same good or service may differ across officials, and these cost structure may be private information. The literature on defense procurement contracts has shown how to design these contracts with producers (with unknown production costs) in order to produce the desired weapons at minimum total cost. Third, our simple model implies that the central government should decentralize and delegate the provision of goods and services to local government officials. A potential problem with this delegation is quality control (e.g., driving tests before issuing a driver’s license; see, e.g., Bertrand et al. (2006) for details). As shown in the literature on franchising, designing uniform and enforceable contracts across the board and monitoring the local officials effectively are necessary conditions to ensure that the quality of the goods and services provided is not compromised under decentralization.

## **V. Summary and Concluding Remarks**

This paper proposes an explanation for the puzzling fact that rampant government corruption is not associated with slower economic growth at the country level. We focus on corruption associated with the provision of government goods and services. We first show that corruption occurs because the government cannot raise sufficient revenues to finance public projects, and the bribes received by officials can be regarded as user fees. We then argue that the structure of the provision of government goods and services partially determines the negative effects of corruption: When multiple officials undertake the same project, the user fee is determined competitively and the pernicious effects of corruption are minimized; when each official is a monopolist in the provision of the goods and services the damaging effects are much higher.

The main policy implication from our analysis is that setting up the provision of government goods and services in a competitive environment reduces the damaging effects of corruption and promotes growth. In large and diversified countries this can be achieved by encouraging inter-regional economic activities and lowering the entry barriers for firms and agents from different regions. In small and homogeneous countries this can be done by encouraging international trade and lowering the costs of relocation across countries. Economic agents can make the competition mechanism more effective by reducing their own transaction costs when moving from region to region. An implication for this result is that corruption has a smaller negative impact on small firms and firms that have smaller amount of fixed assets. Finally, the central government can also control corruption of this type by rewarding officials whose regions have shown the fastest economic growth and attracted the largest amount of economic activities from local and non-local sources. These policies encourage inter-regional competition among officials, and are more effective in promoting growth than policies aiming at eliminating corruption considered in our paper in emerging countries.

## References

1. Acemoglu, Daron, and Simon Johnson, 2005. "Unbundling Institutions," *Journal of Political Economy*, 113 (5), 949-995.
2. Ades, Alberto, and Rafael Di Tella, 1999. "Rents, Competition and Corruption," *American Economic Review* 89(4), 982-993.
3. \_\_\_\_\_, Jun Qian, and Meijun Qian, 2005. "Law, Finance, and Economic Growth in China," *Journal of Financial Economics* 77 (1), 57-116.
4. Allen, Franklin, Rajesh Chakrabarti, Sankar De, Jun Qian, and Meijun Qian, 2006. "Financing Firms in India," working paper, Wharton Financial Institutions Center.
5. Beck, Thorsten, Asli Demirgüç-Kunt and Ross Levine, 2005. "SMEs, Growth and Poverty: Cross-country Evidence," *Journal of Economic Growth* 10 (3), 199-229.
6. Becker, Gary and George Stigler, 1974. "Law Enforcement Malfeasance, and the Compensation of Enforcers," *Journal of Legal Studies* 3, 1-19.
7. Bertrand, Marianne, Simeon Djankov, Rema Hanna, and Sendhil Mullainathan, 2006. "Does Corruption Produce Unsafe Drivers? Working paper, MIT.
8. Bliss, Christopher, and Rafael Di Tella, 1997. "Does Competition Kill Corruption?" *Journal of Political Economy* 105(5), 1001-1023.
9. Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2002. "The Regulation of Entry," *Quarterly Journal of Economics*, 117 (1), 1-37.
10. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_, 2003. "Courts," *Quarterly Journal of Economics*, 118 (2), 453-517.
11. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_, 2005. "The Law and Economics of Self-Dealing," Working Paper, Harvard University.
12. Demirgüç-Kunt, Asli, and Ross Levine, 2002. *Financial Structure and Economic Growth: Cross-country Comparisons of Banks, Markets, and Development*, MIT Press, Cambridge, Massachusetts.
13. Fisman, Raymond, and Roberta Gatti, 2002a. "Decentralization and Corruption: Evidence from U.S. Federal Transfer Programs," *Public Choice* 113, 25-35.
14. \_\_\_\_\_, and \_\_\_\_\_, 2002b. "Decentralization and Corruption: Evidence across Countries," *Journal of Public Economics* 83, 325-345.
15. \_\_\_\_\_, and Jakob Svensson, 2007. "Are Corruption and Taxation really Harmful to Growth? Firm Level Evidence," *Journal of Development Economics* 83, 63-75.
16. \_\_\_\_\_, and Shang-jin Wei, 2004. "Tax Rates and Tax Evasion: Evidence from 'Missing Imports' in China," *Journal of Political Economy* 112, 471-496.

17. Friedman, Eric, Simon Johnson, Daniel Kaufmann and Pablo Zoido-Lobaton, 2000. "Dodging the Grabbing Hand: The Determinants of Unofficial Activity in 69 Countries," *Journal of Public Economics* 76, 459-493.
18. Huntington, Samuel, 1968. *Political Order in Changing Societies*. New Haven: Yale University Press.
19. La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1997. "Trust in Large Organizations," *American Economic Review (proceedings issue)*, 87 (2), 333-338.
20. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_, 1998, "Law and Finance," *Journal of Political Economy*, 106, 1113-55.
21. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_, 1999, "The Quality of Government," *Journal of Law, Economics, and Organization*, 15 (1), 222-279.
22. Leff, Nathaniel, 1964. "Economic Development through Bureaucratic Corruption," *American Behavioral Scientist* 82, 337-341.
23. Li, D., 1998. "Changing Incentives of the Chinese Bureaucracy," *American Economic Review* 88, 393-397.
24. Lui, Francis, 1985. "An Equilibrium Queuing Model of Bribery," *Journal of Political Economy* 93 (4), 760-781.
25. Mauro, Paolo, 1995. "Corruption and Growth," *Quarterly Journal of Economics* 110, 681-712.
26. Rajan, Raghuram, and Luigi Zingales, 2003a. "The Great Reversals: The Politics of Financial Development in the Twentieth Century," *Journal of Financial Economics* 69, 5-50.
27. \_\_\_\_\_, and \_\_\_\_\_, 2003b. *Saving Capitalism from Capitalists: Unleashing the Power of Financial Markets to Create Wealth and Spread Opportunity*, Random House, New York.
28. Rose-Ackerman, Susan, 2004. "Governance and Corruption," in *Global Crises, Global Solutions*, B. Lomborg, ed. Cambridge: Cambridge University Press, Chapter 6.
29. Schneider, F. and D. Enste, 2000, "Shadow Economies: Sizes, Causes and Consequences," *Journal of Economic Literature* 38 (1), 77-114.
30. \_\_\_\_\_, 2002. "Size and Measurement of the Informal Economy in 110 Countries around the World," World Bank.
31. Spagnolo, Giancarlo, 1999, "Social Relations and Cooperation in Organizations," *Journal of Economic Behavior and Organization* 38, 1-25.
32. Shleifer, Andrei, and Robert Vishny, 1993. "Corruption," *Quarterly Journal of Economics* 108, 599-617.
33. Svensson, Jacob, 2003. "Who Must Pay Bribes and How Much? Evidence from a Cross Section of Firms," *Quarterly Journal of Economics* 118, 207-230.
34. \_\_\_\_\_, 2005. "Eight Questions about Corruption," *Journal of Economic Perspectives* 19(3), 19-42.

**Table 1 Top 20 Economies in the World: GDP and Growth**

GDP in 2006 (simple exchange rates)		GDP in 2006 (PPP*)		GDP growth: 1990-2006 (constant prices)		Per capita GDP growth: 1990-2006** (const. prices)		
Rank	Country /Region	US\$ billion	Country /Region	Int'l \$ billion	Country /Region	Annual growth	Country /Region	Annual growth
1	U.S.	13,245	U.S.	13,021	<b>China</b>	<b>10.2%</b>	<b>China</b>	<b>9.2%</b>
2	Japan	4,367	<b>China</b>	<b>9,984</b>	Vietnam	7.6%	Vietnam	5.9%
3	Germany	2,897	Japan	4,171	Malaysia	6.2%	S. Korea	4.8%
4	<b>China</b>	<b>2,630</b>	<b>India</b>	<b>4,159</b>	<b>India</b>	<b>6.1%</b>	Taiwan	4.5%
5	U.K.	2,374	Germany	2,559	Korea	5.5%	<b>India</b>	<b>4.2%</b>
6	France	2,232	U.K.	2,122	Taiwan	5.3%	Malaysia	3.7%
7	Italy	1,853	France	1,935	Bangladesh	5.2%	Poland	3.7%
8	Canada	1,269	Italy	1,791	Sri Lanka	4.9%	Sri Lanka	3.7%
9	Spain	1,226	<b>Russia</b>	<b>1,727</b>	Sudan	4.9%	Thailand	3.7%
10	Brazil	1,068	Brazil	1,701	Thailand	4.7%	Bangladesh	3.1%
11	<b>Russia</b>	<b>979</b>	Spain	1,215	<b>Pakistan</b>	<b>4.4%</b>	<b>Indonesia</b>	<b>2.9%</b>
12	S. Korea	888	Mexico	1,172	<b>Iran</b>	<b>4.4%</b>	<b>Iran</b>	<b>2.8%</b>
13	<b>India</b>	<b>887</b>	Canada	1,156	Egypt	4.3%	Peru	2.7%
14	Mexico	840	S. Korea	1,156	<b>Indonesia</b>	<b>4.3%</b>	Sudan	2.7%
15	Australia	755	<b>Indonesia</b>	<b>960</b>	Peru	4.3%	<b>Argentina</b>	<b>2.6%</b>
16	Netherlands	663	Taiwan	691	Turkey	3.9%	Spain	2.2%
17	Belgium	394	Australia	680	<b>Argentina</b>	<b>3.8%</b>	Egypt	2.2%
18	Turkey	392	Turkey	661	Poland	3.7%	Turkey	2.2%
19	Sweden	385	<b>Argentina</b>	<b>621</b>	<b>Philippines</b>	<b>3.6%</b>	<b>Pakistan</b>	<b>2.1%</b>
20	Switzerland	377	S. Africa	606	Australia	3.3%	U.K.	2.1%

Notes: \* The PPP conversion factor is obtained from the *World Bank Development Indicator* (Table 5.6, World Bank. For details on how to calculate the indicator, see "Handbook of the International Program." United Nations, New York, 1992).

\*\* : Countries with population less than 20 million or GDP less than USD20billion are excluded from this ranking.

**Table 2 Transparency International – Bribe Payers’ Index (BPI) 2006**

This table shows the results of BPI 2006, published by the Transparency International. The BPI is based on the responses of 11,232 business executives from companies in 125 countries to questions about the propensity of foreign firms that do the most business in their country to pay bribes or to make undocumented extra payments. The answers are converted to a score between 0 (bribes most frequent) to 10 (bribes never occur), and the ranking of 30 of the leading exporting countries (combined global exports represented 82% of world total in 2005) listed below shows the average score of a country.

Rank	Country/ Region	No. of respondents	Ave. score (0-10)	Std. Dev.	Respondents in foreign- owned companies	Respondents in locally owned companies	Local respondents in small companies	Local respondents in medium companies	Local respondents in large companies
1	Switzerland	1,744	7.81	2.65	8.20	7.81	7.67	7.64	8.15
2	Sweden	1,451	7.62	2.66	7.99	7.64	7.63	7.69	7.65
3	Australia	1,447	7.59	2.62	7.73	7.61	7.40	7.42	8.11
4	Austria	1,560	7.50	2.60	7.76	7.48	7.37	7.49	7.62
5	Canada	1,870	7.46	2.70	8.03	7.42	7.14	7.46	7.89
6	U.K.	3,442	7.39	2.67	7.76	7.35	7.02	7.46	7.78
7	Germany	3,873	7.34	2.74	7.71	7.29	6.97	7.45	7.66
8	Netherlands	1,821	7.28	2.69	7.47	7.27	7.03	7.27	7.64
9	Belgium	1,329	7.22	2.70	7.66	7.13	6.76	7.16	7.72
10	U.S.	5,401	7.22	2.77	7.78	7.17	6.93	7.16	7.67
11	Japan	3,279	7.10	2.87	7.45	7.06	6.81	7.16	7.37
12	Singapore	1,297	6.78	3.04	6.79	6.82	6.36	6.89	7.38
13	Spain	2,111	6.63	2.73	6.87	6.60	6.37	6.64	6.92
14	UAE	1,928	6.62	3.09	6.85	6.60	6.21	6.76	7.08
15	France	3,085	6.50	3.00	6.72	6.49	6.11	6.61	7.00
16	Portugal	973	6.47	2.79	6.53	6.54	6.39	6.34	6.96
17	Mexico	1,765	6.45	3.17	6.72	6.32	6.01	6.28	6.77
18	Hong Kong	1,556	6.01	3.13	5.88	5.98	5.73	6.03	6.36
19	Israel	1,482	6.01	3.14	6.00	6.05	5.56	6.15	6.68
20	Italy	2,525	5.94	2.99	5.88	5.98	5.78	5.98	6.40
21	South Korea	1,930	5.83	2.93	5.98	5.84	5.53	6.02	6.14
22	Saudi Arabia	1,302	5.75	3.17	5.43	5.81	5.61	6.04	5.93
23	Brazil	1,317	5.65	3.02	5.60	5.62	5.59	5.60	5.73
24	South Africa	1,488	5.61	3.11	5.71	5.61	5.25	5.96	6.07
25	Malaysia	1,319	5.59	3.07	5.20	5.69	5.50	5.79	5.92
26	Taiwan	1,731	5.41	3.08	5.55	5.42	5.28	5.52	5.56
27	Turkey	1,755	5.23	3.14	5.36	5.20	5.24	5.08	5.23
28	Russia	2,203	5.16	3.34	5.20	5.10	4.96	5.14	5.41
29	China	3,448	4.94	3.29	4.51	5.03	4.94	5.12	5.09
30	India	2,145	4.62	3.28	4.55	4.60	4.31	4.83	4.97
Total No. of respondents			11,232		2,097	7,948	3,782	2,132	2,034

Notes: \*'Foreign owned' company is a company with at least 50 percent ownership by the foreign private sector, 'local owned' company is a company with at least 50 percent ownership by the local private sector or the government.  
 \*\*'Small' companies are companies with 100 employees or less; 'medium' companies are those with 101 to 500 employees; 'large' companies have more than 500 employees.

**Table 3-A Corruption, Taxing Ability and Economic Growth**

The Corruption Perception Index for a country is the average value (0 to 10; lower score means more corrupt) of Transparency International from 1995 to 2005. GDP data, starting from 1980 to 2005, are all based on PPP (purchasing power parity) and from IMF World Economic Outlook Database. Tax/GDP variable, starting from 1990 to 2000, is the percentage of tax revenue over GDP and from United Nations Online Network in Public Administration and Finance.

	<b>Statistics</b>	<b>Corruption Perception Index</b>	<b>Tax/GDP</b>	<b>GDP Growth Rate per year (1981-2005)</b>	<b>Per Capita GDP (1981)</b>	<b>GDP per capita (2005)</b>
Least Corrupt Countries	Mean	7.31	21%	6.40%	9,708	14,602
	Stdev.		8%	1.53%	4,764	6,363
Moderately Corrupt Countries	Mean	3.95	17%	6.22%	3,560	8,706
	Stdev.		9%	1.39%	2,618	5,650
Most Corrupt Countries	Mean	2.46	14%	6.14%	1,648	3,636
	Stdev.		11%	2.13%	1,411	2,974

**Table 3-B Corruption, Taxing Ability, and Economic Growth: An International Comparison**

The Corruption Perception Index for a country is the average value (0 to 10; lower score means more corrupt) of Transparency International from 1995 to 2005. GDP data, starting from 1980 to 2005, are all based on PPP (purchasing power parity) and from IMF World Economic Outlook Database. Tax/GDP variable, starting from 1990 to 2000, is the percentage of tax revenue over GDP and from United Nations Online Network in Public Administration and Finance.

Country	Corruption Perception Index	Taxes/GDP	GDP Growth Rate (1981-05)	Stdev. of GDP Growth	Per Capita GDP at 1981	Per Capita GDP at 2005	GDP at 1981 (PPP billion)	GDP at 2005 (PPP billion)
<i>Panel A Most Corrupt Countries</i>								
Nigeria	1.40	18%	6%	5%	579	1,188	42	174
Chad	1.70	5%	9%	7%	381	1,519	2	14
Paraguay	1.88	9%	6%	4%	2,771	4,888	9	28
Indonesia	1.96	15%	8%	5%	1,159	4,459	175	977
Ivory Coast	2.00	21%	7%	3%	1,162	1,510	10	27
Kenya	2.03	19%	6%	3%	716	1,445	12	48
Pakistan	2.14	13%	8%	3%	796	2,653	68	405
Burundi	2.30	15%	4%	11%	517	739	2	6
Cambodia	2.30	9%	5%	6%	n/a	2,399	n/a	35
Congo	2.30	10%	7%	6%	600	1,369	1	5
Sierra Leone	2.30	9%	10%	4%	851	903	3	5
Papua New Guinea	2.33	21%	6%	6%	1,302	2,418	4	14
Ecuador	2.47	23%	6%	4%	2,004	4,316	17	57
Bolivia	2.48	13%	5%	3%	1,492	2,724	8	26
Russia	2.49	11%	4%	7%	n/a	11,041	n/a	1,576
Venezuela	2.54	14%	5%	6%	3,748	6,186	58	164
Madagascar	2.55	8%	5%	4%	608	908	5	16
Moldova	2.58	16%	1%	11%	n/a	2,527	n/a	9
Nepal	2.65	8%	8%	4%	502	1,675	8	39
Algeria	2.70	29%	6%	3%	3,411	7,189	66	238
Guatemala	2.70	8%	6%	2%	2,305	4,155	16	57
Nicaragua	2.71	36%	5%	4%	2,908	3,636	8	21
Ethiopia	2.74	10%	6%	6%	402	823	16	60
India	2.79	10%	9%	2%	741	3,320	502	3,633
Philippines	2.87	16%	6%	4%	2,362	4,923	117	415
Zambia	2.91	18%	5%	5%	758	931	4	11
Iran	2.93	6%	7%	7%	2,854	7,980	117	555
Romania	3.00	20%	4%	6%	3,776	8,785	84	191
Dominican Republic	3.07	13%	7%	4%	2,516	7,627	14	65
China	3.12	4%	13%	3%	512	7,198	512	9,412
Argentina	3.19	6%	5%	6%	6,406	14,109	182	534

Country	Corruption Perception Index	Taxes/GDP	GDP Growth Rate (1981-05)	Stdev. of GDP Growth	Per Capita GDP at 1981	Per Capita GDP at 2005	GDP at 1981 (billion)	GDP at 2005 (billion)
<i>Panel B Least Corrupt Countries</i>								
Japan	6.74	13%	5%	3%	10,086	30,615	1,186	3,911
France	6.82	20%	5%	2%	10,771	29,187	597	1,830
Israel	7.05	30%	7%	3%	8,618	23,474	33	158
Chile	7.19	19%	8%	5%	3,142	11,937	36	193
United States	7.61	11%	6%	2%	13,416	41,399	3,085	12,278
Ireland	7.70	28%	8%	3%	7,831	40,610	27	168
Austria	7.81	21%	5%	2%	11,242	33,432	85	275
Germany	7.91	13%	5%	2%	10,926	30,579	841	2,522
United Kingdom	8.55	27%	5%	2%	9,101	30,436	513	1,833
Australia	8.68	21%	6%	2%	10,043	30,897	150	630
Luxembourg	8.68	27%	8%	3%	14,362	69,800	5	32
Switzerland	8.77	9%	4%	2%	13,996	32,571	89	237
Norway	8.82	28%	6%	2%	12,519	42,364	51	195
Netherlands	8.85	25%	5%	2%	10,767	30,862	153	503
Canada	8.91	19%	6%	2%	12,223	34,273	303	1,105
Singapore	9.15	17%	10%	5%	5,717	28,368	14	123
Sweden	9.23	28%	5%	2%	10,181	29,926	85	271
Iceland	9.36	23%	6%	3%	12,557	35,115	3	11
New Zealand	9.46	33%	6%	3%	8,826	24,797	28	102
Finland	9.62	22%	5%	3%	10,059	31,208	48	163
Denmark	9.63	31%	5%	2%	11,746	34,740	60	188

**Table 4 Industry Compositions among Most Corrupted Countries**

Source of data in the table is World Development Indicators 1990-2004 (World Bank). The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC) revision 3. 'Agriculture' corresponds to ISIC divisions 1-5 and includes forestry and fishing; 'Industry' covers mining, manufacturing (also reported separately), construction, electricity, water, and gas (ISIC divisions 10-45); and 'Services' correspond to ISIC divisions 50-99; this sector is derived as a residual (from GDP less agriculture and industry) and may not properly reflect the sum of services output, including banking and financial services. Manufacturing corresponds to industries belonging to ISIC divisions 15-37.

Country	Agriculture (% of GDP)		Services (% of GDP)		Industry (% of GDP)		Food, beverages & tobacco		Textiles & clothing		Machinery & transport equipment		Chemicals (% of manufacturing)		Other (% of manufacturing)	
	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004
<i>Panel A Most Corrupt Countries</i>																
Algeria	11	10	41	34	48	57	13	-	17	-	-	-	-	-	70	-
Argentina	8	10	56	54	36	36	20	-	10	-	13	-	12	-	46	-
Brazil	8	10	53	50	39	40	14	-	12	-	27	-	-	-	48	-
China	27	13	31	41	42	46	15	15	15	12	24	32	13	12	34	28
Congo	13	6	47	37	41	57	58	-	4	-	3	-	-	-	35	-
Egypt	19	15	52	48	29	37	19	-	16	-	9	-	14	-	43	-
Ethiopia	49	47	38	44	13	10	-	-	13	-	2	-	2	-	83	-
Ghana	45	38	38	37	17	25	-	38	-	11	-	4	-	8	-	39
India	31	21	41	52	28	27	12	2	15	27	26	17	14	5	34	49
Indonesia	19	15	42	41	39	44	28	23	15	17	12	22	9	10	37	28
Kenya	30	27	51	56	19	17	39	37	10	19	10	7	9	10	33	28
Nigeria	33	17	26	27	41	57	15	-	46	-	13	-	4	-	22	-
Russia	17	5	35	60	48	35	15	19	7	2	24	24	8	5	46	50
Venezuela	6	5	34	44	61	52	17	28	5	5	5	4	9	-	64	64
<i>Panel B Selected Least Corrupt Countries</i>																
Germany	2	1	61	70	38	29	-	8	-	2	-	41	-	10	-	38
Japan	3	1	58	68	39	31	9	10	5	0	40	9	10	11	37	70
U.S.	2	1	70	77	28	22	12	12	5	8	31	30	12	10	40	39

Figure 1. Comparing Perfect Bertrand Competition and Monopoly

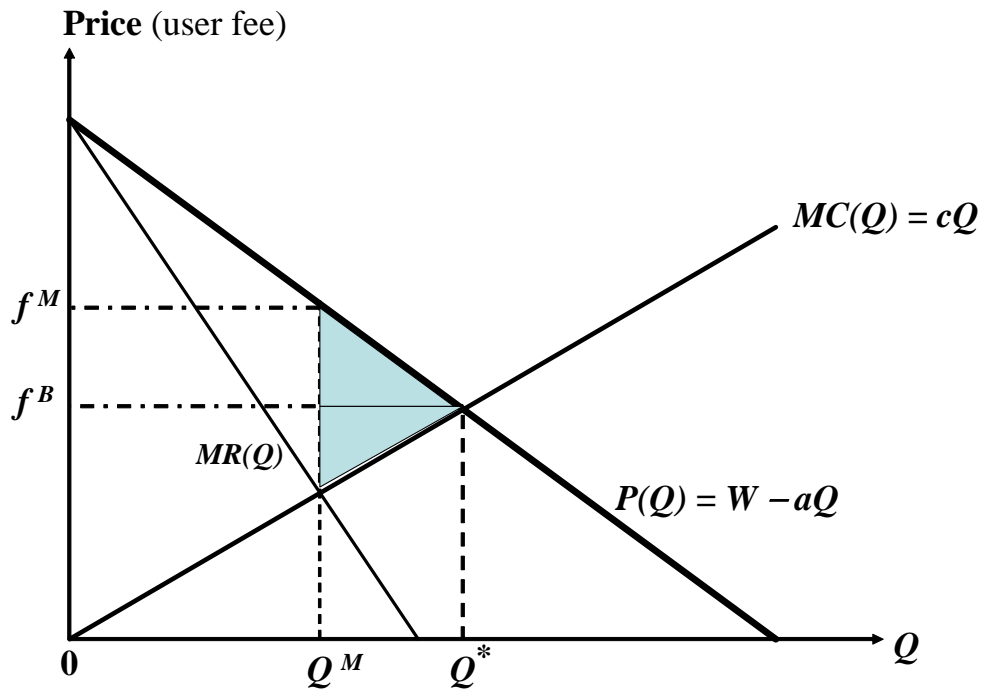


Figure 2. Imperfect Bertrand Competition with Transaction Costs

