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Are corruption and taxation really harmful to growth? Firm level evidence

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Abstract

Exploiting a unique data set containing information on the estimated bribe payments of Ugandan firms, we study the relationship between bribery payments, taxes and firm growth. Using industry-location averages to circumvent potential problems of endogeneity and measurement errors, we find that both the rate of taxation and bribery are negatively correlated with firm growth. A one-percentage point increase in the bribery rate is associated with a reduction in firm growth of three percentage points, an effect that is about three times greater than that of taxation. This provides some validation for firm-level theories of corruption which posit that corruption retards the development process to an even greater extent than taxation.

JEL classification: D92; H25; O14
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1. Introduction

The debate on the effect of corruption on economic growth has been a hotly contested issue for several decades. Often, the effect of corruption is thought of as being something like a tax,

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differing primarily in that the payment does not end up as public revenues.[1] To the extent that this deprives the government of revenue required to provide productive public goods, corruption may be more detrimental to growth than taxation. More recently, Shleifer and Vishny (1993) have argued that corruption may be far more damaging than taxation, because of higher transaction costs due to the uncertainty and secrecy that necessarily accompany bribe payments and the fact that corrupt contracts are not enforceable in courts. On the other side, proponents of “efficient corruption” claim that bribery may allow firms to get things done in an economy plagued by bureaucratic holdups.[2] Moreover, it has also been argued that a system built on bribery will lead to an efficient process for allocating licenses and government contracts, since the most efficient firms will be able to afford to pay the highest bribes (see Lui, 1985).

Hence, the issue of whether bribery is more harmful than taxation, or if, in fact, corruption is damaging at all, is primarily an empirical question. The relationship between growth and corruption has been examined extensively in the macro literature, beginning with Mauro (1995). In general, these studies find a negative correlation between corruption and GDP growth. This body of work is based entirely on cross-country analyses, however, which always raises serious concerns about unobserved heterogeneity across data points. Moreover, the data on corruption is based on perception indices, typically constructed from experts' assessments of overall corruption in a country, raising an additional concern about perception biases. Finally, the cross-country work on the relationship between corruption and growth tells us little about the effect of corruption on individual firms: for example, the negative relationship between growth and corruption at the country level may derive from an inefficient provision of public goods. If this were the case, corruption would not be damaging for the reasons cited by Shleifer and Vishny, and others that focus on firm-level theories of corruption.[3]

In this paper, we take advantage of a unique data set that contains information on the estimated bribe payments of Ugandan firms. We find that there is a (weak) negative relationship between bribery payments and firm growth over the period 1995–1997. After noting the potential problems of endogeneity and measurement error, we look at the relationship between firm growth and bribe payments, using industry-location averages as instruments, and find that the negative effect is considerably stronger. For the full data set, a one percentage point increase in the bribery rate (as defined by bribe payments divided by sales) is associated with a reduction in firm growth of more than three percentage points, an effect that is about 2.5 times greater than that of taxation. Moreover, after outliers are excluded, we find a much greater negative impact of bribery on growth, while the effect of taxation is considerably attenuated. This provides some validation for firm-level theories of corruption which posit that corruption retards the development process to a greater extent than taxation.

The Uganda data set is well suited to analyze the effects of corruption on growth. First of all, the sample of firms is a random set of firms across the main industrial categories. Second, most firms in the sample are small (median firm has 35 employees). Causal empiricism suggests that in general, and in Uganda in particular, the regulatory process is not captured by these types of firms,

[1] See Johnson et al. (1997) on the public finance aspect of corruption, and Bardhan (1997) and Svensson (2005) for reviews of existing literature.

[2] See the discussion in Bardhan (1997) and Svensson (2005). Kaufmann and Wei (1998) provide some indirect evidence in line with Myrdal's (1968) argument that corrupt officials may instead of speeding up, actually cause administrative delays in order to attract more bribes. See also Banerjee (1997).

[3] It is also possible to find that bribe payments are positively correlated with growth in a cross-section of firms, although corruption reduces economic growth at the macro level. This would be the case, for example, if bribes are means by which individual firms get ahead at the expense of those that do not pay.

but a small set of large, politically powerful enterprises. Moreover, the managers in our sample of firms, on average, consider corruption as one of the most important impediments to growth. Finally the extent of reported corruption varies greatly across firms, and as shown in Svensson (2003), part of this variation is due to industry-specific factors.[4]

The rest of this paper is structured as follows: in Section 2, we will describe the specification that we intend to use to examine the relationship between growth and corruption. Section 3 describes the data, including details of how our data on bribe payments were collected. The results are given in Section 4. Finally, Section 5 concludes.

2. Empirical strategy

There are two main econometric issues of assessing whether corruption will have a significant retarding effect on growth: (i) problems due to measurement errors, and (ii) the fact that both growth and corruption are likely to be jointly determined. Below we discuss how we attempt to deal with these issues.

If bureaucrats can customize the nature and amount of harassment on firms to extract bribes, the “required bribe” will depend on the firm’s willingness/ability to pay (see Bliss and Di Tella, 1997; Svensson, 2003). Two firms in the same sector may thus need to pay different amounts in bribes, and the difference may be correlated with (unobservable) features influencing the growth trajectory of the firms. A simple example illustrates the point. Consider two firms in a given sector of similar size and age, which are located in the same region. One of the firms is producing a good/brand that is perceived to have a very favorable demand forecast, while the other firm is producing a good with much less favorable demand growth. Assume furthermore that the firms need to clear a certain number of business regulations and licensing requirements, and/or require some public infrastructure services; moreover, assume that the bureaucrats have discretion in implementing and enforcing these regulations and services. A rational and profit maximizing bureaucrat would try to extract as high a bribe as possible, subject to the constraints that the firm might exit, and/or the bureaucrat may get caught. In this setup we would expect a bureaucrat to demand higher bribes from the firm producing the good with a favorable demand forecast, simply because this firm’s expected profit are higher and, thus, its ability to pay larger. If the forecasts also influence the firms’ willingness to invest and expand, we would expect (comparing these two firms) a positive (observed) relationship between corruption and growth.

A second problem of endogeneity arises if firms may specialize in rent-seeking or efficiency as a means of growth. Specifically, it is possible that firms may differentially choose to devote resources to obtaining valuable licenses, preferential market access, and so forth. Thus, some firms choose to compete based on costly preferential bureaucratic access, while others focus on improving productivity and investing in new capital (see for example Murphy et al., 1991). Both strategies may lead to growth, and in equilibrium, it is not clear that either firm type will grow more rapidly.

The preceding difficulties will tend to mask any direct negative effect that corruption has on growth. These problems may be mitigated by instrumenting for bribes. Our identification strategy can be laid out formally with minimal notational complexity by initially disregarding the

[4] Svensson (2003) investigates what factors can explain the incidence and the level of bribes across firms using the same data. Our focus instead is on explaining the impact of corruption.

relationship between growth and taxation. We can then state the relationship between firm growth (γ_{ij}) and corruption (b_{ij}) as:

$$\gamma_{ij} = \Gamma(b_{ij}(\theta_{ij}), p_{ij}, \theta_{ij}) \tag{1}$$

where subscripts refers to firm i in sector j. In (1), θ_{ij} is a firm-specific (unobservable) factor that may impact both bribery rates and firm growth, p_{ij} is a variable capturing the firm's growth potential. The firm's growth potential can be decomposed into two parts,

$$p_{ij} = X'_{ij}\,\delta + \eta_{ij} \tag{2}$$

where X_{ij} is a vector of observable characteristics, and η is a zero-mean error term.

Linearising the model yields,

$$\gamma_i = \beta_0 + \beta_b b_{ij} + X'_{ij}\delta + \beta_\theta \theta_{ij} + \eta_{ij}, \tag{3}$$

Our previous discussion implies that the omitted variable θ_{ij} is correlated with both growth ($\beta_\theta \neq 0$) and bribery (corr(b,θ)$\neq$0). In line with the discussion in the introduction, we assume that $\beta_\theta > 0$ and corr(b,θ)$>$0. For example, we can think of the shifts in demand described above that is likely to influence both the "required" bribe and growth.[5] Assuming, for simplicity, that θ is essentially uncorrelated with X, this leads to the usual omitted variable bias; given our assumptions, the bias will be towards zero, resulting in an underestimate of the effects of bribery.

Following the discussion above, our identifying assumption to deal with this problem is that b_{ij} can be decomposed into two terms, one industry-specific, and the other particular to the firm:

$$b_{ij} = B_{ij} + B_j \tag{4}$$

In (4), B_j denotes the (average) amount of bribes common to industry-location j, which in turn is a function of the underlying characteristics inherent to that particular industry-location, determining to what extent bureaucrats can extract bribes, while B_{ij} denotes the idiosyncratic component. More importantly, since we assume that the industry-specific part of bribery is determined by underlying technologies and the rent-extraction talents and inclinations of bureaucrats, we assume that this component is exogenous to the firm, and hence uncorrelated with θ. For example, such industry-specific factors might include the extent to which the market for the produced goods is abroad, import reliance, and dependence of publicly provided infrastructure services. Likewise, we expect rent extraction through bribery to differ across locations simply because some bureaucrats may be more effective at extracting bribes than others. If this assumption is valid, we may use B_j to instrument for b_{ij}, since corr(B_j,θ)=0. In such a specification, using industry-location averages as an instrument for firm-level bribery gets rid of the bias resulting from unobservables that are correlated with bribery at the firm, but not industry-location, level.

The other significant estimation issue that we wish to address is the extent and impact of "noisy" data, which is a common concern when using micro-level data. Despite our data collection strategy outlined below, measurement errors, particularly in the bribe data, are likely to be of concern, simply because of the secretive nature of these data. Using grouped averages as

[5] The model could equivalently be framed in terms of simultaneously determined bribery rates and growth, leading to a simultaneity bias from OLS.

instruments to deal with measurement error is a common technique.[6] In our case, the industry-location averages we use should serve to mitigate the effects of measurement error, since we generally think of these errors as being largely idiosyncratic to the firm, and hence uncorrelated with the average bribery values.

In a country such as Uganda, where tax authorities have a high degree of discretion (see Chen and Reinikka, 1999), we might expect that the relationship between effective tax rates (τ) a firm needs to pay and growth to be influenced by the same types of mechanisms. A rational tax collector (who may also be corrupt) can levy higher taxes on a firm with higher current or expected future profits, and the firm (given expectations of high future profits) may also be more willing to comply. Similarly, a firm may specialize in evading taxes and colluding with the tax collector, or improving productivity.

Before proceeding, we wish to discuss the plausibility of our identifying assumption. The key assumption we make is that corr(B_j,θ)=0; the primary objection to this is that there might be processes at the industry-location level that are correlated with θ, *and* required bribe payments. There are several reasons to believe that this is not the case. First, our data set consists of primarily small and medium firms across a spectrum of the most important industrial categories and regions in Uganda. While there is ample anecdotal evidence of firms that have gained (and gained substantially) by bribing officials (and politicians), these episodes appear to be idiosyncratic with respect to industry-locations. We know of no evidence (systematic or anecdotal) that suggests that any of the industries-locations in the data set have been systematically favored (or disfavored) by the government. In most cases, these anecdotes refer to a small set of large enterprises with good connection to the political elite. In addition, even if there are processes at the industry-location level, it is not obvious how they would influence the results. Admittedly, if government officials systematically increase both the regulatory burden and demands for bribes for some industry-locations, then our instrument procedure would over-estimate the negative effect of bribe payment. However, if government officials systematically choose to victimize (i.e., demand higher bribes from) industries/locations with high growth potential, this would attenuate any relationship between growth and industry-location bribery averages, and thus work against our finding any effect. In Section 4, we provide empirical evidence supporting our identifying assumption: our instruments (industry-location averages) do not appear to pick up other unobserved industry-location effects that are correlated with growth.

Our empirical model is,

$$\gamma_i = \beta_0 + \beta_b b_i^{\mathrm{INS}} + \beta_\tau \tau_i^{\mathrm{INS}} + X_i' \delta + \eta_i, \tag{5}$$

where b^{INS} and τ^{INS} are the fitted values from the first stage regressions, using location-industry averages of b and τ as instruments, and including the same vector of control X as covariates.

3. Data

All data used in the paper is from the Ugandan Industrial Enterprise Survey (see Reinikka and Svensson, 2001, for details). This survey was initiated by the World Bank primarily to collect data on the constraints facing private enterprises in Uganda, and was implemented during the period January–June 1998. A total of 243 firms were interviewed in 5 locations, in 14 different industries.

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[6] See Wald (1940) for the original contribution and Krueger and Angrist (2001) for a recent review of this approach.

Of primary concern is the issue of whether reliable data on corruption may be collected. For a long time it has been the common view that, given the secretive nature of corrupt activities, it would be virtually impossible to collect reliable quantitative information on corruption. However, with appropriate survey methods and interview techniques firm managers are willing to discuss corruption with remarkable candor.

The empirical strategy utilized to collect information on bribe payments across firms in Uganda had the following six key components (see Svensson, 2003, for details). First, an employers' association (Ugandan Manufacturers' Association) carried out the survey. In Uganda, as in many other countries, people have a deep-rooted distrust of the public sector. To avoid suspicion of the overall objective of the data collection effort, the survey was done by a body in which firms had confidence. The co-operation with the main private sector organizations had the additional advantage of most entrepreneurs feeling obliged to participate in the survey. Second, questions on corruption were phrased indirectly to avoid implicating the respondent of wrongdoing. For example, the key question on bribe payments was reported under the following question: "Many business people have told us that firms are often required to make informal payments to public officials to deal with customs, taxes, licenses, regulations, services, etc. Can you estimate what a firm in your line of business and of similar size and characteristics typically pays each year?". Third, corruption-related questions were asked at the end of the interview, when the enumerator(s) had presumably established credibility and trust. Fourth, multiple questions on corruption were asked in different sections of the questionnaire. The survey instrument contained roughly 150 questions and a handful was related to corruption. Fifth, each firm was typically visited at least twice by one or two enumerators (to accommodate the manager's time schedule). The data collection effort was also aided by the fact that the issue of corruption has been desensitized in Uganda. During the mid 1990s, several awareness-raising campaigns were implemented to emphasize the consequences of corruption, and by the time the survey took place, the media was regularly reporting on corruption-cases (See Economic Development Institute, 1998; Ruzindana et al., 1998).

We were able to collect bribery data for 176 firms out of the 243 sampled. Summary statistics are reported in Table 1. 27 of the 67 firms that did not respond to the main corruption question also declined to answer other sensitive questions; for example about cost, sales, and investment, while the remaining 40 firms specifically declined to answer the main question on corruption. The missing bribery data raises concern about possible selection bias. Although we do not have information on why some firms did not volunteer how much they pay in bribes (if any), we can check if the groups of responders and non-responders differ on observables. As discussed in Svensson (2003), the group of firms missing information on corruption (67 firms), and the group of firms only missing information on corruption (40 firms), do not differ significantly in observables (size, profit, and investment) from the group of graft-reporting firms. Thus, there is no (observable) evidence suggesting that the sample of 176 firms is not representative.

The reported bribe payments are highly correlated with other (indirect) measures of corruption, thus significantly enhancing our confidence in the reliability of the bribe data. The respondents were asked of the total costs (including informal payments) of getting connected to the public grid and acquiring a telephone line. As discussed in Svensson (2001), controlling for location (with respect to public grid), these are services that ex ante one would expect firms to pay the same amount for. Thus, deviations from the given price typically reflect graft. Of the 25 firms that had been connected to the public grid over the past three years, all reported positive bribe payments. The partial correlation (controlling for location) between connection costs and bribes is 0.67. The pattern is similar for deviations from the fixed price

Table 1
Summary statistics

Variables	Mean (S.D.)	Observations
GROWTH	0.111 (0.347)	189
BRIBE	0.013 (0.024)	166
TAX	0.085 (0.097)	191
SALES95 ($\times 10^3$ USD)	1669 (6181)	197
FOREIGN	0.243 (0.430)	243
TRADE	0.507 (0.501)	227
AGE	12.9 (12.5)	242

Correlation matrix

GROWTH	1						
BRIBE	−0.043	1					
TAX	−0.088	−0.032	1				
LSALE	−0.019	−0.144	0.172	1			
LAGE	−0.105	−0.136	−0.043	0.180	1		
FOREIGN	.0143	−0.091	0.327	0.331	−0.122	1	
TRADE	0.165	0.064	0.076	0.430	0.028	0.378	1

of telephone connection. Of those 77 firms that reported positive deviations, 15 did not report bribe data. The simple correlation between the excess price of telephone connection and reported bribe payment for the remaining firms is 0.41.

Obviously, when studying the relationship between bribes and growth it is necessary to somehow scale the level of bribe payments. The most natural approach would be to look at bribes as a fraction of profits. This, however, would require perhaps excessive confidence in the abilities of Ugandan firms to produce accounts that adhere to some uniform standard. Moreover, profits can be negative. Instead, we deflate using firm sales, a figure that is much less prone to manipulation and misreporting. Thus, our measure of bribery is given by BRIBE = (bribe payments) / sales. Similarly, we measure tax rates by looking at taxes as a fraction of sales (TAX). Unfortunately, we only have bribery data for 1997; hence, both of these variables are calculated using data from that year. Two firms reported bribery rates in excess of 50%, while one firm reported a tax rate of more than 50%. Given that these values far exceed those reported by all other firms, we believe that these observations are the result of gross misreporting or erroneous recording of sales data and they are therefore dropped from the sample.

As our measure of firm growth, we use historical sales data, which was collected for 1995 and 1996.[7] To calculate a rate of growth, we use

$$\text{GROWTH} = [\log(\text{Sales in 1997}) - \log(\text{Sales in 1995})]/2$$

Ideally, we would look at growth over a longer time horizon; our definition here is dictated by data limitations.

Since firm size may be correlated with bribe payments (as larger organizations are more visible to bureaucrats) and since size may also affect future growth, we include log(Sales in 1995) as a control (LSALES95). Similarly, we include the log of the firm's age (LAGE), which has been found to be correlated with growth in many firm-level studies, and may be correlated with bribes if longer established firms have better access to both bank finance and official contacts. Firms

[7] We obtained virtually identical results by using growth rates of firm profits and employment.

involved in trade, either exporting or importing, may be more vulnerable for rent extraction and subject to greater bureaucratic scrutiny and regulation than firms with only local sales. Since a correlation between growth and trade has been reported in many studies, this will also be an important control. Hence, we include a dummy variable denoting whether a firm either exports or imports directly (TRADE). Finally, we include a variable denoting percent of foreign ownership (FOREIGN). Such firms may grow more quickly due to greater resources, access to markets, and technical expertise, while they may be exempt from bureaucratic harassment as an inducement to locate their operations in Uganda.[8]

Summary statistics and a correlation matrix for the basic variables are listed in Table 1.[9]

4. Estimation

As a benchmark we ran several regressions without controlling for the endogeneity and measurement biases. The results, allowing for a number of specifications, are listed in Table 2. As this table indicates, there is only a weak association between rates of bribery and growth in firm sales (*t*-statistic is −1.38). Throughout, we allow the errors in Eq. (5) to be correlated across firms in a given industry-location; i.e., the standard errors are clustered by industry-location.

Controlling for foreign ownership, there is a statistically stronger relationship between taxation and growth.[10] The coefficient on TAX implies that a one-percentage point increase in the rate of taxation will reduce a firm's annual growth rate by about 0.5 percentage points.

To address the possible endogeneity and measurement error biases, we instrument for bribery and taxation rates using location-industry averages as instruments.[11]

The results from the IV-estimations, listed in Table 3, provide support for the hypothesis that both bribery and taxation have a retarding effect on growth. More precisely, the coefficient on BRIBE takes on values of about 3.3. This implies that a one-percentage point increase in the rate of bribe payments will reduce a firm's annual growth rate by about 3.3 percentage points. The coefficient on TAX is approximately 1.5, implying approximately a 1.5 percentage point decline in annual growth from a 1-percentage point increase in tax rates. Thus, consistent with both theoretical and cross-country evidence, corruption has a stronger negative impact on growth than taxation.

4.1. Robustness

Until now, we have taken an extremely conservative approach with respect to outliers: only three observations, which seem quite clearly to be a result of misreporting, have been dropped.

[8] Alternatively, one could easily imagine that foreign firms would be required to pay higher bribes since, as newcomers to the Ugandan market they lack appropriate government connections.

[9] The average bribe rates may seem low. However, this is mainly driven by the choice of denominator and the fact that around 20% of the firms reported that they did not have to pay bribes. As reported in Svensson (2001), for the firms that reported positive bribes, the average amount of corrupt payment was US$ 8280, corresponding to US$ 88 per worker. Roughly half of the firms reporting positive bribe payments pay more annually in graft than for security (including guards, equipment, etc.). Compared to other costs items, average graft payments exceeds for example average cost of fuel and average interest payments. Of the 149 firms for which we have data on both corruption and taxation, about 17% paid higher graft than taxes, and about 25 percent of the firms paid roughly the same amount (i.e., for those firms the absolute difference between BRIBE and TAX is smaller than 0.01).

[10] Holding other determinants constant, foreign firms on average pay higher taxes and grow faster.

[11] Not all regions have firms in all sectors. In total there are 42 industry-location groups. The mean (median) number of firms in each group is 5.5 (4.5).

Table 2
Effect of bribery and taxation on growth, basic relationship

Dependent variable: GROWTH			
	(1)	(2)	(3)
Method	OLS	OLS	OLS
BRIBE	−1.249 (0.903)	−1.069 (0.889)	−1.151 (0.920)
TAX	−0.285 (0.247)	−0.538** (0.252)	−0.534** (0.226)
LSALES95	0.002 (0.011)	−0.009 (0.012)	−0.019 (0.013)
LAGE	−0.052 (0.043)	−0.042 (0.040)	−0.040 (0.046)
FOREIGN		0.182** (0.085)	0.134 (0.088)
TRADE			0.126 (0.075)
Cons	0.224 (0.239)	0.391 (0.249)	0.548** (0.254)
R^2	0.02	0.06	0.08
Observations	126	126	123

Standard errors in parentheses; all regressions use Huber–White correction for heteroskedasticity, allowing for clustering by location-industry.
**Significant at the 5% level.

However, some fairly serious outliers remain in the sample. In particular, there are four firms with changes in log sales of more than two, and one firm with a bribery rate of 0.2 (the second-highest value is 0.11). While there is no theoretical justification for deleting these observations, it would be of considerable concern if our results were completely driven by them. To examine this possibility, we determine the multivariate outliers for the three variables GROWTH, BRIBE, and TAX according to the method of Hadi (1992); similarly, multivariate outliers were determined for the second stage of the IV estimation. A total of 9 observations were flagged as outliers for the OLS specification and 4 outliers were identified for the IV specification.

Our analyses were repeated for both specifications, with these outliers excluded. The results, listed in Table 4, imply that the outlying observations were pushing the measured effect of bribery towards zero in both specifications: excluding outliers increases the coefficient on bribery rates by a factor of 5 in the OLS specification and doubles the coefficient in the IV specification. By contrast, the growth-reducing effect of taxation suggested by the coefficient on both TAX in Table 2 and the instrumented tax rates in Table 3 seem to derive partly from a small number of extreme observations. Hence, the effect of bribery increases substantially when a small number of rather dubious observations are omitted, while the measured effect of taxation actually declines.

Shleifer and Vishny (1993), Wei (1997a,b) and others have argued that it is the element of uncertainty in bribery payments that is particularly damaging. If this were the case, then the relevant independent variable would be the variance of BRIBE, as perceived by an individual firm. However, the correlation between the average of BRIBE and the variance of BRIBE, taken at the industry level, is 0.83, raising concerns of collinearity. In fact, when each such variable is used separately, they produce similar results; when both are included, neither is significant, presumably because of problems of multicollinearity. Note that parallel results exist for the taxation variables, where problems surrounding uncertainty are expected to be lower.

We experimented with several other potential explanatory variables, including measures of competition (number of main competitors, market share), human capital proxies of the owner/manager (higher education, years of previous experience, experience of working abroad), and structural features (distance to the capital). We also ran regressions with location fixed effects or

Table 3
Effect of bribery and taxation on growth: instrumental variable estimation

Dependent variable: GROWTH					
	(1)	(2)	(3)	(4)	(5)
Method	IV	IV	IV	IV	IV
BRIBE	−3.320**	−3.291**	−3.635**	−4.173**	−3.485**
	(1.558)	(1.641)	(1.671)	(2.100)	(1.628)
TAX	−1.342**	−1.579**	−1.698**	−1.849**	−1.640**
	(0.638)	(0.684)	(0.680)	(0.723)	(0.701)
LSALES95	0.008 (0.018)	−0.009 (0.014)	−0.019 (0.015)	−0.022 (0.017)	−0.019 (0.015)
LAGE	−0.063 (0.043)	−0.049 (0.039)	−0.052 (0.044)	−0.060 (0.046)	−0.051 (0.043)
FOREIGN		0.261** (0.001)	0.216** (0.102)	0.211** (0.101)	0.2(0.102)
TRADE			0.125* (0.066)	0.133** (0.064)	0.125* (0.066)
INFRASERV				0.043 (0.039)	
REGULATION				0.012 (0.054)	
Cons	0.249 (0.340)	0.506* (0.304)	0.671** (0.314)	0.569* (0.307)	0.664** (0.308)
F-test of instruments (in BRIBE regression)	24.05 {0.00}	24.14 {0.00}	23.65 {0.00}	19.66 {0.00}	13.33 {0.00}
F-test of instruments (in TAX regression)	18.04 {.000}	27.53 {.000}	23.61 {.000}	25.98 {.000}	14.11 {.000}
Hansen *J*-statistic					1.153 {.562}
Observations	126	126	123	123	123

Standard errors in parentheses; all regressions use Huber–White correction for heteroskedasticity, allowing for clustering by location-industry.

The instruments are industry-location averages of BRIBE and TAX in specifications (1)–(4). In specification (5), industry-location averages of REGULATION and INFRASERV are added as additional instruments.

F-test on instruments is the test statistic on the *F*-test of the joint significance of the instruments (BRIBE, TAX, REGULATION and INFRASERV) in the first-stage regressions, with *p*-values in braces. Hansen *J*-statistic is the test statistic on the overidentification test of the instruments, with *p*-values in braces.

* Significant at the 10% level.

** Significant at the 5% level.

industry fixed effects (with firms classified into five industrial sectors: commercial agriculture, agro-processing, other manufacturing, construction, and tourism. In these cases the variation used to identify the effects come from the variation across industries (locations) in a given location (industry). However, including any one of these variables in the growth equation did not significantly affect the relationship between corruption and growth.

As a final test of the identifying assumption, we include two measure taken from Svensson (2003) of the control public officials maintain over the firms.[12] The first variable is the percentage of senior management's time spent dealing with government regulations each month (REGULATION). The second variable is an index (INFRASERV) of the availability of five key public services (electricity, water, telephones, waste disposal, and paved roads). As stressed above, our identifying assumption would be invalid if some industries-locations have been systematically disfavored by the government in that they receive less and worse public services and government officials systematically increase both the regulatory burden and demands for bribes. If this would be the case, presumably firms in industry-locations with few public services and extensive regulation would grow slower. In column (4), Table 3, we add the industry-location averages of

[12] Svensson (2003) finds firms with more extensive dealing with the public sector are more likely to pay bribes.

Table 4
Effect of bribery and taxation on growth, outliers excluded

Dependent variable: GROWTH		
	(1)	(2)
Method	OLS	IV
BRIBE	−6.261** (2.973)	−7.875** (3.728)
TAX	−0.314* (0.171)	−0.817** (0.388)
LSALES95	−0.013 (0.009)	−0.026 (0.015)
LAGE	−0.031 (0.026)	−0.048 (0.028)
FOREIGN	0.096* (0.056)	0.136* (0.071)
TRADE	0.052 (0.044)	0.080* (0.044)
Cons	0.411** (0.161)	0.779** (0.284)
R^2	0.11	
Observations	114	119

Standard errors in parentheses; all regressions use Huber-White correction for heteroskedasticity, allowing for clustering by location-industry.
* Significant at the 10% level.
** Significant at the 5% level.

REGULATION and INFRASERV as additional controls in the IV-specification. The coefficients on BRIBE and TAX become larger in absolute values, while both the extent of regulation and public service delivery enter insignificantly. In column (5), we instead add these two control variables as instruments. To the extent that REGULATION and INFRASERV have no direct effect on growth (as suggested in column 3) and since they influence to what extent firms are under bureaucratic control; i.e., the influence the public officials' bargaining power vis-à-vis the firms, they are valid instruments. Adding these additional instruments has the advantage that the model is now overidentified and that the validity of the instruments can be tested. The instruments perform well. The F-statistic of their joint significance in the first-stage regression is 14.1 and is highly significant. The validity of the instruments (whether they are uncorrelated with the error process in Eq. (5)) is tested, and the null hypothesis that the instruments satisfy the orthogonality conditions cannot be rejected. Importantly, the IV-estimates of BRIBE and TAX remain basically unchanged. These findings provide suggestive evidence in favor of our identifying assumption.

5. Conclusion

We have shown that there is a strong, robust, and negative relationship between bribery rates and the short-run growth rates of Ugandan firms, and that the effect is much larger than the retarding effect of taxation. To our knowledge, this provides the first micro-level support for firm-based theories on the effects of corruption that have generated much attention in recent years. Much more work is still required in this area and while the results should be interpreted with care given the nature of the data and the problem of identifying causal effects, the evidence we have presented and complementary, qualitative, information from firm managers, points in one direction – corruption is a serious constraint in doing business.

The results of this paper also have significant policy implications. The donor community and other organizations have focused increasing attention on looking for ways to combat corruption in developing and transition countries. Our results suggest that such attention is justified by the data. Corruption significantly reduces firm growth, much more so than taxation.

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Appendix A. Data description and data sources

A.1. Data source

All data used in the paper are from the Ugandan Industrial Enterprise Survey (see Reinikka and Svensson, 2001, for details]. The survey was initiated by the World Bank and was implemented during the period January–June 1998 by the UMA (an employers' association). The sampling frame was based on an Industrial census from 1996 and confined to five general industrial categories (commercial agriculture, agro-processing, other manufacturing, construction and tourism). The five sectors could be further classified into 14 three-digit ISIC-categories. Based on the number of enterprises, the five sectors constituted 52% of the private sector, and almost 80% of employment in 1996. The chosen sample size was 250 establishments. Within these five industrial categories, commercial agriculture made up 26% of employment, agro-processing 28%, other manufacturing 32%, construction 12% and tourism 2%. Balancing the importance of the different industrial categories at present with the likely importance in the future, the initial plan prescribed selecting 50 establishments in commercial agriculture, 50 in agro-processing, 100 in other manufacturing, 25 in construction and 25 in tourism. Five geographical regions were covered in the sample (Kampala, Jinja/Iganga, Mbale/Tororo, Mukono, and Mbarara). These regions constitute more than 70% of total employment. Three general criteria governed the choice of procedure in selecting the sample from the eligible establishments. First, the sample should be at least reasonably representative of the population of establishments in the specified industrial categories. Second, the establishments surveyed should account for a substantial share of national output in each of the industrial categories. Third, the sample should be sufficiently diverse in terms of firm size, to enable empirical analysis on the effects of firm size. To account for these three considerations, a stratified random sample was chosen using employment shares as weights. The final sample surveyed constituted 243 firms, and was fairly similar to the initially selected stratified sample (with respect to location and size).

A.2. Data description

GROWTH: Sales growth over the period 1995–1997, defined as [log(Sales in 1997) − log (Sales in 1995)]/2.

BRIBE: Reported bribe in Uganda Shillings as share of sales. Bribe payments were reported under the following question, "Many business people have told us that firms are often required to make informal payments to public officials to deal with customs, taxes, licenses, regulations, services, etc. Can you estimate what a firm in your line of business and of similar size and characteristics typically pays each year?"

BRIBEAV: Average bribe rate (BRIBE) at the location-industry level.

TAX: Reported tax payment in Uganda Shillings (all types of taxes) as share of sales.

TAXAV: Average tax rate (TAX) at the location-industry level.

SALES95: Gross sales in Uganda Shillings (1995).

FOREIGN: Binary variable taking the value 1 if foreign ownership (in %) is above 50%, 0 otherwise.

TRADE: Binary variable taking the value 1 if the firm either exports or imports itself or both and zero otherwise.

LSALES95: Logarithm of SALES95.

LAGE: Logarithm of age of firm.

REGULATION: Logarithm of 1 + percentage of senior management's time spent dealing with government regulations each month.

INFRASERV: Index (0–5) of availability of public services. The index is the sum of five binary variables indicating if electricity, water, telephones, waste disposal, and paved roads are available (service dummy = 1 if available, 0 otherwise).

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