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Decentralization, Corruption, and the Unofficial Economy

by

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ABSTRACT

We analyze the implications of decentralization for the incentives of local governments to provide productivity enhancing local public goods and extort bribes from local entrepreneurs. We show that an increase in the share of locally raised tax revenue left with the local government raises its incentives to provide public goods and brings more entrepreneurs into the official economy. Corruption, measured by the size of bribes that local officials charge entrepreneurs for issuing licenses for operating officially, may increase or decrease, depending on the extent to which public goods enhance the entrepreneur's productivity. The tests using cross-sectional country-level data support the model's implications.

Keywords: decentralization, local public goods, corruption, unofficial economy

JEL Codes: H77, D73, O17

Decentralization, Corruption, and the Unofficial Economy

1. Introduction

This paper analyzes the implications of decentralization for the incentives of local governments to provide productivity enhancing local public goods and extort bribes from local entrepreneurs. We show that an increase in the share of locally raised tax revenue left with the local government raises its incentives to provide productivity-enhancing public goods and brings more entrepreneurs into the official economy. Corruption, measured by the size of the bribe that local officials charge entrepreneurs for issuing licenses for operating officially, may increase or decrease, depending on the extent to which public goods enhance productivity of the entrepreneurs. The implications of the model are tested using cross-sectional country-level data.

The literature on decentralization and corruption has grown significantly in the last few years.¹ Given that both decentralization and corruption are complex phenomena, it is not surprising that different models arrive at opposite conclusions with respect to this relationship. The analysis that focuses on the role of interjurisdictional competition among the localities suggests that decentralization typically reduces corruption.² The models that emphasize greater accountability of the politicians to the voters under decentralization also imply that decentralization results in lower corruption.³ However,

¹ For a concise survey see Fishman and Gatti (2002).

² See Brennan and Buchanan (1980). Shleifer and Vishny (1993) also highlight the potential role of competition in lowering corruption. However, they also point out that decentralization may exacerbate corruption although this is more likely to occur due to decentralization of bureaucratic powers within a locality rather than among different localities.

³ Persson and Tabellini (2000).

corruption can be increased if decentralization results in lower “quality” of the bureaucrats being involved in the important government decisions.⁴

We contribute to this literature mainly in two ways. First, while the rest of the literature on decentralization and corruption simply assumes that local corruption harms the economy, we explicitly model the distortions caused by bribes charged by local officials.⁵ In certain respects, our model is close to that by Choi and Thum (2005) who examine the effect of the presence of the shadow economy option on the amount of corruption, but they do not consider any taxes and do not focus on decentralization.

Second, we model the difference between bribes and taxes with respect to their effect on the economy. Taxes imposed by the central government and shared with localities depend on the entrepreneur productivity, while bribes charged by local officials are lump-sum.⁶ We argue that to a large extent the difference between taxation and bribes stems from the more limited administrative and technical resources of bribe-takers. Due to limited administrative capabilities of corrupt local officials, bribes are imposed in a relatively unsophisticated manner. In particular, bribe-takers cannot make bribe amounts strongly contingent on the individual characteristics of the entrepreneurs such as their productivity. We assume that bribes serve as a lump-sum entrance fee for operating

⁴ Tanzi (1996). To a large extent the impact of decentralization on corruption and on other aspects of governance depends on what is being decentralized. For example, decentralization of expenditure powers may not provide any advantages unless it is accompanied by decentralization of revenue generation. The incentives of local bureaucrats are undermined if, on the margin, the official local budget revenues are determined largely by the upper level of government rather than the local tax collections. See Zhuravskaya (2000), Blanchard and Shleifer (2001), Jin, et al. (2005), Alexeev and Kurlyandskaya (2003), and Litwack (2002).

⁵ Brueckner (2000) considers decentralization in the presence of corruption, heterogeneous consumers, and tax evasion, but his focus is on the implications of these factors for the Tiebout model rather than the impact of the degree of decentralization on corruption, unofficial economy size, and provision of local public goods in a given locality. Moreover, in Brueckner’s model the amount of corruption, its welfare costs, and tax evasion are exogenous.

⁶ The issue of the difference between taxation and bribes is addressed was Shleifer and Vishny (1993) who argued that much of this difference is due to secrecy that accompanies bribes.

in the official sector. Taxation, on the other hand, is proportional to the taxpayer's productivity.⁷ We will discuss this assumption in greater detail in the next section.

More specifically, in our model, the entrepreneurs operating in the official sector are taxed by the central government and also may have to pay bribes to the local government. Given this tax and bribe burden, the entrepreneurs have incentives to shift their activities underground. In order to induce them to stay in the official sector, the local government provides the officially operating entrepreneurs with a public good that cannot be fully accessed by the underground entrepreneurs.⁸ Lump-sum bribes are distortive because they push some entrepreneurs underground, limiting their ability to use the public good while also reducing the resources available for the provision of public goods. Taxes, on the other hand, are contingent on the entrepreneur's profit, and if set in a reasonable way, can keep all entrepreneurs above ground. The resources for the provision of public goods by the local government come from its share of the central government's tax revenue but may also come in part from bribes. This treatment is consistent with much of the recent literature.⁹ We assume that the local government maximizes its total revenue net of the expenditures on public goods, thus not

⁷ This view of the difference between bribes and taxation presumes that the central government's tax agency does not share the information on the entrepreneurs' productivities with the local officials. This assumption is natural given the competition for revenue between different levels of government and the corrupt nature of the local government. Moreover, this assumption is consistent with the arrangements in most market economies.

⁸ That is, the public goods we have in mind are not pure but are partly exclusionary. For example, contract enforcement by the government for contracts in the unofficial economy is absent or limited.

⁹ The assumption that bribe revenue can be used along with taxes for public goods provision as long as these public goods enhance local government revenue follows Acemoglu and Verdier (2000), Choi and Thum (2005), and Treisman (2006). This assumption does not, of course, imply that bribe revenue is indeed used to provide public goods. It would be perfectly consistent with our model if the entire bribe revenue and perhaps even part of the tax revenue is consumed by corrupt officials or is stashed away in numbered bank accounts.

distinguishing between sources of revenue.¹⁰ The main tradeoff faced by the local officials is between the desire to collect bribe revenue and the fact that bribes reduce the size of the tax base, shrinking the tax revenue, a share of which accrues to the local government.

The role of the central government in our model is passive. Both the tax rate and tax revenue share transferred to local government are treated as exogenous.¹¹ The behavior of the central government is assumed to be influenced by a number of different groups in the economy, including the local governments and the entrepreneurs who impose potentially complicated constraints on the behavior of the central government. Therefore, instead of modeling these constraints, we examine the comparative statics of the local government behavior with respect to the parameters set by the central government.¹²

We obtain the following results. First, we demonstrate that corrupt governments produce less public good than is socially optimal. This result is consistent with the empirical findings of Djankov, *et al.* (2002) showing that a high degree of corruption is associated with lower provision of public goods, although Djankov, *et al.* do not model the mechanism of underprovision of public goods in the presence of corruption. This result is also similar to Choi and Thum (2005).

¹⁰ This assumption implies that the central government chooses not to monitor the behavior of local authorities, possibly due to lack of resources or the lack of well-developed institutions of accountability.

¹¹ While we recognize the validity of Treisman's (2004) argument that the inclusion of central government's behavior can significantly affect the outcomes of decentralization, we think that the activities of the central and local governments affect different economic actors. For example, the environment in which small businesses operate may not be significantly influenced by the extent of central government corruption. Treisman himself recognizes that his neutrality result may not hold when the roles of local and central governments become sufficiently asymmetric. Also, his result holds only when taxes and bribes are treated symmetrically. Such treatment may not be justified, however, and we treat these two revenue-raising mechanisms differently.

Second, our model demonstrates that an increase in the share of locally collected tax revenue returned to the local government always increases the provision of public goods. However, contrary to the common assumption, greater decentralization may or may not reduce local government corruption measured by the size of bribes imposed on entrepreneurs. The crucial parameter that determines the comparative statics of corruption and public good provision is the elasticity of private payoff with respect to the provision of local public good. This elasticity is difficult to measure, but the modern empirical literature suggests that it is quite small. If this is indeed the case, then our model implies that as the share of local government in the official tax revenues increases, the degree of corruption, as measured by the size of bribes imposed on the entrepreneurs, declines, and the provision of public goods increases. Therefore, local governments that receive a larger proportion of the local tax revenues will tend to be less corrupt and provide more public goods.

Third, we show that even though the effect of greater decentralization on corruption is ambiguous, it always increases the size of the official economy relative to the unofficial one.

Finally, we test the predictions of our model with respect to the relationship between the degree of decentralization and corruption, the size of unofficial economy, and the provision of productivity-enhancing public goods. Such testing is hampered by poor data availability and potentially significant endogeneities that are difficult to eliminate. Keeping in mind these limitations, the findings based on commonly used cross-country data generally confirm our hypotheses.

¹² The extension of the present model to optimizing central government leads to similar results. However, the range of parameters for which the obtained results hold is more restrictive. For the extended model see

The paper is organized as follows. The next section presents the model and derives the comparative statics with respect to the local government's share of tax revenue. Section 3 presents the empirical tests. Section 4 concludes.

2. The Model

Consider an economy with two levels of government: central and local. The central government imposes a tax on entrepreneurs operating in a jurisdiction of a local government and transfers a proportion γ of tax revenue to the local government. Because the focus of the analysis is primarily on the behavior of the local government and because the central government is a highly complex organization representing a broad cross-section of interests, the tax rate and the size of transfers determined by the central government are treated as exogenous. The local government is responsible for the provision of local public goods. It produces public goods according to a twice continuously differentiable production function $f(g)$, $f' > 0$, $f'' < 0$, $f'(0) = \infty$, $f'(\infty) = 0$ where g is the expenditures on inputs. The price of inputs is treated as exogenous and normalized to 1. The local government is assumed to be able to purchase as much g as it desires at a constant price.

The number of entrepreneurs in the economy is normalized to 1. Entrepreneurs can choose to operate in the official or unofficial economy. In the absence of corruption, the payoff to an entrepreneur in the official sector is:

$$U_i^{of} = (1-t)y_i f(g) \quad (1)$$

where y_i represents an individual entrepreneur's exogenous ability.¹³ This ability is assumed to be uniformly distributed on $[0,1]$. Alternatively, entrepreneurs can choose to operate in the underground economy. The payoff generated in the unofficial sector is specified as:

$$U_i^u = ky_i f(g), \quad (2)$$

where $k \in [0,1]$. That is, the gross of tax payoff of entrepreneurs in the unofficial sector is assumed to be smaller than in the official economy. One reason for k to be less than 1 is the limited ability of the underground entrepreneurs to use the government-provided public good. Also, underground entrepreneurs operate in secrecy and may have to use suboptimal technologies in production and delivery of their product.¹⁴ Finally, the lower payoff to underground entrepreneurs may reflect the probability of discovery and penalty.

Given the payoffs in the absence of corruption, all entrepreneurs will choose to operate in the official sector as long as $(1-t) > k$. This inequality is assumed to hold throughout the rest of the analysis, because otherwise, both the output and the government revenue are zero. The proportion of entrepreneurs who enter the official sector is denoted by N . In the case without corruption $N = 1$.

The local government is assumed to maximize its revenue net of the costs of public good provision. In addition to the γ share of the tax revenue collected from the entrepreneurs within its jurisdiction, the local officials extort informal lump-sum bribe $B \geq 0$ from each

¹³ We do not assume the absence of tax evasion among entrepreneurs who operate officially. Instead, we assume that whatever evasion takes place, its final outcome is an effective tax rate of t on the entrepreneur's profit. We could also replace profit taxation with a tax on sales. The important assumption here is that the tax amount depends on the entrepreneur's ability.

¹⁴ The first justification for $k < 1$ is used by Grossman (1995). The second justification is present in Choi and Thum (2005) and Berkowitz and Li (2000).

entrepreneur. The precise mechanism of corruption is not crucial, as long as the local government acts as a monopolist in charging the bribes and providing local public goods. In the presence of corruption, the payoff of an entrepreneur in the official sector becomes:¹⁵

$$U_i^{of} = (1-t)y_i f(g) - B \quad (3)$$

Notice that this specification assumes that the local officials are unable to “bribe-discriminate” among entrepreneurs. This is a reasonable assumption when an individual’s productivity is private knowledge. At the same time, in the above specification, tax payment depends on income level suggesting that the central government does have information about the entrepreneur’s productivity. As explained earlier, this informational asymmetry between the central and local government arises because of the greater administrative resources of the tax authorities compared to bribe takers. It is also assumed that central tax authorities do not share the individuals’ tax and income information with local government officials. Even though the interaction between the central and local government is not explicitly modeled, it is plausible to expect that the central government will not share tax information, particularly if tax information is considered confidential or if local governments are known to be corrupt.

The lump-sum nature of the bribe is often used in the literature (e.g., Li, 1996; Choi and Thum, 2005), although Svensson (2002) found that bribes in Uganda were positively related to firm’s profits. Note, however, that in order for us to obtain our

¹⁵ One can argue that local governments may have to compete for entrepreneurs. If the entrepreneurs are mobile, the competition would lower the value of B . This situation would correspond to the competitive corruption outcome in Shleifer and Vishny (1993). The current analysis is limited to the situation when the

results, we need only that the bribe includes a substantial component that is independent of the firm's profit and that serves as a binding entry fee into the official sector.

Svensson's benchmark regression does include such a component. Moreover, the adjusted R^2 in Svensson's benchmark regression was less than 0.2, suggesting that profit explained a relatively small proportion of bribe variation.¹⁶

Entrepreneurs operate in the official sector if the payoff there is larger than the payoff in the unofficial sector, i.e., $U_i^{of} \geq U_i^{un}$, or:

$$(1-t)y_i f(g) - B \geq ky_i f(g) \quad (4)$$

The threshold level of profit that generates higher payoff in the official economy than in the unofficial sector satisfies the following condition:

$$y_i \geq \frac{B}{\delta f(g)} \quad (5)$$

where $\delta = 1 - t - k > 0$. The value of δ represents the surplus or advantage from operating in the official sector compared to the unofficial sector in the absence of

entrepreneurs' ability to move to a different locality is restricted. In fact, the differences in the degree of mobility of entrepreneurs can explain why corruption arises in some regions and not in others.

¹⁶ Svensson's results are consistent with our assumption of limited information that the corrupt officials have with respect to the firm's profitability. For example, let the official in our model know only whether the entrepreneur's ability is in the $[0, c]$ interval or in the $[d, 1]$ interval, where $c < 1$ and $d > 0$. Then while the bribe would differ between the groups of entrepreneurs, it would be independent of the specific y_i and at least for the entrepreneurs with $y_i \in [0, c]$ the bribe would preclude some of them from operating in the official economy. Because the bribe depends on the group to which an entrepreneur belongs, a regression of bribe amounts on profitability may generate a statistically significant coefficient albeit with a relatively low R^2 . Nonetheless, our results would remain qualitatively the same, but they would have to be restated for $y_i \in [0, c]$ instead of $y_i \in [0, 1]$.

bribes.¹⁷ Given the distribution of y , the size of the official sector, measured as a proportion of entrepreneurs operating within it, is:

$$N = \frac{\int_{\frac{B}{\delta f(g)}}^1 dy_i = 1 - \frac{B}{\delta f(g)} \quad (6)$$

Naturally, all else equal, the percentage of entrepreneurs in the official sector is negatively related to the size of the bribe they have to pay and positively related to the provision of public goods.

Given our assumption of revenue-maximizing local government, its problem is:

$$\underset{g, B}{\text{Max}} L = \gamma \int_{\frac{B}{\delta f(g)}}^1 y_i f(g) dy_i + BN - g, \quad (7)$$

where N is defined in (6). The first term in (7) represents the proportion of tax revenue left with the local government, the second term is revenue from bribe collection and the third term reflects the cost of inputs used for the provision of the public good. In other words, we assume that from the point of view of corrupt local officials, bribe revenue is equivalent to tax revenue. While this is not an unusual assumption (see Treisman, 2006), one might argue that it is somewhat extreme as bribe revenue is probably easier to divert

¹⁷ One might argue that if our model included the central government in a meaningful way, it would be interested in eliminating corruption at the local government level by setting $\delta = 0$ or $k = (1 - t)$. However, the center may not find elimination of corruption desirable. First, if k is small, the tax rate would have to be excessively high and hence politically infeasible in most countries. Second, the entrepreneurs' as a group may obtain a larger payoff at lower t , even if they have to pay bribes. A central government that is influenced by entrepreneurs and that cannot costlessly redistribute income may not want to set tax rates sufficiently high to eliminate corruption. Third, the central government may be subject to pressures from local governments not to raise taxes, particularly if γ is relatively low. Fourth, high tax rates may be too costly to enforce. Recall that in our model, t represents the effective tax rate that incorporates possible tax evasion and tax avoidance.

to the official's personal consumption than tax revenue. Note, however, that in order to account for this difference, we would simply need to lower the weight on the first term in L . Technically, this adjustment is equivalent simply to lowering γ and, therefore, it does not affect our comparative statics results.

While in our model the central government is passive, its actions can potentially be important for the behavior of the local officials. A crucial parameter that is determined largely by the central government is the extent of revenue-sharing or fiscal decentralization that we parameterize by γ . As we discussed in the introduction, the impact of fiscal decentralization on the local government has been a subject of lively debate in the recent literature, although most of it concentrates on the link between decentralization and corruption. The following proposition confirms that even in our simple model decentralization may affect the degree of local corruption either positively or negatively, and adds implications of fiscal decentralization for the amount of local public goods and for the size of unofficial economy.

Proposition 1: The solution to problem (7) exists and is unique. Comparative statics for problem (7) with respect to the degree of revenue sharing, γ , are as follows:

$$(i) \frac{\partial g^*}{\partial \gamma} > 0.$$

(ii) Denote elasticity of $f(g^*)$ with respect to g by ε . Then, $\frac{\partial B^*}{\partial \gamma} < 0$ if ε is sufficiently low and $\frac{\partial B^*}{\partial \gamma} > 0$ otherwise.

$$(iii) \text{ In addition, } \frac{\partial N^*}{\partial \gamma} > 0.$$

Proof. Given the properties of $f(g)$, the existence and uniqueness of the solution to (7) is established in a straightforward manner by showing that the first order conditions for (7) yield a unique solution and that the second-order conditions are satisfied. The first order conditions are:

$$\frac{\partial L}{\partial B} = \frac{\gamma B + 2\delta B - f\delta^2}{f\delta^2} = 0 \quad (8)$$

$$\frac{\partial L}{\partial g} = \frac{f'(\gamma\delta f^2 + (\gamma + 2\delta)B^2) + 2\delta^2 f^2}{2\delta^2 f^2} = 0, \quad (9)$$

where f denotes $f(g)$. The second order conditions are straightforward but cumbersome and are not presented here. From (8) and (9)

$$B = \frac{f\delta^2}{\gamma + 2\delta} \text{ and } f' = \frac{2(\gamma + 2\delta)}{(\gamma + \delta)^2}. \quad (10)$$

In order to demonstrate (i), we implicitly differentiate f' in (10) with respect to γ and simplify using again the expression for f' from (10) to obtain:

$$\frac{\partial g^*}{\partial \gamma} = -\frac{2t(\gamma + 3\delta)}{f''(\gamma + \delta)^3} > 0$$

Similarly, we can establish that

$$\frac{\partial B^*}{\partial \gamma} = \frac{\delta^2}{(\gamma + 2\delta)^2} \left(f' \frac{\partial g}{\partial \gamma} (\gamma + 2\delta) - f \right)$$

The sign of the above expression depends on the elasticity of $f(g)$ with respect to g ,

$\varepsilon = g f' / f$, is greater or smaller than

$$\frac{g t}{(\gamma + 2\delta) \frac{\partial g}{\partial \gamma}} = -\frac{f'' g (\gamma + \delta)^3}{2(\gamma + 2\delta)^2} > 0$$

For example, if $f(g)=g^\beta$, $\beta>0$, then $\frac{\partial B^*}{\partial \gamma} < 0$ if and only if $\varepsilon = \beta < \frac{\gamma + \delta}{2(\gamma + 2\delta)}$ and

$\frac{\partial B^*}{\partial \gamma} > 0$ otherwise. Finally, the sign of $\frac{\partial N^*}{\partial \gamma}$ is easily established by implicit

differentiation of (6) using the expressions for $\frac{\partial g^*}{\partial \gamma}$ and $\frac{\partial B^*}{\partial \gamma}$ derived above. Q.E.D.

All of these results are consistent with intuition. Consider first the positive effect of γ on g^* . Other things being equal, higher γ implies that the marginal revenue of the local government from providing public good becomes greater and, therefore, the local government procures more inputs for public good provision. Larger public good provision increases income of entrepreneurs in both official and unofficial sectors. In addition, some entrepreneurs in the unofficial economy will find it beneficial to shift to the official economy, because restricted access to public goods in the unofficial economy becomes more punitive with the increasing size of the public good provision. The resulting increased tax base magnifies the benefits from the increase in the share of tax revenue received by local government.

Along with the adjustment of the public good provision as a result of a change in γ , the government adjusts the optimal size of the bribe, B^* . The local government's cost of bribery in this model is the flight of entrepreneurs to the unofficial economy.

Therefore, since the local government's interest in local official output increases with its share of tax revenue, local officials have an incentive to reduce the size of the bribe and bring more entrepreneurs into the official sector. However, increased provision of public goods increases also income of entrepreneurs in the official sector and thus increases the opportunities for extortion from them. Which effect dominates depends on the elasticity

of entrepreneur's payoff with respect to public goods, $\varepsilon = g'f'/f$. When ε is low, an increase in the public good provision produces a relatively small increase in entrepreneurs' incomes that may be insufficient to induce entrepreneurs working in the official sector to tolerate higher bribes. As a result, the government's incentive to lower the bribe in order to enhance the attractiveness of the official sector dominates.

When ε is large and γ increases, the size of the bribe increases. This is because an increase in income of entrepreneurs from the higher provision of public good is sufficiently large so that local government officials can increase the bribe without sending entrepreneurs to the unofficial economy. Entrepreneurs facing an increase in the bribe that would otherwise drive them to the underground economy are sufficiently compensated by the increase in their level of income from the public good provision to stay in the official economy.

Independent of the impact of γ on the size of the bribe, a larger γ unambiguously increases the size of the official sector. This is a particularly interesting result in that it allows for a possible simultaneous increase in corruption measured by the size of the bribe and an increase in public good provision and the reduction in the relative size of unofficial economy. Given that the effect of γ on the size of the bribe, B , depends on the value of ε , it is worthwhile to examine comparative statics of the threshold value of ε in the framework of a particularly simple example where $f(g) = g^\beta$. In this case, $\varepsilon = \beta$ and the threshold value is given by $\beta_0 \equiv \frac{\chi + \delta}{2(\chi + 2\delta)}$. That is, the equilibrium bribe B^* increases in γ if $\beta > \beta_0$, and B^* decreases in γ otherwise. It is readily seen that this threshold increases in t , γ and k . An increase in either the tax rate or the share of taxes left with the local

government strengthen local government's interest in developing the local tax base. Therefore, a larger value of β is required for the incentives to charge higher bribes to dominate over the incentives to promote the local tax base. Similarly, a larger value of k implies a lower cost for entrepreneurs to operate in the unofficial sector, making it more difficult for the local government to lure entrepreneurs above ground. When the value of k is relatively high, a high value of β is necessary to make it possible for the local government to attract entrepreneurs above ground and increase the bribe at the same time.

Welfare of all active agents in this model increases in γ . Indeed, suppose γ increases from some initial level of γ_0 to $\gamma_0 + \Delta$. Local government can assure a greater than the initial level of welfare for itself by changing neither its bribe size nor the provision of public goods. Therefore, it should be able to achieve at least the same level of welfare by adjusting its bribe and public good provision optimally. A similar revealed preference argument combined with the fact that an increase in γ leads to an increased provision of public goods demonstrates that those agents who were in the underground economy when $\gamma = \gamma_0$ would also benefit from higher γ . Welfare gain for the entrepreneurs operating in the official economy can be derived by a rather straightforward but somewhat tedious analysis of the derivative of their payoff, $(1-t)yf(g) - B$, with respect to γ , utilizing (10) and keeping in mind that for those entrepreneurs (5) holds. These results are not particularly interesting, however, because they do not reflect the effect of changing γ on central government and the public good that it provides. (Recall that central government is passive in our model.) Depending on the central government's costs of providing public goods and their impact on welfare of other agents, welfare outcomes can be different. Note, however, that for some values of

parameters, central government revenue increases in γ even though its share of tax revenue declines. This can occur because greater γ increases N and g that lead to higher total tax revenue. Depending on the elasticity of total tax revenue with respect to γ , an increase in γ can lead to either an increase or a decrease in central government's tax revenue.

3. A test of the model's implications

The analysis of the previous section provides two predictions that are independent of the value of elasticity, ε , of public good impact on the entrepreneurs payoff. Both the provision of productivity-enhancing local public goods and the size of the official sector of the local economy increase in the share of taxes left at the disposal of local government.¹⁸

In addition, depending on the value of ε , corruption as measured by the bribe size may either increase or decrease in γ . The value of ε is mainly an empirical issue. In a summary of previous empirical studies Nadiri and Mamuneas (1994) report that elasticity of output with respect to expenditure on public goods falls in the range between 0 and 0.4. Similarly, Lynde and Richmond (1993) find that the estimated average value of elasticity of output with respect to public capital input is 0.2. The studies concentrate on the estimation of the importance of infrastructure for the productivity of the private

¹⁸ We stress that our model examines the provision of local public goods rather than all public goods. As Freinkman and Yossifov (1999) point out, the empirical evidence of the link between decentralization and growth (and, therefore, presumably growth-enhancing public goods) is mixed. This might be a consequence of the phenomenon analyzed by Treisman whereby greater decentralization increases the provision of local public goods but decreases the supply of nationwide public goods, resulting in an ambiguous effect on overall growth. Our model's prediction with respect to the unofficial economy, however, is likely to hold, because in most countries the unofficial sector consists primarily of small businesses that are affected

sector. In addition, output elasticity with respect to infrastructure capital at the local level is shown to be smaller than at the more aggregate level.¹⁹ These findings suggest that the impact of local public goods on private sector output is not particularly large, implying that coefficient ε is likely to be small. Therefore, in the empirically relevant cases, corruption is predicted to decline in γ .

We will now attempt to test all three predictions of the model using cross-country data. Obviously, our main variables of interest can be measured only very approximately. Therefore, the results below should be treated with considerable caution. We note, however, that the measures we employ have been extensively used in the literature despite their apparent shortcomings. Below, we provide a brief review of the data. A more detailed discussion of the data on decentralization is available in Fishman and Gatti (2002) and de Mello and Barenstein (2001) as well as on the World Bank (2006) website. The former two papers also review various corruption indicators. To measure the size of the unofficial economy we use the most comprehensive recent estimates by Schneider (2005). This is the only set of estimates that has a sufficient number of cross-country observations to permit more or less reliable inferences for our data. The governance indicators we use are detailed in Kaufmann et al. (2005). All our variables and sources for them are summarized in Table 1 of the Appendix.

Our main independent variable is γ . We use the average share of subnational tax revenue for 1980-2000 from World Bank (2006) as a proxy for this variable. Our use of average for a period of years rather than for a given year follows Fishman and Gatti and

mainly by local rather than nationwide public goods. Campos (1997) argues that this is indeed the case in developing countries although perhaps not in the economies in transition.

¹⁹ This result is primarily attributed to the possible spillover effect of the public sector capital that is smaller with smaller level of aggregation, see Holtz-Eakin (1994).

de Mello and Barenstein's approaches and is motivated by the need to increase the number of observations and the fact that these shares tend to remain relatively stable over time. For the sake of consistency, we also use averages of other variables, generally for the 1990-2000 period, if such data are available. (We average governance indicators only for years 1996, 1998, and 2000, as these are the only data reported in Kaufmann et al., for year 2000 and earlier.) The use of averages does not affect our qualitative results, except when it significantly increases the number of observations, as is the case for subnational tax revenues and share of expenditures on public order.

The effect of subnational tax revenue on the incentives of local government might, of course, be modified by the upper level government's policy with respect to transfers. For example, if changes in transfers tend to offset changes in local tax revenue, local officials would not be interested in developing local tax base (see Zhuravskaya, 2000, and Alexeev and Kurlyandskaya, 2003). On the other hand, if transfers have the nature of matching grants, they can promote incentives for local tax base growth. In addition, lumping together revenues of different level of subnational government also makes inference difficult. Unfortunately, we do not have sufficient information to resolve these issues for most countries.

There are several different measures of corruption, all of which are highly correlated with each other. We choose the measure from Kaufmann et al. (2005) as a proxy for B.

Perhaps the most difficult variable to measure is the amount of locally provided productivity-enhancing public goods. To the best of our knowledge, no commonly accepted measure exists even for all productivity-enhancing public goods, to say nothing

of their locally provided share. We chose as a proxy for one kind of such public goods the share of subnational budgets devoted to the provision of public order and safety from World Bank (2006). Obviously, this indicator suffers from many shortcomings for our purposes. First, public order and safety is but one of productivity-enhancing public goods. At the same time, some of public order and safety expenditures may not enhance productivity. Moreover, high share of these expenditures may be an indicator of high crime rates rather than high commitment on the part of local government to maintain order. Also, local expenditures on this public good might be affected by the fact that in some countries a considerable share of expenditures on public order and safety comes from the central budget. Nonetheless, this category of local government expenditure appears to be more relevant to enhancing productivity of local entrepreneurs than expenditures on defense, recreation, or general public expenditures. It is harder to argue that public order and safety is more productivity-enhancing than expenditures on transportation and communications or on education. These latter types of expenditures, however, appear to be either more consumer-oriented rather than entrepreneur-oriented or a large share of this type of expenditures usually comes from the central government, making it difficult to evaluate the role of the local government in providing these public goods. Also, the focus of our model is on the type of public goods to which underground entrepreneurs do not have as much access compared to those who operate legally. Public order appears to be the best candidate out of the types of expenditures, for which the data are available.

With respect to our control variables, in the corruption regression we largely follow Fishman and Gatti's (2002) basic specification in using logarithm of per capita

purchasing power parity (PPP) GDP and the size of government.²⁰ Unlike Fishman and Gatti, we use Voice and Accountability instead of Civil Liberties to control for the possibility of political checks on the behavior of local officials. Voice and Accountability is intended as an aggregate measure of the degree to which the country's citizens are able to affect the selection of government officials and as such it includes indicators of civil liberties (Kaufman et al., 2005, p. 130). Also, our sample size is larger than Fishman and Gatti's, mainly because it includes several former Soviet republics. Because of this, we include a dummy variable, FSU, for the former Soviet Union. The use of this dummy does not produce qualitative changes in our estimates. We will comment on some additional variables when we discuss the results of specific regressions. The descriptive statistics for our sample of countries is presented in Table 2.

In the regressions where corruption is a dependent variable, the share of subnational tax revenue may be influenced by the dependent variable.²¹ Following Fishman and Gatti (2003) we tried to alleviate this problem by instrumenting subnational tax revenue share by five legal origin dummies for English Common Law, French Commercial Code, German Commercial Code, Scandinavian Commercial Code, and Socialist laws as instruments. There are reasons to doubt the validity of these instruments, however, because legal origin might influence the quality and traditions of civil service institutions in general and the degree of corruption in particular through channels other than the degree of decentralization. Also, unlike in Fishman and Gatti, our instrument

²⁰ Fishman and Gatti use logarithms of GDP and population instead of per capita GDP. Both in their regressions and in ours, logarithms of GDP and of population have opposite signs and are approximately equal by absolute value (they are usually within one standard deviation of each other) suggesting that they can be replaced by a logarithm of per capita GDP.

²¹ The reverse causality between decentralization and corruption may be due to the desire of corrupt central government officials to keep greater control over tax revenues and rent-generating expenditures of overall government.

overidentification tests suggest that these instruments are correlated with the regression error. We present the instrumental regression results for the sake of comparability, but we put more trust in the OLS results.

The results of regressions that test the relationship between control of corruption and decentralization are presented in Table 3. These regressions are similar to Fishman and Gatti's, one difference being that, in accordance with our model, we use the share of subnational revenue instead of the share of subnational expenditures as the main explanatory variable. Not surprisingly, our results are largely similar to theirs although there are some interesting differences. In Fishman and Gatti's benchmark regressions, both OLS and two-stage, the coefficient of civil liberties is positive albeit not statistically significant while in our regressions Voice and Accountability is significant at 1% level.²² We think that the statistical significance of Voice and Accountability is quite natural and adds to the plausibility of our results. We also add a dummy variable for common law legal tradition. While legal origin dummies may not be good instruments for the degree of decentralization, the common law dummy is highly significant in the OLS regression. Another additional variable that was absent in Fishman and Gatti's regressions but is highly in ours is absolute latitude. We experimented with other specifications of the corruption regression and different measures of corruption. Neither changed our main results and given that this issue was researched elsewhere, we prefer to concentrate on the more novel findings.

²² De Mello and Barenstein argue that civil liberties indicator should be excluded from the corruption regression because it is highly correlated with decentralization and because corruption indicators are used in its construction. We do not view these arguments as valid with respect to Voice and Accountability in our case. The correlation between our measure of decentralization and Voice and Accountability indicator is only about 0.24.

We turn next to the impact of decentralization on the provision of local productivity-enhancing public goods. Previous research dealt mainly with the relationship between fiscal independence of local government and its incentives to provide local public goods in general (Zhuravskaya, 2000). The focus on productivity-enhancing public goods makes empirical testing so much more difficult. As we mentioned, our choice of the share of expenditures on public order and safety in local budgets is dictated in part by feasibility as well as by substantive considerations. Also, we have only 45 observations for this variable. Therefore, these tests should be viewed with greater caution than our other results.

The OLS regression with different sets of control variables produces a positive and highly statistically significant decentralization coefficient (see Table 4). The only other significant factor is the role of all government in the economy that has a negative coefficient significant at 5% level. This might occur because as the central government grows, it takes on a greater share of expenditures on public order, allowing local governments to reduce their share of expenditures in this category. The results do not change appreciably when we instrument per capita PPP GDP via latitude and dummy variables for European population, East Asia, and Latin America. It does not appear likely that there would be reverse causality between the share of public order expenditures and decentralization.

While the effect of decentralization on corruption and certain aspects of the relationship between decentralization and the provision of public goods have been modeled and tested in several papers that we have referenced above, the impact of the local share of tax revenue on the size of unofficial economy has not been well researched

either theoretically or empirically. Our model suggests an unambiguous negative relationship here. We begin the empirical investigation of this relationship by running a regression with subnational tax revenue, logarithm of per capital GDP, size of government and dummy variables for common law tradition and for the former Soviet Union as independent variables. In agreement with our model's prediction, this regression yields a negative and statistically significant coefficient for decentralization (see the first two regressions in Table 5).

Note, however, that in our model the relationship between unofficial economy and decentralization is not direct, but may work either through lower corruption, i.e., entry fee (bribe) B , or through greater provision of public goods, g , or both. An interesting empirical issue, therefore, is which transmission channel is more likely to operate. Unfortunately, we have only 40 observations with non-missing values for both the size of unofficial economy and public order expenditure shares. Therefore, the tests employing the latter variable are not particularly reliable. When we replace the share of subnational tax revenue in the unofficial economy regressions (3) and (4) in Table 5 with the public order expenditure and control of corruption measure, the coefficients of both variables are negative, but only control of corruption coefficient is statistically significant. This might suggest that decentralization affects the size of unofficial economy only via lower bribes but it also may happen simply because of the small number of data points. In order to alleviate this problem, we estimate the following structural model:

$$\text{CORR} = a_0 + a_1 \text{SNTAX} + a_2 \text{VOICE} + a_3 \text{PCGDP} + a_4 \text{GOV} + a_5 \text{FSU} + a_6 \text{COMLAW} + e_1 \quad (11)$$

$$\text{ORDER} = b_0 + b_1 \text{SNTAX} + b_2 \text{VOICE} + b_3 \text{PCGDP} + b_4 \text{GOV} + b_5 \text{FSU} + b_6 \text{COMLAW} + e_2 \quad (12)$$

$$UE=c_0+c_1CORRP+c_2ORDERP+c_3PCGDP+c_4VOICE+c_5FSU+e_3, \quad (13)$$

where UE is the logarithm of the size of unofficial economy as a share of GDP in percentage terms, SNTAX denotes the average share of subnational tax revenue in total tax revenue for 1980-1996 period, CORR stands for control of corruption measure and CORRP is its value predicted from (11), VOICE is a measure of voice and accountability, PCGDP represents logarithm of per capita PPP GDP, GOV is the size of government expenditures relative to GDP, ORDER is the expenditures on public order and safety in subnational budgets and ORDERP is its predicted value based on (12), and FSU denotes a dummy variable for the former Soviet republics. The exclusion of GOV and COMLAW from (13) is based on the fact that neither variable had a statistically significant coefficient in regressions (1) and (3) in Table 5. In a sense, we instrument ORDER and CORR variables with SNTAX, GOV, and COMLAW, but unlike a conventional IV regression, we use the coefficients of the ORDER regression to generate its predicted values for all those countries for which the explanatory variables in (12) are available. This increases the number of observations in (13) to 70. When we run a conventional IV regression, instrumenting CORR and ORDER with SNTAX, GOV, and COMLAW, the p-values for both CORR and ORDER in the second stage regression are slightly above 0.1. If we add SNTAX to (13), its coefficient is not statistically significant but neither are any other coefficients in the resulting regression. These results are broadly robust to inclusion of absolute latitude in equations (11)-(13), although as regression (6) in Table 5 shows, the inclusion of latitude increases statistical significance of the ORDERP to 5% but decreases the p-value of CORRP to 0.13 in equation (13). The results suggest that decentralization does indeed reduce the size of unofficial economy and it appears to be

working via both lower corruption and greater provision of productivity-enhancing local public goods.

4. Conclusions

We examined the effect of decentralization measured by the share of tax revenue retained by the local government on the incentives of local officials with respect to the provision of local public goods and corruption. The main contributions of our model to the literature on decentralization are two-fold. First, while the literature focuses either on taxation or on bribes, our model explicitly incorporates both taxes and bribes that are imposed on entrepreneurs who operate above ground. At the same time, these entrepreneurs have an option of avoiding taxation and bribes by escaping into an underground economy, although such escape deprives entrepreneurs of the full benefit of local public goods. Our second contribution consists in explicitly modeling the essential differentiation between taxes and bribes. Taxes in our model depend on entrepreneur's productivity while bribes function as a lump-sum entry fee into the official economy. This distinction is motivated by the greater ability of tax administration to monitor the activities of entrepreneurs relative to the monitoring capabilities of local officials. It is also consistent with the usual way taxes are modeled in the tax literature and bribes are modeled in the literature on corruption.

We derive the following main implications from the model. First, both the provision of local productivity-enhancing public goods and the relative size of the official economy increase in the share of tax revenue left at the disposal of local officials. Second, the size of the bribe charged for the entry into the official economy may either

increase or decrease with greater decentralization, depending on the elasticity of the contribution of public goods to the entrepreneurs' payoffs. Given the existing estimates of this elasticity, we concluded that bribes are likely to be inversely related to decentralization.

We test the above predictions of the model using cross-sectional country-level data. While these tests should be treated with caution due to the difficulties of constructing proxies for our variables of interest and limited data availability, the results of the tests generally support the model's predictions. Two empirical results are most important. First, decentralization increases the supply of productivity-enhancing local public goods and second, decentralization reduces the size of unofficial economy working both through lowering corruption and via greater provision of local productivity-enhancing public goods.

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APPENDIX

Table 1. Data Description

Variable	Description and Source
SNTAX	Average value of subnational government revenue as a percentage of all government revenue for 1980-2000. Source: World Bank (2006).
CORR	Average value of the index of control over corruption for 1996, 1998, and 2000 (the only years prior to 2001 that are available in this source). The index is intended to measure perceptions of corruption defined as the exercise of public power for private gain. Higher values indicate lower corruption. Range: from -2.5 to 2.5. Source: Kaufmann et al. (2005).
UE	The average size of unofficial economy as percentage of GDP for years 1990, 1995, and 2000 (the only years provided in the source). Source: Schneider (2005).
ORDER	Average of subnational governments' expenditures on public order and safety as a percentage of all expenditures of the subnational governments during 1980-1996 period. Source: World Bank (2006).
VOICE	Average value of the Voice and Accountability index for 1996, 1998, and 2000, intended to reflect the process by which the authorities in the country are selected and replaced. This measure is a combination of various indicators of the political process, civil liberties, and political rights. Source: Kaufmann et al. (2005).
PCGDP	Logarithm of the average per capita purchasing power parity GDP for years 1990-2000. Calculated from 1990-2000 per capita PPP GDP. Source: WDI Online (2006).
GOV	Average value of general government final consumption expenditure in years 1990-2000 as % of GDP. Source: WDI Online (2006).
FSU	A dummy variable that equals unity if the country is a former Soviet republic and has a value of zero otherwise.
Legal origin	This dummy variable identifies the legal origin of the Company Law or Commercial Code of a given country. Five alternative legal origins are (1) English Common Law; (2) French Commercial Code; (3) German Commercial Code; (4) Scandinavian Commercial Code; and (5) Socialist laws. Source: La Porta et al. (1999).
COM_LAW	Dummy variable that takes on a value of 1 for common law countries and 0 otherwise. Source: La Porta et al. (1999).
Latitude	Absolute latitude of a country scaled between 0 and 1 Source: La Porta et al. (1999)

Table 2. Summary statistics of the main variables

Variable	Number of observations	Mean	STD	Minimum	Maximum
SNTAX	82	15.04	12.39	1.19	52.52
CORR	82	0.38	1.08	-1.27	2.45
Unofficial Economy	70	28.53	13.34	7.77	60.97
ORDER	45	2.99	2.71	0.09	10.85
VOICE	82	0.37	0.89	-1.39	1.63
Per capita GDP	82	10,488	9,270	546	38,907
GOV	82	16.35	4.95	5.29	28.94
FSU	82	0.12	0.33	0	1
Latitude	82	0.37	0.21	0.01	0.72
Common law	82	0.30	0.46	0	1

Notes: The descriptive statistics for per capita GDP and for the second economy size are not in logarithms even though in the regressions logarithms of these values are used;

Only the values of the variables that are actually used in at least one of the regressions contribute to the summary statistics in this table.

Table 3. Decentralization and control of corruption

Dependent variable: CORR -- Control of corruption index

	OLS			GMM IV
	(1)	(2)	(3)	(4)
SNTAX	.010** (.004)	.010** (.004)	.008* (.004)	.027*** (.006)
PCGDP	.403*** (.067)	.434*** (.064)	.367*** (.065)	.334*** (.087)
VOICE	.506*** (.080)	.538*** (.083)	.499*** (.085)	.480*** (.098)
GOV	.032*** (.011)	.025** (.012)	.012 (.012)	.044*** (.010)
FSU	-.589*** (.135)	-.416*** (.160)	-.619*** (.181)	-.883*** (.167)
Common law		.345*** (.112)	.430*** (.107)	
Latitude			1.00*** (.372)	
Number of observations	82	82	82	82
R ²	.831	.849	.859	.795
P-value for Hansen-Sargan test				.004

Notes: Robust standard errors are in parentheses;

Significance levels for coefficient estimates: *** - 1%; ** - 5%; * - 10%;

Constant is not shown;

H₀ for Hansen-Sargan test of overidentifying restrictions for GMM estimator is that the instruments are uncorrelated with the error term and that the excluded instruments are correctly excluded from the estimated equation;

GMM IV – GMM instrumental variables estimates; SNTAX is instrumented with legal origin dummy variables;

Table 4. Decentralization and expenditures on public order and safety

Dependent variable: ORDER -- Share of expenditures on public order and safety in subnational budget

	OLS					GMM IV
	(1)	(2)	(3)	(4)	(5)	(6)
SNTAX	.080*** (0.025)	.083*** (.026)	.088*** (.026)	.087*** (.028)	.091*** (.032)	.089*** (.025)
PCGDP	.432 (.401)	.223 (.718)	.178 (.711)	.234 (.786)	.316 (.843)	-.277 (.525)
GOV	-.162** (.073)	-.166** (.071)	-.151** (.072)	-.153** (.072)	-.137* (.081)	-.101 (.074)
VOICE		.292 (.747)	.164 (.671)	.113 (.704)	.174 (.771)	
FSU			-.705 (.688)	-.394 (.835)	-.154 (1.01)	
Common law				1.08 (1.09)	.911 (1.59)	
Latitude					-1.45 (5.42)	
No. observations	45	45	45	45	45	45
R ²	.229	.231	.239	.265	.268	.165
P-value for Hansen-Sargan test						.811

Notes: Robust standard errors are in parentheses;

Significance levels for coefficient estimates: *** - 1%; ** - 5%; * - 10%;

Constant is not shown;

GMM IV – GMM instrumental variables estimates; PCGDP is instrumented with absolute latitude and dummy variables for (1) European population; (2) Latin America; and (3) East Asia;

H₀ for Hansen-Sargan test of overidentifying restrictions for GMM estimator is that the instruments are uncorrelated with the error term and that the excluded instruments are correctly excluded from the estimated equation.

Table 5. Decentralization and size of unofficial economy

Dependent variable: UE -- Logarithm of unofficial economy as a percentage of GDP

	OLS						GMM IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SNTAX	-.012** (.005)	-.010** (.004)						
CORR			-.506*** (.122)	-.486*** (.112)			-.395 (.242)	-.316 (.269)
CORR (predicted)					-.429** (.197)	-.328 (.215)		
ORDER			-.027 (.025)	-.027 (.024)			-.058 (.035)	-.075* (.039)
ORDER (predicted)					-.067* (.036)	-.084** (.042)		
PCGDP	-.182** (.073)	-.133** (.062)	-.018 (.116)	-.001 (.118)	.001 (.109)	.015 (.096)	-.056 (.148)	-.031 (.171)
GOV	-.004 (.009)	.007 (.009)	.003 (.012)	.006 (.012)				
FSU	.378** (.150)	.564*** (.164)	.241* (.137)	.324** (.158)	.115 (.125)	.347* (.205)	.225 (.164)	.407*** (.159)
VOICE	-.121 (.105)	-.076 (.010)	.271* (.154)	.278* (.153)	.112 (.164)	.103 (.151)	.217 (.158)	.201 (.165)
Common law	-.154 (.106)	-.216** (.103)	.151 (.127)	.097 (.169)				
Latitude		-.869*** (.287)		.392 (.630)		-.667* (.390)		-.649 (.482)
No. obs.	70	70	40	40	70	70	40	40
R ²	.587	.625	.715	.721	.582	.625	.675	.654
P-value for Hansen- Sargan test							.158	.512

Notes: Robust standard errors are in parentheses; Constant is not shown;

Significance levels for coefficient estimates: *** - 1%; ** - 5%; * - 10%;

CORR (predicted) is based on regression (2) from Table 3;

ORDER (predicted) is based on regression (4) from Table 4;

GMM IV – GMM instrumental variables estimates; excluded instruments are SNTAX, GOV, and Common law;

H₀ for Hansen-Sargan test of overidentifying restrictions for GMM estimator is that the instruments are uncorrelated with the error term and that the excluded instruments are correctly excluded from the estimated equation.