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Fiscal Decentralization: A Remedy for Corruption?

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Abstract

This paper examines the effect of fiscal decentralization in a country on the level of corruption. Using a tax competition framework with rent-seeking behavior, it is shown theoretically that fiscal decentralization, modeled as an increase in the number of competing jurisdictions, leads to a lower level of corruption. This result is then tested using a small, cross-country data set. The empirical results are not very strong, but they suggest that the hypothesized relationship between decentralization and corruption may indeed exist.

Keywords: corruption, fiscal decentralization, tax competition

JEL Code: H0, H1, H7

1. Introduction

Corruption, defined by the World Bank[1] as "the abuse of public office for private gain," is a widespread phenomenon seen both in developing and developed countries. Much attention has been given recently to the causes and effects of corruption, as well as to possible ways of preventing it. This study explores one possible cause and consequently a potential remedy for corruption. The paper investigates the link between the extent of fiscal decentralization in a country and its level of corruption, attempting to gauge whether decentralization might be a remedy for corruption.

Although the possible link between corruption and fiscal decentralization has not been explicitly examined, either theoretically or empirically, in previous research, the link has been implied in several studies.[2] Shleifer and Vishny (1993), for example, study bribes under different market conditions and note that if several government entities can provide the same public service, bribes offered to secure that service may be driven to zero. In a different vein, Tanzi (1994) argues that, by weakening the personal link between bureaucrats and those they serve, a larger (and possibly more-centralized) state will increase the probability that corrupt activities take place. Conversely, it is also possible to argue that stronger personal links might have the reverse effect by making it easier for corrupt individuals to collaborate. Moreover, smaller jurisdictions may mean more affordable bribe rates and fewer means of fighting corruption, as well as a greater opportunity for detailed regulation of economic activity, encouraging corruption.[3] These contrary predictions are supported by the results of Persson, Tebellini and Trebbi (2001), who study the effects of electoral rules on corruption and find empirical evidence that relatively smaller voting districts lead to more corruption.

The only previous empirical work looking specifically at the relationship between fiscal decentralization and corruption is provided by Huther and Shah (1998), who investigate the relationship between "good governance" and fiscal decentralization. They report a Pearson correlation coefficient of 0.532 between the absence of corruption (their good governance measure) and the extent of subnational expenditures, a coefficient that is statistically significant. This finding supports the view that increased decentralization reduces corruption.

The present paper extends this emerging literature in two needed directions. First, it provides a stylized analysis of the link between corruption and fiscal decentralization based on a theoretical model drawn from the literature on tax competition. In the analysis, fiscal decentralization is modeled as an increase in the number of competing jurisdictions within a tax-competition model, with jurisdictional corruption being captured by rent-seeking behavior. Comparative-static analysis shows that as the number of competing jurisdictions rises, the level of "corrupt earnings" (tax revenue appropriated by bureaucrats) falls. Thus, by applying the comparative-static approach of Hoyt (1991) in a rent-seeking model like that of Edwards and Keen (1996), the analysis confirms a natural link between intergovernmental competition and corruption under certain conditions. However, because the model does not perfectly replicate the institutional features of decentralization, it only offers a stylized picture of this link. In particular, instead of creating a layer of lower-level governments in a federal setting (or expanding their powers), the model analyzes the effect of a *horizontal increase* in the number of jurisdictions. Nevertheless, the model captures a key effect of fiscal decentralization: an increase in intergovernmental competition for residents and business investment.

The paper's second contribution is to carry out an explicit empirical investigation of the link between corruption and fiscal decentralization. This exercise uses a small cross-section data set of 40 countries. Partly because of the small sample size, strong results do not emerge. However, the estimates provide some tantalizing evidence that the hypothesized link between corruption and decentralization may indeed be present in the data. The results may spur additional efforts to generate better measures of this relationship.

The paper's theoretical model draws on the tax-competition literature initiated by Wilson (1986), Zodrow and Mieszkowski (1986), Wildasin (1988), and Bucovetsky (1991).[4] In such models, a tax on mobile capital is used to finance public spending, and the capital flight that occurs as a jurisdiction raises its tax rate limits the incentive to do so, leading to underprovision of public goods. In an important contribution to this literature, Hoyt (1991) showed that, as the number of jurisdictions increases exogenously, competition for capital becomes more intense, and the extent of underprovision of public goods becomes greater. As explained above, Hoyt's approach is applied to answer a different comparative-static question in a modified tax-competition model where jurisdictions engage in rent-seeking rather than utility-maximizing behavior. The model developed by Edwards and Keen (1996) is modified and a comparative-static analysis is carried out in the fashion of Hoyt (1991) to examine the link between fiscal decentralization and corruption. Unlike Edwards and Keen's work, the noncompetitive case is considered, where the number of jurisdictions n is relatively small. The analysis shows that, under some conditions, the level of corrupt earnings in each jurisdiction falls as n increases. With more competition for capital, bureaucrats limit the amount of corrupt earnings they attempt to extract, knowing that capital flight is

enhanced as n grows. A real-world example of such a situation is mentioned by Jin, Qian and Weingast (2001) when discussing the Russian regional-local government system. They write that "the lack of fiscal incentives in part explains why local government preys on private businesses."

The link between rent-seeking behavior and intergovernmental competition that is formally analyzed in the paper has actually been the subject of a long empirical tradition in public economics. Oates (1972) presents the first in a line of empirical investigations of this link by looking for a relationship between the extent of decentralization and the size of the government, but fails to find one in regressing the share of tax revenues in national income on the share of central government tax revenues in total tax revenues, using cross-country data. Similar negative results are found in Oates (1985) and Forbes and Zampelli (1989). Oates (1985) uses both a cross-country and a United States data set, in which he examines the connection between the degree of state-local fiscal decentralization and the budgetary size of state and local government. Forbes and Zampelli use county government size as their dependent variable and the number of counties as their independent variable. In contrast, the affirmative results of Giertz (1981), Nelson (1987), Eberts and Gronberg (1988), and Zax (1989), all of which are based on United States data, are consistent with the view that competition constrains rent-seeking behavior. Oates (1989) evaluates these conflicting findings, discussing the puzzles presented by empirical research so far.

Corruption is, of course, not a serious problem in the U.S. samples used in most of the above studies, which instead rely on various measures of governmental size as indicators of rent-seeking behavior. Rent-seeking is manifested in overt corruption, however, in many other countries, especially in transition and Third World countries. To test the hypothesis of an inverse relationship between corruption and fiscal decentralization, this paper uses the Transparency International 1998 Corruption Perceptions Index and four different measures of fiscal decentralization.[5] The empirical work estimates regressions relating corruption to the extent of fiscal decentralization in a country and to other variables. Along with ordinary least squares (OLS) regressions, two-stage least squares (2SLS) regressions are estimated to address the potential endogeneity of the fiscal decentralization variable.

There is a growing economic literature on corruption, and it is important to appreciate a key difference between elements of that literature and the present study. In particular, many studies in the literature have explored the *effects* of corruption on various variables of interest. Mauro (1995, 1998) studied the effects of corruption on growth and the composition of government expenditures, respectively. Tanzi and Davoodi (1997) explored its effects on public investment and growth, Gupta, Davoodi and Alonso-Terme (1998) investigated its effects on income inequality and poverty, and Alesina and Weder (1999) studied its effects on the amount of foreign aid received by a country. In contrast the present paper focuses on the *determinants of corruption*, as opposed to its effects. The literature contains other papers that follow this approach, but none of these studies looks at fiscal decentralization as a determinant of corruption. Ades and Di Tella (1995) study the impact of market structure on corruption, Ades and Di Tella (1997) look at the effect of industrial policies on corruption, Leite and Weidmann (1999) investigate the role of natural resource abundance as a determinant of corruption, Tanzi (1998) presents a survey of studies on corruption, and Treisman (2000) studies the effect of a number of political variables (e.g., a history of

British rule) on corruption. The present study complements this latter work by exploring the role of a new variable, fiscal decentralization, as a determinant of corruption.

The plan of the paper is as follow. Section 2 presents the theoretical model, and Section 3 explains the empirical framework, the variables that are used in the model and the data. The estimation results are presented and interpreted in Section 4. Section 5 concludes and summarizes the findings of the study.

2. The Model

2.1. The Setting

This section carries out a comparative-static exercise using a modified version of the rent-seeking model of Edwards and Keen (1996). The goal is to show the effects of greater decentralization on the level of corruption. As noted above, the characterization of fiscal decentralization used here is a stylized one: the extent of decentralization rises as the number of jurisdictions increases. Even though this characterization does not exactly capture the institutional features of fiscal decentralization, several empirical studies have used decentralization variables based on a similar definition. For example, Oates (1985), Nelson (1987), Eberts and Gronberg (1988), Zax (1989) and Forbes and Zampelli (1989) use the number of local government units in a state, county or metropolitan area to measure the extent of decentralization.

The economy has n identical jurisdictions, with P residents in each. The total population is then $N = nP$. Let K denote the economy's fixed total stock of capital and K_i denote capital in jurisdiction i. Then, letting $k_i = K_i/P$ denote capital per worker in jurisdiction i, the allocation of capital across jurisdictions must satisfy

$$\sum_{i=1}^{n} Pk_i = K. \tag{1}$$

Capital is combined with labor in each jurisdiction to produce a private consumption good. The common production function $f(k_i)$ gives output per worker in a jurisdiction, where f satisfies $f' > 0$ and $f'' < 0$. Public spending is financed by a tax per unit of capital, with jurisdiction i's rate denoted t_i. Because capital is mobile, its after-tax rate of return must be uniform across jurisdictions. Letting ρ denote this endogenous after-tax return, the relationship

$$\rho = f'(k_i) - t_i \tag{2}$$

must hold for all jurisdictions i. Equations (1) and (2) determine ρ and the equilibrium allocation of capital across jurisdictions, conditional on tax rates. Note that in Edwards and Keen's (1996) rent-seeking model, jurisdictions are so small that their decisions have no impact on capital's net-of-tax return, which is viewed as parametric. Here, jurisdictions are assumed to be large enough to recognize the impact of their decisions on ρ.

Using equations (1) and (2), the effect of changes in tax rates on the allocation of capital and on capital's net return can be derived. It can be shown that when the tax rate rises in any

jurisdiction, ρ declines. To derive a formula that shows the effect of taxes on the allocation of capital, let $\bar{k} = K/N$ denote the average level of capital per worker in the economy. Then, equation (1) can be rewritten as

$$\sum_{i=2}^{n} Pk_i = N\bar{k} - Pk_1, \tag{3}$$

and both sides can be divided by P to get

$$\sum_{i=2}^{n} k_i = n\bar{k} - k_1. \tag{4}$$

When $k_m = k_j$ for all $m, j \geq 2$, (4) yields

$$k_2 = \frac{n\bar{k} - k_1}{n-1}, \tag{5}$$

where k_2 is the common level of k in other jurisdictions. Given equations (5) and (2), the following relationship must hold:

$$f'(k_1) - t_1 = f'\left(\frac{n\bar{k} - k_1}{n-1}\right) - t_2. \tag{6}$$

Differentiating equation (6) with respect to the tax rate in jurisdiction 1 gives:

$$f''(k_1)\,dk_1 - dt_1 = -\frac{1}{n-1} f''\left(\frac{n\bar{k} - k_1}{n-1}\right) dk_1. \tag{7}$$

As the jurisdictions are identical ex ante, the equilibrium will be symmetric (with $k_i = \bar{k}$), allowing equation (7) to be rewritten to yield.

$$\frac{\partial k_i}{\partial t_i} = \left(1 - \frac{1}{n}\right)\frac{1}{f''(\bar{k})} < 0. \tag{8}$$

Equation (8) describes the effect of a jurisdiction increasing its tax rate on the amount of capital in that jurisdiction, which falls. As n gets larger, the coefficient of $1/f''$ increases, so that $\partial k_i/\partial t_i$ becomes more negative. Thus, the capital flight that occurs in response to an increase in jurisdiction i's tax rate becomes more pronounced as the number of jurisdictions grows, raising the degree of competition for capital.

Consumers have common preferences, and the utility in jurisdiction i, $U(x_i, z_i)$, depends on x_i, consumption of the numeraire private good, and z_i, consumption of the public good. It is also assumed that U is a strictly concave function and that

$$U_{z_i x_i} = \frac{\partial^2 U(x_i, z_i)}{\partial z_i, \partial x_i} \geq 0, \quad \forall i,\ i = 1, 2, \ldots, n, \tag{9}$$

so that the marginal utility derived from one good is non-decreasing in the consumption of the other good. In other words, the goods x and z are (weak) complements.

As in Edwards and Keen (1996), the jurisdictional governments are neither wholly selfish nor totally benevolent. They care about both their own and their residents' welfare. The

government's objective in the present model is to maximize a weighted sum of corrupt earnings and citizens' utility.[6] The objective function is thus

$$\lambda U(x_i, z_i) + (1 - \lambda)s_i, \tag{10}$$

where s_i is the part of government i's budget which is not spent on the public good, or corrupt earnings, expressed on a per-worker basis. λ, a number between 0 and 1, denotes the weight given to the utility of residents in this objective function.

The government's budget constraint is given by:

$$z_i = t_i k_i - s_i. \tag{11}$$

Note that since z_i equals tax revenue less corrupt earnings, all on a per-worker basis, equation (11) reflects the standard assumption that the public good is a private good with constant unitary cost.

In addition to wage income, workers own equal shares of the economy's capital stock, with each worker's endowment equal to $\bar{k}$. The private good consumption of an individual in jurisdiction i is the sum of wage income, w_i, and capital income, $\rho\bar{k} = (f'(k_i) - t_i)\bar{k}$. Since $w_i = f(k_i) - k_i f'(k_i)$ (output per worker minus the return to capital), x consumption equals

$$\begin{aligned} x_i &= f(k_i) - k_i f'(k_i) + (f'(k_i) - t_i)\bar{k} \\ &= f(k_i) - (k_i - \bar{k})f'(k_i) - t_i\bar{k}. \end{aligned} \tag{12}$$

Substituting equations (11) and (12) in equation (10), the government's objective function can be written

$$F(t_i, s_i; n) = \lambda U(f(k_i) - (k_i - \bar{k})f'(k_i) - t_i\bar{k}, t_i k_i - s_i) + (1 - \lambda)s_i, \tag{13}$$

where the fact that k_i is a function of t_i is used.

2.2. Strategic Choice of Tax Rates and Corrupt Earnings

Each government i maximizes its objective function by adjusting the tax level and the level of corrupt earnings in a Nash game. Letting F subscripts denote partial derivatives, the first order conditions are given by:

$$F_{t_i}(t_i, s_i; n) = 0 \quad \forall i,\ i = 1, 2, \ldots, n \tag{14}$$

$$F_{s_i}(t_i, s_i; n) = 0 \quad \forall i,\ i = 1, 2, \ldots, n \tag{15}$$

Condition (14) yields

$$\begin{aligned} F_{t_i} &= \lambda\left[U_{x_i}\frac{\partial x_i}{\partial t_i} + U_{z_i}\frac{\partial z_i}{\partial t_i}\right] \\ &= \lambda\left[U_{x_i}\left(-(k_i - \bar{k})f''(k_i)\frac{\partial k_i}{\partial t_i} - \bar{k}\right) + U_{z_i}\left(k_i + t_i\frac{\partial k_i}{\partial t_i}\right)\right] = 0, \end{aligned} \tag{16}$$

where the derivatives of x_i and z_i with respect to t_i are computed using (13). Using (8) in (16) along with the fact that jurisdictions are symmetric in equilibrium, with $k_i = \bar{k}$, (16)

can be written as

$$F_t = \lambda\left[-\bar{k}U_x + \left[\bar{k} + t\left(1 - \frac{1}{n}\right)\frac{1}{f''(\bar{k})}\right]U_z\right] = 0. \tag{17}$$

Note that under symmetry, the i subscripts in (16) may be dropped. Using (13) and imposing symmetry, (15) becomes

$$F_s = -\lambda U_z + (1 - \lambda) = 0. \tag{18}$$

Equations (17) and (18) define the equilibrium levels of s and t, which will be the same across all jurisdictions. It should be noted that, in equilibrium, the budget constraints (11) and (12) become:

$$z = t\bar{k} - s, \tag{19}$$

$$x = f(\bar{k}) - t\bar{k}. \tag{20}$$

Plugging these expressions into equations (17) and (18), the equations define the equilibrium t and s as functions of n.

Equations (17) and (18) are totally differentiated, using equations (19) and (20), to see how the equilibrium responds to changes in the number of jurisdictions, n. In these computations, K, the amount of capital in the economy, as well as N, the total population size, remain fixed. As a result, $\bar{k}$, capital per worker in the economy, remains constant. However, the jurisdictions' common population, P, falls as n increases, so that the relationship $nP = N$ continues to hold. Given constant returns and the fixed $\bar{k}$, this shrinkage in jurisdiction size has no consequence.[7] With $\bar{k}$ fixed, comparative-static computations reveal that

$$\frac{\partial t}{\partial n} = \frac{-tU_zU_{zz}}{n^2 f''\bar{k}^2(U_{xx}U_{zz} - U_{xz}U_{zx}) + n(n-1)U_zU_{zz}} < 0. \tag{21}$$

Because $U(x, z)$ is strictly concave, $U_{xx}U_{zz} - U_{xz}^2 > 0$ and $U_{zz} < 0$ hold, establishing the inequality in (21). Thus, an increase in the number of jurisdictions leads to a decrease in the capital tax rate. This result is independent of the assumption that the two goods are complements. The effect of n on the level of corrupt earnings is given by

$$\frac{\partial s}{\partial n} = \frac{\bar{k}t(U_{zx} - U_{zz})U_z}{n^2 f''\bar{k}^2(U_{xx}U_{zz} - U_{xz}U_{zx}) + n(n-1)U_zU_{zz}} < 0, \tag{22}$$

where the sign again relies on concavity of U as well as on the assumption that x and z are weak complements. Note that with $U_{zx} \geq 0$, the numerator of (22) is positive, making the entire expression negative. Thus, as the number of jurisdictions increases, s decreases, indicating a lower level of corrupt earnings.

An intuitive explanation for these results relies on (8), which shows that capital flight in response to an increase in a jurisdiction's tax rate becomes more pronounced as n rises. With greater interjurisdictional competition thus raising the perceived penalty from higher taxes, each jurisdiction chooses a lower tax rate. With tax revenue lower in equilibrium, there would appear to be less room for extraction of corrupt earnings. As a result, s falls.

While this logic is natural, it appears to be valid only under the maintained complementarity assumption on preferences. If x and z were instead substitutes, with the inequality in (9) reversed and holding strictly, then the sign of (22) would be indeterminate, implying an

ambiguous effect of n on the level of corrupt earnings. Complementarity between public and private goods is a plausible assumption (road investment, for example, enhances the benefit from auto ownership), but since the reverse case is possible, the model's predictions are not entirely robust.

Moreover, as recognized in the introduction, the exclusive focus on greater intergovernmental competition means that the analysis suppresses other avenues by which decentralization may have an impact on corruption. As noted above, stronger personal links between bureaucrats and their constituents under decentralization might make it easier for corrupt individuals to collaborate, and smaller jurisdictions may make bribery more affordable and limit the resources available for fighting it. In addition, smaller jurisdictions may encourage more-detailed regulation of economic activity, encouraging corruption. While such effects could reverse the analytical predictions from above, the analysis nevertheless has value in that it generates a sharp hypothesis using a precisely specified framework. Whether this hypothesis is realistic, of course, can only be decided by turning to the data.

To conclude this section, some additional results are worth mentioning. As explained in the introduction, the above analysis extends the important findings of Hoyt (1991) to a rent-seeking model. Hoyt showed that, in the standard tax-competition framework, an increase in n leads to a lower equilibrium tax rate and thus a lower z, implying greater underprovision of the public good. The present results show that, in a rent-seeking context, the same decline in taxes occurs as n rises, depressing the revenue expropriated as corrupt earnings. Interestingly, however, by substituting (21) and (22) into the budget constraint (19), it is easily seen that z *increases* with n, the opposite of the outcome in Hoyt's model. The reason is that corrupt earnings fall faster than tax revenue as n increases, allowing the level of the public good to rise. Since x rises with n as well from (20), it follows that consumers become better off as the number of jurisdictions rises, in contrast to Hoyt's finding. Thus, in a model where rent-seeking bureaucrats try to enrich themselves at the taxpayers' expense, greater interjurisdictional competition is welfare enhancing rather than harmful. See the appendix for details of this analysis.

3. The Empirical Framework

The theoretical result that decentralization decreases the level of corrupt earnings can be tested empirically. Various measures of fiscal decentralization and of corruption exist to make this possible, using a cross-country data set. This study utilizes some measures of decentralization that fit the stylized definition in the model, as well as ones that fit the more standard definition.

The ordinary least squares model that is estimated is:

$$CORRUPTION_i = \alpha + \beta\, DECENTRALIZATION_i + \gamma X_i + \varepsilon_i, \tag{23}$$

where X_i is the vector of other explanatory variables and ε_i is the error term.

The dependent variable is the 1998 Corruption Perceptions Index of Transparency International. This index is a composite measure derived from several different surveys during the three years prior to 1998.[8] As its name implies, the index measures the perception of corruption, not the actual level of corruption itself. However, it is one of the best indices

available, covering a large number of countries. Transparency International's Corruption Perception Indices for various years have been used in a number of studies, including Gupta, Davoodi and Alonso-Terme (1998), Alesina and Weder (1999) and Treisman (2000). The score of a country is higher if it is more corruption-free. In 1998 the index ranged between 1.4 and 10. The index values are reported in Table 1.

3.1. Measures of Fiscal Decentralization

No obvious measure exists to grade countries on their extent of fiscal decentralization. In order to avoid focusing on a single, possibly illegitimate indicator, four different measures of fiscal decentralization are used in the regressions, reflecting different definitions. Their descriptions follow. The abbreviations for the variables are shown in parentheses.

1. *Number of Local Jurisdictions (DEC-#Jrsd)*: This variable is the total number of local (municipality or equivalent) jurisdictions in a country per thousand citizens. It ignores other subnational levels of government. Also, as the definition of a "local government" differs across countries, a comparison of numbers of local governments may not be entirely meaningful.
2. *Number of Local and Intermediate Jurisdictions (DEC-#All_Jrsd)*: This variable equals the total number of local and intermediate (state, province, region, department or other) jurisdictions in a country per thousand citizens. The problem of comparability from the first measure persists, and now there is another comparability problem, which arises from adding quantities of jurisdictions at different subnational levels.

Although DEC-#Jrsd and DEC-#All_Jrsd have the drawbacks noted above, these variables best fit the description of fiscal decentralization used in the analytical framework since they count numbers of jurisdictions. While the main regressions use the normalized form of these variables (expressed as jurisdictions per thousand population), additional regressions use unnormalized variables, where the decentralization measures are simple counts of subnational jurisdictions. The simple correlation coefficient between the normalized variables is very close to 1.00. The data used for both measures are taken from the World Development Report 1999/2000.

A similar set of fiscal decentralization indices is used for the United States in several studies, starting with Oates (1985).[9] He uses the absolute number of local government units in each state as a measure of decentralization in that state but does not use population-normalized values on the belief that normalization reduces explanatory power. Following Oates, Nelson (1987), Eberts and Gronberg (1988), Zax (1989) and Forbes and Zampelli (1989) use similar measures for different levels of government, both normalized and unnormalized.

This study uses two other decentralization measures, defined as follows:

3. *Share of Noncentral Government Employment (DEC-Labor)*: This variable is the ratio of noncentral government employment to total government employment. The data used in constructing it comes from Schiavo-Campo, de Tommaso and Mukherjee (1997). This is a new measure which has not been used before in the literature, and it displays a high

Table 1. The Transparency International 1998 Corruption Perceptions Index.

Rank	Country	CPI	Rank	Country	CPI
1	Denmark	10.0	43	South Korea	4.2
2	Finland	9.6	43	Zimbabwe	4.2
3	Sweden	9.5	45	Malawi	4.1
4	New Zealand	9.4	46	Brazil	4.0
5	Iceland	9.3	47	Belarus	3.9
6	Canada	9.2	47	Slovak Republic	3.9
7	Singapore	9.1	49	Jamaica	3.8
8	Netherlands	9.0	50	Morocco	3.7
8	Norway	9.0	51	El Salvador	3.6
10	Switzerland	8.9	52	China	3.5
11	Australia	8.7	52	Zambia	3.5
11	Luxembourg	8.7	54	Turkey	3.4
11	United Kingdom	8.7	55	Ghana	3.3
14	Ireland	8.2	55	Mexico	3.3
15	Germany	7.9	55	Philippines	3.3
16	Hong Kong	7.8	55	Senegal	3.3
17	Austria	7.5	59	Ivory Coast	3.1
17	United States	7.5	59	Guatemala	3.1
19	Israel	7.1	61	Argentina	3.0
20	Chile	6.8	61	Nicaragua	3.0
21	France	6.7	61	Romania	3.0
22	Portugal	6.5	61	Thailand	3.0
23	Botswana	6.1	61	Yugoslavia	3.0
23	Spain	6.1	66	Bulgaria	2.9
25	Japan	5.8	66	Egypt	2.9
26	Estonia	5.7	66	India	2.9
27	Costa Rica	5.6	69	Bolivia	2.8
28	Belgium	5.4	69	Ukraine	2.8
29	Malaysia	5.3	71	Latvia	2.7
29	Namibia	5.3	71	Pakistan	2.7
29	Taiwan	5.3	73	Uganda	2.6
32	South Africa	5.2	74	Kenya	2.5
33	Hungary	5.0	74	Vietnam	2.5
33	Mauritius	5.0	76	Russia	2.4
33	Tunisia	5.0	77	Ecuador	2.3
36	Greece	4.9	77	Venezuela	2.3
37	Czech Republic	4.8	79	Colombia	2.2
38	Jordan	4.7	80	Indonesia	2.0
39	Italy	4.6	81	Nigeria	1.9
39	Poland	4.6	81	Tanzania	1.9
41	Peru	4.5	83	Honduras	1.7
42	Uruguay	4.3	84	Paraguay	1.5
			85	Cameroon	1.4

and significant correlation with the next one, which is probably the most conventional measure of fiscal decentralization.

4. *Share of Noncentral Government Expenditure (DEC-Spend)*: This is a very widely used measure of fiscal decentralization, which equals total expenditures of non-central governments divided by total government expenditures. The transfers to lower levels of government (including capital transfers) are subtracted from expenditures at each level. The data are from the IMF's Government Finance Statistics Yearbook 1998.[10]

Among studies relying on similar measures is Oates (1972, p. 203), who uses the central government share of total government revenues to measure centralization. Oates (1985) uses the state share of state-local general expenditures (also of revenues) and also, at the international level, the fractions of total expenditures (and revenues) of the central government. Relying on cross-country data, Wasylenko (1987) uses the state and local expenditure share in total government expenditure as a decentralization measure.

While the first two decentralization variables closely follow the model by counting the numbers of jurisdictions below the national level, the latter two variables measure the employment and expenditure shares of subnational governments. These shares, of course, need not be closely linked to the actual number of subnational jurisdictions. Despite this less than perfect correspondence to the model, all of the decentralization variables permit a test of the main implication of the theoretical analysis, which is that greater interjurisdictional competition resulting from fiscal decentralization may limit corruption. Such an increase in competition could come from an increase in the number of jurisdictions below the national level following decentralization, but it could also arise through assignment of greater spending powers to a fixed number of subnational jurisdictions. Thus, while the model explicitly pertains to the first case, its message can be used to motivate reliance on decentralization variables like DEC-Labor and DEC-Spend.

3.2. Other Explanatory Variables

Following is a list of the other variables that are used in the study:

Relative Wages in the Public Sector (WAGE): Low public sector wages may provide an incentive for public servants to engage in dishonest activities for extra income. In some countries, government employees may even be paid low wages with the implicit expectation that they will be able to compensate by taking advantage of their positions. Also, if corrupt practices lead to dismissal from public service, higher public sector wages may deter civil servants from engaging in such practices by raising the penalty from dismissal. It can therefore be expected that higher relative public sector wages are associated with a lower level of corruption (Van Rijckeghem and Weder, 1997). The public sector wage-corruption relationship is also examined by Ul Haque and Sahay (1996), who show in an analytical framework that higher government wages attract better human capital to the public sector and cause a decrease in the level of corruption.

Measuring relative wages by the ratio of government wages to manufacturing wages, Van Rijckeghem and Weder (1997) find a weak negative relationship between corruption

and wages. They state that as the manufacturing sector is comparable to the government sector in terms of its skill content, their relative-wage measure is appropriate for a cross-country study. However, the measure used in the present study is the ratio of average government wages to per capita GDP. Because of many missing observations in the government/manufacturing wage ratio, the current variable is used despite its potential shortcomings.[11] The data are from Schiavo-Campo, de Tommaso and Mukherjee (1997).

Degree of Openness of Economy (IMPORT): Leite and Weidmann (1999) explain that trade restrictions produce rents and consequently a favorable environment for corrupt behavior. They find that countries with fewer trade restrictions tend to have less corruption. Ades and Di Tella (1995) use the share of imports in GDP as an explanatory variable to proxy the degree of competition in the economy. They find a significant negative relationship between the degree of foreign competition and the level of corruption. Ades and Di Tella (1997) and Treisman (2000) find a mostly significant negative relationship between the level of corruption and the ratio of imports to GDP. Following these arguments, the imports of goods and services as a percentage of GDP, used to measure the degree of openness, is included among the explanatory variables. The data are from the Balance of Payments Statistics Yearbook 1998.

Ethnolinguistic Fractionalization (ETHLNG): This variable is used to capture the possible effects of ethnic and linguistic diversity on the level of corruption. Shleifer and Vishny (1993) predict a lower level of corruption in homogeneous societies as these societies will be able to maximize joint bribes, which means a lower overall level of bribes than societies in which bribes are taken but joint bribe maximization is not achieved. To justify a possible effect of ethnolinguistic fractionalization on corruption, Leite and Weidmann (1999, p. 20) state that "... the prevalence of strong family ties, together with a lack of national identity and the absence of accountability to government officials, leads people in positions of power to favor friends and relatives, at the expense of the greater public good." They do not find any significant relationship between the two variables, however. Van Rijckeghem and Weder (1997) also include this variable to capture cultural factors, and they, too, fail to find a link to corruption. Treisman (2000) includes this variable in his search for the determinants of corruption, and finds that once income is controlled for, the variable loses its significance.

The index of ethnolinguistic fractionalization is taken from Mauro (1995). It was originally constructed by Taylor and Hudson (1972) using 1960 data. The index is a measure of the probability that two randomly chosen individuals from a country do not belong to same ethnolinguistic group, so that higher values of the index indicate more fragmentation.

Press Freedom (PRESS): The existence of a free flow of information in a country is likely to reduce corruption by creating an environment of awareness, both of rules and regulations, and of extent of ongoing corrupt activities. Press freedom, accordingly, is expected to exert a negative influence on the level of corruption. Shleifer and Vishny (1993, p. 610) note that "[c]ountries with more political competition have stronger public pressure against corruption—through laws, democratic elections, and even the independent press—and so are more likely to use government organizations that contain rather than maximize corruption proceeds." Tanzi (1994, p. 15) states that "[i]n a truly democratic system,

with checks and balances exercised through fair elections, through the Parliamentary process, and through a vigorous free press, the extent of corruption by the political leaders will generally be checked or, at least, it will eventually be discovered and hopefully controlled."

The data are from the 1999 Press Freedom Worldwide Country Ratings of The Freedom House. Lower values indicate higher levels of press freedom. This index takes into account laws and administrative decisions affecting the press, as well as the extent to which political and economic influences affect its operations. The organization utilizes data from "correspondents overseas, staff travel abroad, international visitors, findings of human rights and press organizations, a regular flow of foreign publications, a 24-hour news service, specialists in geographic and geopolitical areas, and reports of governments themselves" to generate this index.[12]

Level of Education (SCHOOL): Ades and Di Tella (1997, p. 1029) include average years of total schooling in their corruption regressions, and they justify the inclusion of this variable by the "presumption that in more educated countries with better information flows the costs of corruption will be better understood and will be socially condemned accordingly." They find a mostly significant negative relationship. Van Rijckeghem and Weder (1997) include a similar variable with similar explanations, but their results do not show a significant relationship between education and corruption. The variable used in this paper is the enrollment in primary and secondary education expressed as a percentage of the population age group corresponding to the national regulations for these two levels of education for 1996. The data is from Statistics Unesco.

GNP: Per capita income is a variable that is used in several studies to control for the level of economic development. The regressions in the paper, however, try to capture the primitive determinants of corruption correlated with economic development through variables like SCHOOL, WAGE and PRESS. Nevertheless, two regressions with GNP per capita are presented, for which the data was taken from World Development Report 1999/2000 Tables 1 and 1a (data for 1998), and 1999 World Development Indicators Tables 1.1 and 1.6 (data for 1997).

AREA: This variable measures the land area of the country in thousands of square kilometers. Its role will be discussed later. The data are taken from World Development report 1999/2000.

The summary statistics for all variables are presented in Table 2. Note that because country coverage varies depending on the variable in question, the ultimate samples (for which all the variables are observed) are smaller in size than any of the observation counts in Table 2.

4. Empirical Results

4.1. OLS Estimates

The results of the OLS regressions are presented in Table 3. Since the results are stronger when the variables are in logarithmic form, only these estimates are reported. The first

Table 2. Summary statistics.

Variable name	Number of observations	Mean	Standard deviation
Corruption Perceptions Index (CORR)†	85	4.887	2.403
Number of Local Jurisdictions* (DEC-#Jrsd)	72	0.099	0.146
Number of Local & Intermediate Jurisdiction* (DEC-#All_Jrsd)	72	0.100	0.147
Share of Noncentral Government Employment (DEC-Labor)	62	0.421	0.213
Share of Noncentral Government Expenditure (DEC-spend)	51	0.258	0.150
Average Government Wages/per Capita GDP (WAGE)	66	2.755	2.120
Imports/GDP (IMPORT)	64	0.404	0.244
Ethnolinguistic Fractionalization Index (ETHLNG)	70	0.379	0.303
Freedom of the Press Index (PRESS)†	84	37.702	21.727
School Enrollment Ratio (SCHOOL)	64	91.313	18.662
Surface area in 1000 Km^2's (AREA)	85	1149.642	2747.923

*Normalized by Population.
†Denotes that the index is a decreasing measure.

eight columns of Table 3 contain two regressions for each of the decentralization variables, reflecting slightly different specifications. The last two columns present results using the unnormalized versions of the first two decentralization measures.

The first notable feature of the results is that all of the estimated decentralization coefficients are positive, indicating (as expected) that greater decentralization reduces corruption. In interpreting the positive signs, recall that a higher value of the Corruption Perceptions Index indicates *less* corruption. Despite this favorable sign pattern, however, only four out of the first eight decentralization coefficients are significantly different from zero, with three of these instances showing significance at just the 10 percent level. Moreover, significance is attained in three cases only in incomplete specifications that leave out one of the control variables. A significant DEC-#Jrsd coefficient emerges in the equation where the PRESS variable is dropped, and significant DEC-Labor and DEC-Spend coefficients emerge only in equations without the SCHOOL variable.

Columns (9) and (10) report the results of two regressions that use unnormalized versions of the decentralization variables DEC-#Jrsd and DEC-#All. Like the regressions in columns (1) and (4), the results show positive but insignificant coefficients on the decentralization variables. The results for the other control variables are similar to those in the other regressions.

While the results therefore do not provide unequivocal support for the main hypothesis, the evidence they offer is hard to ignore. Regardless of whether decentralization is measured by a count of subnational jurisdictions or by shares of employment or spending, the point estimates show that its effect is always to reduce corruption. Moreover, the decentralization variable that is perhaps most closely linked to the theory (the normalized DEC-#All_Jrsd, which counts all subnational jurisdictions) performs well in a specification that includes the full list of controls. In this specification (column 3 in Table 3), the decentralization

Table 3. Ordinary least squares regressions.

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DEC-#Jrsd	0.061	0.078*								
	(1.597)	(1.762)								
DEC-#All_Jrsd			0.066*	0.048						
			(1.713)	(1.007)						
DEC-Labor					0.151	0.348***				
					(1.149)	(3.138)				
DEC-Spend							0.100	0.158*		
							(0.907)	(1.803)		
DEC-#Jrsd (Unnormalized)									0.029	
									(0.934)	
Dec-#All_Jrsd (Unnormalized)										0.031
										(1.003)
WAGE	0.025	−0.153	0.027	−0.080	0.030	0.007	−0.019		0.024	0.026
	(0.217)	(−1.294)	(0.240)	(−0.583)	(0.276)	(0.059)	(−0.122)		(0.200)	(0.219)
IMPORT	0.208*	0.200	0.211*	0.131	0.272**	0.254**	0.144	0.121	0.209*	0.212*
	(1.974)	(1.616)	(2.012)	(1.052)	(2.308)	(2.167)	(1.230)	(1.055)	(1.804)	(1.836)
ETHLING	0.018	0.024	0.018	−0.057	0.001	−0.058	−0.008	−0.082	0.005	0.004
	(0.363)	(0.412)	(0.358)	(−0.971)	(0.012)	(−1.119)	(−0.116)	(−1.471)	(0.093)	(0.073)
PRESS	−0.356***		−0.355***	−0.448***	−0.354***	−0.422***	−0.329**	−0.389***	−0.387***	−0.387***
	(−3.351)		(−3.357)	(−4.579)	(−3.344)	(−4.807)	(−2.558)	(−3.977)	(−3.549)	(−3.564)
SCHOOL	0.746***	1.179***	0.740***		0.698**		0.918		0.756**	0.751**
	(2.800)	(4.303)	(2.792)		(2.461)		(1.690)		(2.724)	(2.711)
Constant	−0.540	−3.562**	−0.537	2.987***	0.079	3.488***	−1.126	3.187***	−0.474	−0.466
	(−0.387)	(−2.847)	(−0.387)	(7.334)	(0.052)	(11.127)	(−0.401)	(9.351)	(−0.329)	(−0.324)
Number of observations	33	33	33	40	32	40	24	34	33	33
F-Statistics	14.92***	11.36***	15.18***	10.46***	14.28***	15.28***	8.63***	12.64***	13.79***	13.88***
Adjusted R^2	0.72	0.62	0.73	0.55	0.72	0.65	0.67	0.59	0.71	0.71

Dependent Variable: Corruption Perceptions Index.
All Variables in Logarithmic Form.
***, ** and * denote significance at 1%, 5% and 10% levels, respectively.
t-statistics are shown in parentheses.

coefficient is significant at the 10 percent level. Thus, the empirical results are suggestive, indicating that the hypothesized link between decentralization and corruption may indeed exist. This conclusion points to the need for additional, more-ambitious empirical work, perhaps making use of panel data. Collection of such international data is arduous, however, given the poor coverage and limited frequency of some data series.

Since a broader purpose of this study is to increase the scant amount of empirical evidence on the determinants of corruption, the impacts of the other (control) variables are worth examining. As predicted, press freedom has a negative and significant effect on corruption under all the specifications in Table 3, with the magnitude of the PRESS coefficients showing considerable stability. Although not as consistently significant as PRESS, SCHOOL also performs well, with the expected negative effect. The positive sign of IMPORT's coefficient in all of the regressions suggests that the openness of an economy, expressed as the share of imports in GDP, is inversely related to the level of corruption, as predicted. However, this relationship does not always display statistical significance.

Ethnolinguistic Fractionalization Index has frequently been used as an explanatory variable for corruption, but its coefficients are not significant in any of the regressions reported here. The relative wage in the public sector also does not have a significant effect in any of the specifications, and both of these last two variables exhibit coefficient signs that differ across specifications.

It can be argued that per capita GNP should be included as a determinant of corruption, following previous studies which included per capita income as an explanatory variable to account for the level of economic development, like Ades and Di Tella (1995, 1997) and Van Rijckeghem and Weder (1997). However, this variable is highly correlated with SCHOOL, PRESS and ETHLNG, the primitive determinants of corruption that are of more direct interest. Despite this drawback, regressions that include per capita GNP are shown in the first two columns of Table 4, using the specifications in columns (6) and (8) of Table 3. As can been seen, per capita GNP has a significantly positive impact on the corruption index, indicating that rising incomes reduce corruption. The results for the other variables are qualitatively unchanged in the DEC-Labor equation, but the decentralization variable and PRESS lose their significance in the DEC-Spend equation.

4.2. Considering Endogeneity

The above results assume that there is a one-way causality between fiscal decentralization and corruption. However, it is conceivable that bureaucrats in corrupt governments make an effort to prevent fiscal decentralization for fear of losing income, if the hypothesis that fiscal decentralization lowers corrupt earnings is correct. In this case, the coefficients estimated by OLS are biased.

2SLS regressions are run in order to control for reverse causation. The instrument that is used is the surface area of the country in thousand square kilometers (AREA). An ideal instrument should affect how decentralized a country is, but not how much corruption exists. Intuitively, the area of a country should not have any direct impact on the level of corruption. However, AREA is a variable that has often been used as an explanatory variable for the degree of fiscal decentralization (see Wasylenko (1987) and Panizza (1999)).

Table 4. Additional results.

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
DEC-Labor	0.190*		0.141	0.313		
	(1.844)		(0.562)	(1.074)		
DEC-Spend		0.026			0.282	−0.005
		(0.357)			(0.661)	(−0.016)
WAGE	0.056		0.030	0.002	0.064	
	(0.567)		(0.274)	(0.014)	(0.252)	
IMPORT	0.230**	0.104	0.267*	0242	0.206	0.015
	(2.307)	(1.201)	(21.771)	(1.613)	(1.095)	(0.066)
ETHLNG	−0.012	−0.036	0.000	−0.061	−0.014	−0.083
	(−0.274)	(−0.826)	(0.008)	(−1.069)	(−0.192)	(−1.410)
PRESS	−0.192*	−0.131	−0.355***	−0.429***	−0.313**	−0.463***
	(−1.988)	(−1.434)	(−3.289)	(−4.148)	(−2.185)	(−2.676)
SCHOOL			0.707**		0.672	
			(2.083)		(0.834)	
GNP	0.295***	0.358***				
	(3.772)	(4.811)				
Constant	−0.086	−1.097	0.029	3.462***	0.227	3.035***
	(−0.088)	(−1.184)	(0.015)	(9.351)	(0.053)	(6.588)
Number of observations	40	34	32	40	24	34
F-Statistic	20.06***	22.47***	14.11***	13.50***	7.39***	10.57***
Adjusted R^2 from 1st stage			0.57	0.32	0.44	0.31
DWH statistic			0.002	0.017	0.219	0.306

Columns (1)–(2): Ordinary Least Squares Regressions.
Columns (3)–(6): Two-Stage Least Squares Regressions.
Dependent Variable: Corruption Perceptions Index.
All Variables in Logarithmic Form.
***, ** and * denote significance at 1%, 5% and 10% levels, respectively.
t-statistics are shown in parentheses.

The system of equations underlying the 2SLS estimation is:

$$\begin{aligned} CORRUPTION_i &= \alpha + \beta\, DECENTRALIZATION_i + \gamma X_i + \varepsilon_i \\ DECENTRALIZATION_i &= \delta + \zeta\, CORRUPTION_i + \eta Z_i + \upsilon_i \end{aligned} \tag{24}$$

where Z_i stands for the vector of exogenous variables and υ_i is the error term.

The results of the 2SLS estimations are shown in Table 4. The instrument works poorly for the specifications with DEC-#Jrsd and DEC-#All_Jrsd, so these results are not reported.[13] In columns (3) and (4), the magnitudes of the decentralization coefficients are about the same as in the OLS regressions, although DEC-Labor loses significance in column (4). In regressions (5) and (6), the coefficients of DEC-Spend are not significant.

Looking at all of the 2SLS results, it can be seen that the WAGE and ETHLING coefficients continue to show patterns similar to the OLS results, almost always staying insignificant. PRESS again turns out to be a consistently significant determinant of corruption, and its coefficient does not vary much across specifications. IMPORT and SCHOOL give mixed results depending on the specification.

Another statistic that is presented for each 2SLS regression is the F-statistic for the augmented Durbin-Wu-Hausman test, shown in the last row of Table 4.[14] The null hypothesis is that OLS would produce consistent estimates for the same regression. In none of the cases can the null hypothesis be rejected. This means that there may be no need to use 2SLS. It should be noted, however, that if the instrument is poor, the Hausman test rarely rejects OLS (Johnston and DiNardo, 1997, pp. 356–358).

Given the fragility of the results in Table 3, it is not surprising that an attempt to correct for possible endogeneity of decentralization does not meet with much success. However, it is conceptually important to bear the endogeneity issue in mind as research on the link between fiscal decentralization and corruption proceeds.

5. Conclusion

Motivated by a theoretical model, this paper has explored the link between fiscal decentralization and corruption. By focusing on a possible determinant of corruption that has not been studied previously, the paper adds to a small literature that attempts to understand the genesis of corrupt activities.

The empirical results are not particularly strong, but they offer tantalizing evidence that corruption may indeed be lower in countries where the extent of fiscal decentralization is high. If confirmed by additional research, this finding would suggest that the benefits of decentralization go beyond the well known gains from a better match between public spending and consumer preferences, as identified by Tiebout (1956). The benefits may include a reduction in public corruption, with bureaucrats in a fiscally decentralized economy less able to engage in rent-seeking behavior.

Appendix

To see that z increases with n, substitute (21) and (22) into the budget constraint (19):

$$\frac{\partial z}{\partial n} = \frac{-\bar{k}tU_{zx}U_z}{n^2 f''\bar{k}^2(U_{xx}U_{zz} - U_{xz}U_{zx}) + n(n-1)U_zU_{zz}} > 0. \tag{25}$$

The reason for this conclusion is that corrupt earnings fall faster than tax revenue as n increases, allowing the level of the public good to rise. This will hold true as long as the two goods are complements. Another result derived from (20) is that

$$\frac{\partial x}{\partial n} = -\bar{k}\frac{\partial t}{\partial n} > 0, \tag{26}$$

showing that x rises with n (lower taxes enable the consumers to spend more on the private good).

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Notes

1. *Helping Countries Combat Corruption: The Role of the World Bank*, Poverty Reduction and Economic Management, The World Bank, September 1997, p. 8.
2. After the first version of this paper was completed, I became aware of unpublished research on the same subject by R. Fisman and R. Gatti. Their paper was recently published in the *Journal of Public Economics* (Fisman and Gatti, 2002).
3. An anonymous referee pointed out several of these possible effects.
4. See Wilson (1999) for a recent survey.
5. Transparency International indices, which Tanzi (1998) calls the "best-known" of the surveys on corruption, are also used by Gupta, Davoodi and Alonso-Terme (1998), Alesina and Weder (1999) and Treisman (2000).
6. By contrast, in Edwards and Keen (1996) jurisdictions maximize a weighted sum of tax revenues and residents' utility.
7. Since jurisdictions were assumed to each contain a single resident in Hoyt's (1991) model, he found it necessary to assume that the total capital stock increases along with n in order to keep $\bar{k}$ constant. Allowing jurisdictions to naturally shrink in size as their number grows obviates the need for this assumption.
8. The 1998 index incorporates in it data from the "Country Risk Service and Country Forecasts" of the Economist Intelligence Unit, the "50th Anniversary Survey" of Gallup International, the "World Competitiveness Yearbook" of the Institute for Management Development, the "Asian Intelligence Issue" of the Political and Economic Risk Consultancy, the "International Country Risk Guide" of the Political Risk Services, the "Private Sector Survey" of the World Development Report and the "Global Competitiveness Report" of the World Economic Forum, according to Dr. Johann Graf Lambsdorff's "Transparency International 1998 Corruption Perceptions Index Framework Document" dated September 1998.
9. I thank Dr. Hamid Davoodi for suggesting the application of such measures to international data.
10. Lines C.II, C.3.2 and C.7.1.1 from the Consolidated Central Government Table, Table St. and Table L are used.
11. Van Rijckeghem and Weder's data set is not available.
12. "Country Ratings, Press Freedom Worldwide, January 1, 1999," part on Methodology, Freedom House.
13. Several other instruments, mostly involving the characteristics of the terrain of the country, were tried with no better results.
14. Davidson and MacKinnon (1993), pp. 237–240.

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