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Decentralization and corruption: new cross-country evidence

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Abstract. We attempt to improve the understanding and measurement of decentralization and its relationship with corruption in a worldwide context. This is done by presenting the conceptual underpinnings of such a relationship as well as using more defensible measures of both decentralization in its various dimensions as well as corruption for a sample of 158 countries. It is the first paper that treats various tiers of local governments (below the intermediate order of government) as the unit of comparative analysis. By pursuing rigorous econometric analysis we demonstrate that decentralization, when properly measured to mean moving government closer to people by empowering local governments, is shown to have a significant negative effect on the incidence of corruption regardless of the choice of the estimation procedures or the measures of corruption used. In terms of various dimensions of decentralized local governance, political decentralization matters even when we control for fiscal decentralization. Further voice (political accountability) is empirically shown to be more important in combating corruption than exit options made available though competition among jurisdictions.

1 Introduction

During the past two decades a silent revolution has swept the globe and a large number of industrial and developing countries have pursued decentralization reforms [see Boadway and Shah (2009) and Shah (1998) for motivations for such a change]. The reform agenda has been pursued through varying combinations of political, administrative, and fiscal decentralization initiatives. These reforms have proven to be controversial. This is because decentralization is perceived as a solution to both problems—such as a dysfunctional public sector, lack of voice, and exit—as well as a source of new problems—such as capture by the local elite, aggravation of macroeconomic management due to lack of fiscal discipline, and perverse fiscal behavior by subnational units.

The impact of decentralization on corruption (defined as the abuse of public office for private gain or exercise of official powers against public interest) is an area of growing interest inviting much controversy and debate. However, the empirical literature on this subject is scant, and much of the discussion is grounded in selective anecdotal evidence at the microlevel or macrolevel. In this paper we use new cross-country data on decentralization and corruption to synthesize and strengthen the empirical foundations of this debate by trying to isolate the role of decentralized decision making in creating an enabling environment for an accountable public sector.

With this paper we make several contributions to the existing literature. The existing literature uses subnational governance as an indicator of decentralization. This is not appropriate in many situations as provinces and states in federal countries are typically larger than nation-states in many unitary countries. Therefore, simply shifting responsibilities to an intermediate tier may not represent strengthened local decision making. This paper overcomes this problem by focusing on decentralized

local governance and capturing its fiscal and political dimensions for a worldwide sample of 158 countries [see Ivanyna and Shah (2011) for details on the underlying data and their aggregation].

We further utilize improved measures of the incidence of corruption. We use three different datasets for this purpose, two of which have not been used before in similar studies. As a base measure of corruption we use Transparency International's (TI's) Corruption Perception Index (CPI), which is an aggregate index based on the opinion of country experts. Further, with the help of the Global Corruption Barometer (GCB) survey, which is also conducted by TI, we measure corruption—its frequency and amount—at the household level for seventy-one countries with more than 55 000 households covered. Our third dataset is the World Bank Enterprises Survey (WBES), which covers ninety-nine countries and provides microlevel data on corruption—both frequency and amount of bribery—for more than 80 000 firms in different industries. Therefore, our research on corruption and decentralization extends both to microlevel and macrolevel data, and encompasses both households and businesses.

The paper is organized as follows. In section 2 we present a brief review of the theoretical and empirical literature on decentralization and corruption. The dataset on decentralization is described in section 3, and our measures of corruption are presented in section 4. This is followed by a discussion of our empirical model and variables in section 5. In section 6 we present our main results, and present the principal findings and limitations of current research in a concluding section.

We conclude that decentralization has a significant negative effect on the incidence of corruption in the majority of our settings. Empowering local governments (LGs) reduces the frequency of bribery and the amount of bribes paid to government officials both by households and by firms. Political decentralization matters even when the fiscal side of decentralization is controlled for. The empirical results presented here further demonstrate that voice (local accountability) matters more than exit (interjurisdictional competition) in combating corruption.

2 How decentralization affects corruption: a brief survey of the theoretical and empirical literature

Various authors have presented diverse perspectives on the role of decentralization in combating corruption. First we review various arguments and empirical evidence advanced to support the view that decentralization may worsen corruption. Then we turn to the arguments for decentralization as a tool to restrain bureaucrats. Refer to Bardhan and Mookherjee (2005) and Boadway and Shah (2009) for detailed literature surveys of the topic.

2.1 Decentralization breeds corruption

It has been argued that decentralization brings officials into close contact with citizens promoting personalism, and a higher degree of discretion leading to the safeguarding of individual citizens' needs at the expense of public interest. It also leads to weakening of monitoring, controls, and audits by central agencies thereby creating opportunities for corruption (Prud'homme, 1994; Tanzi, 1995). Treisman (1999) has argued that fiscal decentralization leads to ovegrazing by police forces reporting to various orders of government and by regional politicians as they yield strong influence over central institutions of accountability in governance. Several authors have argued that political decentralization promotes a higher incidence of corruption through the involvement of a larger number of officials in dealing with potential investors [eg feudal lords and oligarchs (Blanshard and Schleifer, 2000; Shleifer and Vishny, 1993)] and by

interest group capture where feudals and oligarchs dominate the local political scene (Shah, 1998).

Of the empirical studies, Treisman (2000), from analysis of cross-country data, has concluded that decentralized countries have higher perceived corruption and poorer service delivery performance in public health services. A recent study by Fan et al (2009) using cross-section data of eighty countries has found that, in countries with a large number of government tiers and a larger number of public employees, reported bribery was more frequent.

2.2 Decentralization limits opportunities for corruption

However, a growing body of conceptual literature argues that decentralization offers the potential for greater accountability by moving decision making closer to people. Arguments that have been advanced to support the positive impact of decentralization in reducing corruption include: enhanced accountability and reduced corruption in view of competition among LGs (Arikan, 2004; Weingast, 1995); exit and voice mechanisms at the local level; a higher level of information (Boadway and Shah, 2009; Seabright, 1996); lower expected gains from corruption but higher probability of detection and punishment at the local level (Carbonara, 1999; Wildasin, 1995; enhanced transparency (Ahlin, 2001); and lower transaction costs for citizens and improved countervailing institutions (Boadway and Shah, 2009).

A number of empirical studies provide support for the positive influence of decentralization in controlling corruption. Crook and Manor (2000) examined the process of political decentralization in India (Karnatka state), Bangladesh, Côte d'Ivoire, and Ghana and found that decentralization led to enhanced transparency and reduced incidence of corruption. They concluded that decentralization reduces grand theft but increases petty corruption in the short run but, in the long run, both may go down. Fiszbein (1997), on the basis of a review of political decentralization in Colombia, concluded that competition for political office opened the door for responsible and innovative leadership that in turn became the driving force behind capacity building, improved service delivery, and reduced corruption at the local level. Kuncoro (2000) found that, in Indonesia, administrative decentralization led to lower corruption as firms relocated to areas with lower bribes. Wade (1997) found that overcentralized top-down management accompanied by weak communications and monitoring systems contributed to corruption and poor delivery performance for canal irrigation in India. Huther and Shah (1998), using international cross-section and time-series data, found that fiscal decentralization was associated with enhanced quality of governance as measured by citizen participation, political and bureaucratic accountability, social justice, improved economic management, and reduced corruption. Arikan (2004) reconfirmed the same result. De Mello and Barenstein (2001), on the basis of cross-country data, concluded that tax decentralization was positively associated with improved quality of governance. Fisman and Gatti (2002) found a negative relation between fiscal decentralization and corruption. Gurgur and Shah (2002) identified major drivers of corruption in order to isolate the effect of decentralization. In a sample of industrial and nonindustrial countries, lack of service orientation in the public sector, weak democratic institutions, economic isolation (closed economy), colonial past, internal bureaucratic controls, and centralized decision making are identified as the major causes of corruption. For a nonindustrial countries sample, drivers for corruption are a lack of service orientation in the public sector, weak democratic institutions, and a closed economy. Decentralization has a greater negative impact on corruption in unitary countries than in federal countries. They concluded that decentralization was confirmed here to support greater accountability in the

public sector and reduced corruption. Dincer et al (2006), using data for US states, found that decentralization by inducing yardstick competition discourages corruption.

In conclusion, the conceptual and empirical literature is inconclusive regarding the impact of decentralization on corruption. Further, this literature treats decentralization synonymously with decision making at subnational levels. This is clearly an erroneous view in many situations, as decision making at the state and provincial levels is far removed from people. By restricting decentralization to define empowerment of LGs we can get a more useful handle on the decentralization measure to relate to the incidence of corruption. The existing empirical literature mostly uses corruption measures such as the TI CPI which has questionable validity due to methodological limitations. In view of these limitations a more careful analysis is needed to measure the impact of decentralization to the local level on corruption. This study takes a first step in this direction by utilizing newer and more useful measures of decentralization and corruption and by conducting rigorous econometric analysis.

3 Measuring decentralization

In this section we briefly discuss our measurement of decentralization. The reader is refered to Ivanyna and Shah (2011) for a detailed analysis.

Decentralization attempts to move public sector decision making closer to the people. The existing literature has treated decentralization to be synonymous with subnational governance. This often does not satisfy the above definition as intermediate orders of government in large federal countries may be farther removed from people than the central government (CG) in small unitary states. Therefore, it would be inappropriate to compare provinces in Canada or states in Brazil, India, or the USA with municipalities, say, in Greece. After all CGs of small countries (Monaco, Lichtenstein, etc) can themselves be considered as fully decentralized LGs. In view of this LG serves as a better unit of analysis for comparative analysis of decentralization.

The descriptions, definitions, and sample distributions of decentralizations variables used in regressions are reported in table 1.

The formula for our main decentralization index (di_main) is the following:

$$\text{di\_main} = \text{lg\_expdiscr} \times (0.25 + 0.5 \times \text{lg\_taxaut}), \quad (1)$$

where

$$\text{lg\_expdiscr} = \text{lg\_expdec} \times [1 - \text{lg\_vergap} \times (0.75 - 0.5 \times \text{lg\_transf})]. \quad (2)$$

Note from equation (2) that, even if a country has the widest possible vertical gap of 1, and zero share of unconditional formula-based transfers, it still keeps a share of its original expenditure for decentralization (lg_expdec). This is to reflect the fact that a discretionary conditional grant (lg_expdiscr) from the CG still gives more autonomy to the LG than the direct spending of the CG. At the same time, a country with a positive vertical gap (lg_vergap) and the best possible set of transfers (lg_transf) gets less than lg_expdec. This is to reflect the fact that even the best set of transfers does not give the LG as much fiscal independence as its own revenues. From equation (1), while the index penalizes those countries where LGs do not have taxation autonomy (lg_taxaut), it is still positive for these countries, reflecting the fact that own revenues do grant some degree of discretion to the LG.[1]

If there are not data on lg_taxaut, lg_vergap, or lg_transf, then the worst possible values are assumed: lg_taxaut = lg_transf = 0; lg_vergap = 1. This is a reasonable

[1] The figures used in the formula for di_main are chosen arbitrarily to satisfy our assumptions. The exact figures depend on specifics of fiscal arrangements between CG, state government, and LG in each country. This is left for future research.

Table 1. Decentralization variables used in regressions (source: Ivanyna and Shah, 2011).

Name	Type	Definition
Political independence		
lg_indep	Discrete: 0, 0.25, 0.5, 0.75, 1	1: legislative safeguards against dismissal of LG council by CG; 0.5: LG can be dismissed under certain circumstances (prescribed by law or constitution); 0: LG can be dismissed in an arbitrary situation; 0.25 or 0.75: if LG is treated asymmetrically.
lg_legel	Approximately continuous: 0–1	Final value—average over all tiers considered. For each tier—1: whole council is directly elected; 0.5: council is partly elected, partly appointed, or council is elected indirectly, LG is treated asymmetrically; 0: council is appointed, or does not exist.
lg_execel	Approximately continuous: 0–1	Final values—average over all tiers considered. For each tier—1: mayor is directly elected; 0.5: mayor is indirectly elected, does not exist, or coexists with an appointed executive, LG is treated asymmetrically; 0: mayor is appointed.
lg_dirdem	Discrete: 0, 0.25, 0.5, 1	1: obligatory referendum in case of certain government decisions (prescribed by law or constitution); 0.5: obligatory public approval in case of certain government decisions (public hearings, citizen assemblies); 0.25: legitimate provisions for other forms of citizen participation (civil councils, open LG sessions, possibility to submit petition or initiate referendum); 0: no legitimate provisions for direct democracy.
Fiscal autonomy		
lg_expdiscr	Continuous: 0–100	LG expenditures as percentage of GG expenditures.
lg_vergap	Continuous: 0–100	Grants from other governments (same tier or upper tier, also from other countries) as percentage of LG revenues.
lg_taxaut	Discrete: 0, 0.25, 0.5, 0.75, 1	1: LG regulates fully (sets base and rate) at least one major tax (property, income, or sales tax); 0.5: LG partly regulates (sets rate or base in CG-defined boundaries, or only after CG approval) at least one major tax, or fully regulates some fees and minor taxes; 0: no administration of major taxes, partial administration of minor taxes; 0.25 or 0.75: LG are treated asymmetrically.
lg_transf	Discrete: 0, 0.25, 0.5, 0.75, 1	1: at least half of transfers (to LG budgets from same tier or upper-tier governments) are unconditional and formula based; 0.5: quarter to half of transfers are unconditional and formula based; 0: all transfers are either conditional or discretionary; 0.25 or 0.75: LGs are treated asymmetrically.

Notes: Definitions and characteristics of decentralization variables are shown; year of the data = 2005; LG = local government, CG = central government, GG = general government.

assumption since, in most cases, countries which do not report these figures have simply nothing to report. Besides, these extreme values are effectively smoothed in our final formula. At the same time, if our main decentralization variable lg_expdec is not available, then the country is excluded from further analysis. As a result, the index is built for 158 countries worldwide. Together they comprise 98% of the world's gross domestic product (GDP), and 99% of the world's population.

4 Measuring the incidence of corruption

We use five different measures of corruption. Two of them are taken from the TI GCB survey, two from the WBES, and the fifth is the TI CPI, a measure which is commonly used in empirical research on corruption but has questionable empirical validity. We use this measure for completeness. The definitions of corruption variables are given in table 2, and their descriptive statistics are given in table 3.

Table 2. Measures of corruption.

Name	Type	Source	Definition	Years	*N*	Country index
paid_bribe	binary: 0, 1	TI GCB	Question 5 in survey; 1 if yes, 0 if no	2005	50 704 (0 = 88%)	68
bribe_burden	continuous, corner at 0	TI GCB	Question 5.1 in survey; lower estimates of bribe paid divided by current GDP per capita	2005	48 470 (0 = 86%)	66
informal_gift	binary: 0, 1	WBES	Surveys 2002–05: maximum by questions 40(v), 40(vi), 42(i); surveys 2006–09: maximum by questions j5, j12, j15; 1 if at least one yes, 0 if all no	2004–06	40 721 (0 = 77%)	80
bribe%sales	continuous, corner at 0	WBES	Surveys 2002–05; question 39; surveys 2006–09: question J7; percent of annual sales spent on bribes	2004–06	40 309 (0 = 71%)	79
corruption_ perception	approximately continuous	TI CPI	Aggregate index of different CPIs	2005, 2007	175	175

Question 5: In the past twelve months have you or anyone living in this household paid a bribe in any form? Answers: (1) yes; (2) no.
Question 5.1: What was the approximate amount of money paid overall in bribes by your household in the past twelve months? Answers: (1) Under US$30; ...; (11) US$1000 or more.
Question 42(i)–j5: In any of the tax inspections or meetings was a gift or informal payment expected or requested? Answers: (1) yes; (2) no.
Question 40 (v)–j12: In reference to the application for an import license, was an informal gift or payment expected or requested? Answers: (1) yes; (2) no.
Question 40(vi)–j15: In reference to the application for an operating license, was an informal gift or payment expected or requested? Answers: (1) yes; (2) no.
Question 39–j7: We've heard that establishments are sometimes required to make gifts or informal payments to public officials to 'get things done' with regard to customs, taxes, licenses, regulations, services, etc. On average, what percentage of total annual sales do establishments like this one pay in informal payments or gifts to public officials for this purpose? Answer: % of sales (0–100).
Notes: Measures of corruption used in the paper are described; TI GCB = Transparency International Global Corruption Barometer; TI CPI = Transparency International Corruption Perception Index; WBES = World Bank Enterprises Survey.

The GCB is an annual survey of households conducted by TI, and commenced in 2003. The data we have are from 2005—55 000 households were surveyed in sixty-eight countries from all continents, and all income groups. Apart from demographic characteristics of a respondent, the GCB questionnaire has questions in the following groups: which sectors and institutions are most affected by corruption (opinion of a respondent); which spheres of life does corruption afect most (opinion of a respondent); how is corruption evolving over time (opinion of a respondent); how frequently do people bribe (real facts from a respondent's life); how much does it cost (real facts from a respondent's life); what form does bribery take (real facts from a respondent's life).

Two measures of corruption that we use—paid_bribe and bribe_burden—capture real-world experiences of individuals with corrupt practices. For the first measure a respondent is asked if he or she paid bribe money during the last twelve months.

Table 3. Variables used in regressions: definitions, sources, summary statistics.

Variable	Definition	Source	Mean	SD	Min	Max
Corruption						
paid_bribe	see table 2	see table 2	0.11	0.32	0	1
bribe_burden	see table 2	see table 2	1.23	11.7	0	458
informal_gift	see table 2	see table 2	0.23	0.42	0	1
bribe%sales	see table 2	see table 2	1.67	5.9	9	300
corruption_perception	see table 2	see table 2	4	2.1	1.48	9.66
Decentralization (country-level sample)						
di_main	see section 3	equation (1)	0.05	0.06	0	0.35
di_aux	di_main, without adjustment for tax autonomy	own calculations	0.1	0.11	0	0.54
lg_indep	see table 1	see table 1	0.24	0.28	0	1
lg_legel	see table 1	see table 1	0.8	0.31	0	1
lg_execel	see table 1	see table 1	0.45	0.35	0	1
lg_dirdem	see table 1	see table 1	0.22	0.22	0	1
lg_expdec	see table 1	see table 1	0.14	0.13	0.01	0.59
lg_vergap	see table 1	see table 1	44.5	24.4	0	100
lg_taxaut	see table 1	see table 1	0.36	0.37	0	1
lg_transf	see table 1	see table 1	0.36	0.39	0	1
Administrative structure						
1_lg_tier	1 if LG has only 1 tier in a country	various sources	0.26	0.44	0	1
2_lg_tier	1 if LG has 2 tiers in a country	various sources	0.46	0.5	0	1
lg_units	number of units (jurisdictions) at all tiers of LG	various sources	4 117	20 635	3	250 671
lg_area	average area of LG unit, (000s km^2)	various sources	2.1	6.9	0	70.38
Other country-specific controls						
log(GDP_per_capita)	log of GDP per capita, purchasing power parity units, 2005	World Development Indicators (http://data.worldbank.org), World Bank	7.67	1.62	4.5	10.7
gov_consumption	GG consumption as % of GDP, 2005	Penn World Tables (http://pwt.econ.upenn.edu)	18.5	9.45	3.11	62.21
start_business	number of procedures needed to start business, 2005	Doing Business (http://www.doingbusiness.org), World Bank	10.2	3.4	2	19
enforce_contract	number of procedures needed to enforce contract, 2005	Doing Business, World Bank	37.38	6.32	21	55
UK legal_origin	1 if country has British legal origin	Treisman (2000)	0.3	0.46	0	1

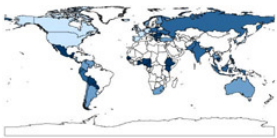
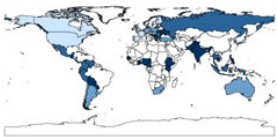
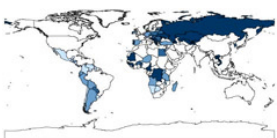
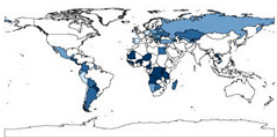
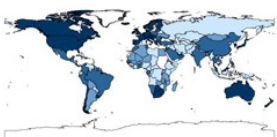
Notes: Descriptions of variables are given in our regressions; LG = local government; CG = central government; GG = general government.

For the second measure the question is what was the amount of all bribes paid.[(2)] These measures provide more or less objective assessments of corruption (at least, of petty corruption) levels among households in a country: the former one estimates the frequency of the bribery, while the latter one estimates its burden in terms of GDP.

[(2)] We then take this amount as a percentage of the country's GDP per capita.

To capture the extent of corruption in the business world we utilize the WBES dataset. The WBES is a survey of firms from different sectors of economy (services, manufacturing, construction, etc) with more than five official employees. It has been conducted annually since 2005 in developing and transition countries. The questions that the representatives of the firms are asked during an interview pertain to the firm's general characteristics and financial indicators, the investment climate in host countries, the state of infrastructure, labor market, degree of competition, etc. The separate group of questions concerns business – government relations. This group contains several questions about bribing governmental officials: are there any informal gifts or payments expected or requested during certain kinds of interaction between a firm and a government official (eg tax inspections, obtaining operating or import licenses); what percentage of annual sales goes to such gifts and payments; does a firm try to secure a

Table 4. Corruption in the world.

Corruption variable	World map	Top-five least corrupt	Top-five most corrupt	Income distribution
paid_bribe		Hong Kong (0.2%) Japan (0.3%) Spain (0.4%) UK (0.7%) Netherlands (0.8%)	Cameroon (48%) Paraguay (46%) Cambodia (37%) Nigeria (35%) Ethiopia (35%)	24 17 19 8
bribe_burden		Singapore (0%) Hong Kong (0%) Netherlands (0.1%) USA (0.1%) Portugal (0.3%)	Senegal (14%) Cameroon (13%) Togo (12%) Ethiopia (11%) Ghana (10%)	23 17 18 8
informal_gift		Namibia (1.2%) Jordan (1.3%) Uruguay (1.7%) El-Salvador (1.8%) West Bank and Gaza (2.6%)	Kyrgyzia (85%) Albania (76%) Cameroon (70%) Bosnia and Hertzegovina Democratic Republic of Congo (69%)	11 22 28 19
bribe%sales		Spain (0.1%) Korea (0.1%) Slovenia (0.2%) Sri Lanka (0.2%) Cape-Verde (0.2%)	Paraguay (10%) Niger (7%) Burkina Faso (7%) Guinea (5%) Cameroon (5%)	11 21 28 19
corruption_perception		Iceland (9.66) Finland (9.63) New Zealand (9.58) Denmark (9.51) Singapore (9.41)	Democratic Republic of Korea (1.48) Guinea (1.66) Bangladesh (1.68) Chad (1.7) Myanmar (1.8)	48 37 49 48

Notes: [In color online, see http://ww.dx.doi.org/10.1068/c1081r] Corruption variables: see definitions in table 2; maps: the darker the country the greater is the value assigned to it (the more corrupt it is, except the case of corruption_perception); income distribution (World Bank's classification of countries): first row—number of high-income countries in the sample; second row—upper-middle income; third row—lower-middle income; fourth row—low income.

contract with a government; and what percentage of its value is paid back to government officials?

We use two main measures of corruption from the WBES. The first one, informal_gift, captures frequency of bribery among the businesses in a country; it is equal to 1 if a respondent said that an informal gift or payment was expected or requested when the firm dealt with tax inspections, operating licenses, or import licenses. The second measure of corruption, bribe%sales, captures the burden of bribery on a firm. It is equal to the percentage of annual sales that the firm spends on informal gifts to 'get things done' with the government. This figure is directly asked about in the survey.

As an alternative to our 'objective' (or 'factual') measures of corruption, we also use a measure which is opinion based. It is corruption_perception, TI's Corruption Transparency Index. This index is a composite score front about fifteen (may be different each year) polls of experts, expressing their opinion about the level of corruption in a given country. This measure may obviously be subject to certain perceptional and ideological biases, image of a country in mass media, etc. The advantage of it, however, is its availability for a large sample of countries (174 in 2005, 169 in 2007), and over a long period of time (annually from 2001 to 2007, and also for 1996, 1980 – 85, and 1988 – 92).

The state of corruption in the world based on our five measurements is shown in table 4. The table shows a wide variation in the level of corruption in the world. For example, bribe_burden in Singapore is virtually 0, while in Senegal people pay up to 14% of GDP in bribes. In Spain firms spend 0.1% of their annual sales on unofficial payments to governmental officials, while in Paraguay this figure reaches 10%. In Kyrgyzstan about 85% of meetings between firms and governmental officials end up with bribes being paid, while in Namibia this figure is only 1.2%.

Table 4 also shows the distribution of the countries by income and region (see world maps) for each measure. Comparing the distributions with the one for corruption_perception, which is available for almost all countries and can be considered representative, one can see that the GCB sample (variables paid_bribe and bribe_burden) is somewhat skewed towards high-income and upper-middle-income countries, with most representation in Europe, CIS, Latin America, and East Asia. At the same time the WBES sample (variables paid_bribe and bribe_burden) is somewhat skewed to lower-middle-income and low-income countries, mostly in Africa, CIS, Eastern Europe, and South America. Analysis of all four corruption variables would therefore provide the most objective picture.

5 Econometric specifications

Our goal is to identify the empirical effect of decentralization on corruption, where the population of interest is the world's countries. Our general approach is to regress:

$$\text{corruption} = \beta_0 + \beta_1 \times \text{decentralization} + \text{other controls}. \quad (3)$$

β_1 is the coefficient (coefficients if we use several variables for decentralization) we are interested in, provided the other factors which may affect the relationship between decentralization and corruption are properly controlled for. To cover as many appearances of corruption in a society as possible as well as to make our research robust to a small sample bias and sample selection we use five different variables to measure corruption. The distribution of these variables drives several different econometric specifications of equation (3).

In the case of the paid_bribe variable we have binary responses of individuals from different countries: 1 meaning that they paid a bribe in the last twelve months; 0 meaning that they did not. Therefore, we are estimating the probability of an

individual i from country j to pay a bribe given our set of controls:

$$\begin{aligned} &P(\text{paid\_bribe}_{ij} = 1) \\ &= P(\beta_0 + \beta_1 \times \text{decentralization}_j + \beta_2 \times \text{ind\_controls}_i \\ &+ \beta_4 \times \text{country\_controls}_j + u_{ij} > 0) \\ &= \text{F}(\beta_0 + \beta_1 \times \text{decentralization}_j \\ &+ \beta_2 \times \text{ind\_controls}_i + \beta_4 \times \text{country\_controls}_j), \end{aligned} \tag{4}$$

where i changes from 1 to N_j (number of individuals in the sample which are residents of the country j); j changes from 1 to N (number of countries covered by the survey). F is error u's cumulative distribution function. In particular, our interest is to find how the probability changes with changes in decentralization, with all other controls fixed. Assuming that the errors u_{ij} are normally distributed, the natural way to estimate this probability is to use a probit model (F becomes then a cumulative function of a normal distribution). Note that decentralization variable(s) are the same for all individuals from one country, and we use both individual-specific controls (ind_controls) and country-specific controls (country_controls). In addition, we also fit a linear probability model in this case [ordinary least squares (OLS)], since it is robust to the distribution of the error and possible heteroskedasticity in the data.

Similar reasoning concerns the informal_gift measure. It is also a dummy variable, which is equal to 1 if a respondent firm made or was requested to make an informal payment to a government official in exchange for access to a public service, and equal to 0 if the firm did not. Thus we are estimating the probability of a firm making an informal gift (paying a bribe) to a government official. The probit and the linear probability models are used in this case:

$$\begin{aligned} P(\text{informal\_gift}_{ij} = 1) = \text{F}(&\beta_0 + \beta_1 \times \text{decentralization}_j + \beta_2 \times \text{ind\_controls}_i \\ &+ \beta_4 \times \text{country\_controls}_j). \end{aligned} \tag{5}$$

The bribe_burden measure varies from 0 for those who did not pay any bribes to a maximum of 458% of the country's GDP per capita. The distribution of bribe_burden clearly has a corner solution at 0 (in fact, 86% of observations in the sample are equal to 0). With such a distribution of dependant variable, the most appropriate way is to estimate a tobit censored model with the lower limit set to 0:

$$\begin{aligned} \text{bribe\_burden}^*_{ij} = &\beta_0 + \beta_1 \times \text{decentralization}_j + \beta_2 \times \text{ind\_controls}_i \\ &+ \beta_4 \times \text{country\_controls}_j + u_{ij}; \end{aligned} \tag{6}$$

$$u_{ij} | < \text{controls} > \sim \text{normal}(0, \sigma^2); \ \text{bribe\_burden}_{ij} = \max(0, \text{bribe\_burden}^*_{ij}), \tag{7}$$

where bribe_burden* is a latent (unobservable) variable, and $<$controls$>$ are all right-hand-side variables in the regression. For comparison we also estimate the usual OLS model in this case.

The variable bribe%sales is treated similarly to bribe_burden. Indeed, most of the firms in the sample (71%) report 0 as the percentage of annual sales that go for informal payments to government officials. Therefore, we again fit a tobit censored model with the lower limit set to 0. As an alternative specification, an ordinary OLS model is also estimated.

In the case of the corruption_perception measure we use the standard OLS model. This variable is close to continuous, and there is no censorship in the sample. Therefore, OLS appears to be the most appropriate and straightforward way to estimate the effects of interest:

$$\text{corruption\_perception}_j = \beta_0 + \beta_1 \times \text{decentralization}_j + \beta_4 \times \text{country\_controls}_j + u_j \,. \quad (8)$$

Note that corruption_perception is measured not at an individual level but at a country level. As usual, index j in equation (8) indicates that the observation is from country j, but there are no individual-specific controls.

The descriptive statistics of main variables, which we use in our regressions, are given in table 4. As mentioned before, the dependent variables are paid_bribe, bribe_burden, informal_gift, bribe%sales, and corruption_perception—five different measures of corruption. The main variable which we use as a measure of decentralization is di_main.

There are several country control variables' groups, which we include based on the theoretical arguments described in section 2. First, we included variables which characterize the administrative structure of a country: average size of local government, tiers dummies, and number of LG units at a lower tier. We also control for the level of country's development (log(GDP_per_capita)) its openness (openness), origin of its legislature (legal_origin), consumption needs of a general government (gov_consumption), and the level of bureaucracy (start_business, enforce_contract)—a standard set of variables used in empirical investigations on corruption. We also control for a country's heterogeneity by including such variables as religious_fractionalization and lingual_fractionalization of a country's population. Individual controls included in the regressions are sex, age, education, income, and employment status. Firm-specific controls that we use are size of a firm (number of employees), its sector (manufacturing, services, or other), and its ownership (domestic private, foreign private, or state).

6 Main results

Our main results are presented in table 5. Linear probability (OLS) estimates are reported in columns 1, 4, 7, 10, 13, and 14—for all five measures of corruption. In columns 2 and 8 the coefficients from probit regressions are reported, where paid_bribe and informal_gift are dependent variables. Since the coefficients in the probit model do not have a direct interpretation (except for their direction, relative magnitude, and statistical significance), in columns 3 and 9 we report average partial effects of each variable on corruption, evaluated at the corresponding samples. Columns 5 and 11 report tobit estimates, where bribe_burden and bribe%sales are used as dependent variables. Similarly to probit estimates, there is no direct interpretation for tobit estimates. Since the share of corner responses is so high (70 – 90% are 0) in the sample, the estimates cannot be directly compared with OLS estimates. Therefore, in columns 6 and 12 we report average partial effects of each variable, evaluated at the corresponding samples. Columns 13 and 14 report OLS estimates, where the dependent variables are corruption_perception in 2005 and 2007, respectively. For comparison, in the second and third rows of the table (in italics) we also report the resulting coefficients where lg_expdec, and di_aux are used as the measures of decentralization, and all other regressors the same. In all specifications (where feasible) we allow for heteroskedasticity and serial correlation between errors inside one country.

As table 5 shows, decentralization measured by di_main has a negative effect on corruption in all specifications and for all datasets that we use. When clustered by country, standard errors are used and the effect is only marginally statistically significant (p-value of 0.05 – 0.15) when the dependent variables are bribe_burden, informal_gift, or bribe%sales, while for paid_bribe it is practically insignificant. However, the average size of a cluster in our data is 646 observations for the GCB sample, and 546 observations for the WBES sample, while the number of clusters is 57 in the GCB,

Table 5. Results of the main estimation.

Estimation method	paid_bribe			bribe_burden			informal_gift			bribe%sales			corruption_perception	
	(1) OLS	(2) probit	(3) ape	(4) OLS	(5) tobit	(6) ape	(7) OLS	(8) probit	(9) ape	(10) OLS	(11) tobit	(12) ape	(13) 2005	(14) 2007
di_main	−0.13	−0.93	−0.17	−6.01*	−29.39	−2.99	−0.68*	−2.25*	−0.55*	−4.55	−17.15	−4.62	4.14**	5.03***
	(0.016)	(0.89)	(0.16)	(3.32)	(32.59)	(7.45)	(0.38)	(1.25)	(0.31)	(3.28)	(12.63)	(8.53)	(1.83)	(1.51)
lg_expdec	−0.04	−0.26		−2.37*	−8.26		−0.25	−0.93		−3.11*	−8.27		1.10	1.48
	(0.09)	(0.43)		(1.41)	(15.38)		(0.17)	(0.58)		(1.71)	(6.58)		(1.01)	(0.92)
di_aux	−0.02	−0.24		−3.08	−6.78		−0.29	−1.16*		−2.83*	−10.04		1.96	2.39**
	(0.11)	(0.52)		(1.91)	(19.27)		(0.19)	(0.62)		(1.59)	(6.46)		(1.24)	(1.10)
1_lg_tier	0.04	0.30	0.06	−0.54	11.74	1.36	−0.10**	−0.33**	−0.07***	0.34	0.37	0.10	0.83**	0.78**
	(0.04)	(0.20)	(0.04)	(0.60)	(7.90)	(1.95)	(0.04)	(0.14)	(0.03)	(0.44)	(2.03)	(1.08)	(0.39)	(0.35)
2_lg_tier	0.00	0.12	0.02	−1.24**	4.88	0.50	−0.11**	−0.32***	−0.08***	−0.07	−1.50	−0.4	0.41	0.35
	(0.02)	(0.11)	(0.02)	(0.56)	(4.35)	(1.48)	(0.04)	(0.12)	(0.03)	(0.29)	(1.47)	(0.69)	(0.27)	(0.22)
UK legal_origin	−0.04	−0.21	−0.04	−2.24**	−11.20	−1.06	−0.05	−0.15	−0.03	−1.48***	−6.50***	−1.75	−0.09	−0.04
	(0.04)	(0.24)	(0.04)	(0.89)	(8.71)	(2.67)	(0.05)	(0.17)	(0.04)	(0.48)	(2.31)	(1.14)	(0.35)	(0.31)
start_business	−0.01	−0.03	−0.00	−0.14**	−0.82	−0.08	−0.00	0.00	0.00	0.09	0.24	0.07	−0.06	−0.04
	(0.00)	(0.02)	(0.00)	(0.07)	(0.80)	(0.17)	(0.00)	(0.01)	(0.00)	(0.007)	(0.26)	(0.12)	(0.04)	(0.04)
enforce_contract	−0.00	0.00	0.00	−0.00	0.21	0.02	0.01**	0.03**	0.01**	−0.05*	−0.24*	−0.07	−0.02	−0.02
	(0.00)	(0.01)	(0.00)	(0.05)	(0.44)	(0.12)	(0.00)	(0.01)	(0.00)	(0.03)	(0.15)	(0.08)	(0.02)	(0.02)
gov_consumption	−0.01***	−0.03***	−0.01***	−0.09**	−1.35***	−0.14	−0.00	−0.01*	−0.00*	−0.01	0.04	0.01	0.02	0.01
	(0.00)	(0.01)	(0.00)	(0.04)	(0.42)	(0.10)	(0.00)	(0.00)	(0.00)	(0.02)	(0.07)	(0.05)	(0.02)	(0.01)
log (GDP per capita)	−0.05***	−0.30***	−0.05***	−0.58*	−12.0***	−1.22*	−0.02	−0.12**	−0.03**	−0.26	−1.16*	−0.31	0.91***	0.78***
	(0.01)	(0.06)	(0.01)	(0.32)	(3.08)	(0.71)	(0.02)	(0.05)	(0.01)	(0.16)	(0.70)	(0.57)	(0.14)	(0.11)
Firm industrial controls	industrial	industrial	industrial	industrial	industrial	industrial	firm	firm	firm	firm	firm	firm	no	no
Dataset	GCB	GCB	GCB	GCB	GCB	GCB	WBES	WBES	WBES	WBES	WBES	WBES	CPI	CPI
Standard errors	cluster	cluster	margeff	cluster	cluster	bootstrap	cluster	cluster	margeff	cluster	cluster	bootstrap	robust	robust
Observations	36 821	36 821	36 821	36 296	36 296		32 775	32 775	32 775	33 824	33 824	118	118	
R^2	0.10			0.05			0.19	0.04		0.04	0.86	0.82	0.86	
Number of countries	57			57			60			60			111	111

* Significant at 10% level; ** significant at 5% level; *** significant at 1% levels.

Notes: Dependent variable: columns 1–3 = paid_bribe, columns 4–6 = paid_bribe, columns (7)–(9) = informal_gift, columns 10–12 = bribe%sales, column 13 = corruption_perception, 2005, column 14 = corruption_percentage, 2007 (see definitions in table 2); estimation methods: columns 1, 4, 7, 10, 13, 14 = ordinary least squares (OLS), columns 2, 8 = probit, columns 5, 11 = tobit with lower limit at 0, columns 3, 6, 9, 12 = average partial effects (ape) over sample; standard errors are reported in brackets: columns 1, 2, 4, 5, 7, 8, 10, 11 = clustered by country and heteroskedasticity robust, columns 13, 14 = heteroskedasticity robust, columns 3, 9 = estimated by margeff, columns 6, 12 = cluster bootstrapped (500 iterations); additional controls are included in all regressions, but local government not reported here due to a lack of space; these are regional dummies, year dummies, individual and firm controls, population, openness, fractionalization, lg_units, population size, lg_area; GCB = Global Corruption Barometer; WBES = World Bank Enterprises Survey; CPI = Corruption Perception Index.

Table 6. Results of the main estimation: alternative inference.

Estimation method	paid_bribe		bribe_burden		informal_gift		bribe%sales	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
di_main	−0.13***	−0.09	−6.01***	−13.10**	−0.68***	−1.50**	−4.55***	−7.50
	(0.04)	(0.31)	(1.48)	(5.17)	(0.07)	(0.07)	(1.07)	(9.50)
lg_expdec	−0.04*	−0.02	−2.37***	−4.66	−0.25***	−0.61**	−3.11***	−3.94
	(0.02)	(0.16)	(0.65)	(2.84)	(0.03)	(0.24)	(0.46)	(3.33)
di_aux	−0.02	−0.02	−3.08***	−6.51*	−0.29***	−0.83***	−2.83***	−3.17
	(0.02)	(0.19)	(0.81)	(3.39)	(0.03)	(0.27)	(0.49)	(3.94)
Standard errors	robust	standard	robust	standard	robust	standard	robust	standard
Dataset	GCB	GCB average	GCB	GCB average	WBES	WBES average	WBES	WBES average

* Significant at 10% level; ** significant at 5% level; *** significant at 1% level.
Notes: dependent variable: columns 1–2 = paid_bribe, columns 3–4 = bribe_burden, columns 5–6 = informal_gift, columns 7–8 = bribe%sales (see definitions in table 2); estimation methods: columns 1, 3, 5, 7 = ordinary least squares (OLS) on the whole sample, columns 2, 4, 6, 8 = OLS on the averaged data from the corresponding sample (see Wooldridge, 2006); standard errors are reported in parentheses: columns 1, 3, 5, 7 = heteroskedasticity robust, columns 2, 4, 6, 8 = standard; other controls included in the regressions are identical to those in table 5; GCB = Global Corruption Barometer; WBES = World Bank Enterprises Survey.

and 60 in the WBES. As is argued by Wooldridge (2006), for a relatively small number of clusters and large clusters, inference based on clustered standard errors may be too conservative (meaning that it produces standard errors that are too large).[3]

In table 6 we report the results from identical (to the ones in table 5) regressions, but we do not cluster the standard errors (columns 1, 3, 5, 7). We show only results from OLS, but the results from probit and tobit have the same property: while the point estimates of the decentralization's effect on corruption remain the same, the standard errors are now much smaller. In all above-mentioned specifications decentralization has a negative and strongly statistically significant effect on corruption.

To ignore countries' fixed effects completely—as in columns 1, 3, 5, and 7 of table 6—would be too optimistic. As a conservative alternative we use the inference for clustered data proposed by Donald and Lang (2007). For that we simply average our data by country (means of every series by country) and run the same regressions as before, except this time with the number of observations, which corresponds to a number of countries in our samples. The OLS standard errors are then correct. The results for each of our four measures of corruption are presented in columns 2, 4, 6, and 8 of table 6. The effect of decentralization on corruption remains negative in all four specifications. It is significantly different from 0 though only if the dependent variables are bribe_burden and informal_gift. These results are supported by the ones in columns 13–14 in table 5, where we ran a regression on a cross-country sample and used T1 corruption_perception as our measure of corruption.

While the effect of decentralization on corruption is not always statistically significant, tables 5 and 6 present strong evidence that it is strictly negative. First, the point estimates of the effect are negative in all our specifications, and they are insensitive to the inclusion of additional regressors on the right-hand side. Second, even if conservative clustered standard errors are used, it is statistically significant on the margin in certain specifications, and this fact is supported by the Donald and Lang (2007) approach. The strongest (statistical) evidence is for the amount of bribes that households pay (bribe_burden), and for the frequency of bribery among firms

[3] The difference in cluster sizes (646 vs 546) may also explain why standard errors in regressions ran on the GCB sample are in general higher than the ones from the WBES sample.

(informal_gift). Therefore, both households and firms are affected by decentralization. As our cross-country regressions suggest, it also has a positive effect on the corruption_perception of a country among experts (which is higher for less corrupt countries).

Decentralization also has a significant economic effect on corruption. From column 2 of table 5 it follows that a 0.1 increase in decentralization of LGs—which effectively means extending their expenditures and own revenues by 10 percentage points—in an average country would reduce the average probability of a household paying a bribe by 1.7 percentage points. While this may seem small, one should note that the mean probability of paying a bribe in the sample is 11%, and 1.7 percentage points represent more than a 15% decrease in the frequency of bribery among households. As for bribe_burden, empowering LGs by 10 percentage points more would decrease the bribe burden (share of his or her incomes spent on bribes) for an average person by about 0.30 percentage points, which is more than a quarter decrease from an average bribe burden in the sample. The effect of decentralization on frequency and amount of bribery is much stronger for firms than for households. Columns 9 and 12 from table 5 suggest that a 10 percentage point increase in LG decentralization is associated with a 5.5 percentage point decrease in frequency of 'informal gifts' and a 0.74 percentage point decrease in share of annual sales alloted to bribery. Finally, a 10 percentage point increase in decentralization would raise the CPI in 2007 by 0.5 points, which is equivalent for an average country moving up by about twelve positions in TI's country ranking.

In tables 5 and 6—rows 2 and 3—we also report the results when we use other decentralization measures in identical regressions. We consider two additional measures—lg_expdec, which is widely used in other literature, and di_aux (see the definitions in table 3). The effect of lg_expdec is smaller than the effect of di_main in all our specifications, even accounting for a higher mean of lg_expdec. In most specifications it is also less statistically different from zero (ie t-statistics are smaller). The biggest difference can be seen in columns 13 – 14, where corruption_perception is used as a measure of corruption. There the di_main is shown to have a very significant positive effect, while the effect of lg_expdec is statistically and economically zero. The behavior of the di_aux is similar to the one of lg_expdec, which suggests that just decentralizing expenditures is generally not enough to have a significant effect on a government's integrity. Increasing a government's own revenues, taxation autonomy, and financing it with unconditional formula-based transfers is an essential part of a successful story.

6.1 Voice versus exit

Our main specifications, which are reported in table 5, do not allow us to disentangle the channels through which decentralization may affect corruption. The theory names two major channels. First, decentralizing government brings power closer to people, which makes it more controllable and thus accountable. This is the so-called 'voice' argument. Second, decentralized LGs obtain more instruments to compete with other governments and attract mobile residents or businesses. On the other hand, if the residents or businesses are dissatisfied with integrity at their present jurisdiction, they can move to the other one. This is the so-called 'exit' argument. In this section we test whether one of the channels—voice or exit—is dominant.

The theoretical assumptions about a country for voice or exit arguments to work are quite different, which potentially allows us to identify these effects separately. Exit of residents is possible only if they are mobile—that is, can choose in which jurisdiction to reside, and if they have options of where to exit. This is not needed for a voice argument to work. Instead, under this argument it is the government's closeness to the people that makes the voice of the people 'louder' and thus behavior of the government

more accountable. For instance, abstracting from international mobility, a country such as Lichtenstein has quite a bad premise for the exit argument to work (since its residents simply do not have options of where to move inside the country), but an extremely good premise for the voice argument to work—as the CG of Lichtenstein is closer to its people (in terms of population over which it governs) than most of the large LGs elsewhere.

Our specification strategy in this section is the following:

$$\text{corruption} = \beta_0 + \beta_1 \times \text{decentralization} + \beta_2 \times \text{decentralization} \times \text{mobility} + \beta_3 \times \text{decentralization} \times \text{exit options} + \text{other controls}. \quad (9)$$

Including the interaction of decentralization and mobility in equation (9) allows us to test for significance of the exit argument. Indeed, if $\beta_2 > 0$ it means that the effect of decentralization on corruption increases with mobility of firms and residents. Following the theoretical discussion above, this may happen only if the exit argument for decentralization works. The same holds for β_3. Therefore, under equation (9), $\beta_2 + \beta_3$ would be a measurement for the exit part of the decentralization effect on corruption. β_1 then encompasses the voice part of the effect (together with other possible channels, through which decentralization may affect corruption).

The estimation results of our new specification are shown in table 7. There, as a proxy for residents and firms mobility, we use the average area of the LG unit (based on the presumption that moving is costly when the distance is longer—for example, moving from state to state is more expensive than moving from county to county). As a proxy for number of exit options we use number of LG units in a country [shown to have an effect on corruption in Arikan (2004)]. We ran five different specifications,

Table 7. Voice versus exit.

	paid_bribe	bribe_burden	informal_gift	bribe%sales	corruption_perception
	(1)	(2)	(3)	(4)	(5)
di_main	−0.25***	−14.76**	3.45	−17.8	−0.78
	(0.06)	(5.72)	(2.74)	(28.07)	(3.59)
di_main × no_units	0.00***	0	0	0.00*	0
	(0)	(0)	(0)	(0)	(0)
lg_area	0.01***	0.54	−0.06*	0.22	0
	(0)	(0.36)	(0.03)	(0.37)	(0.01)
di_main × lg_area	−0.23***	−10.07	0.85*	−6.01	0.1
	(0.05)	(6.09)	(0.5)	(7.14)	(0.12)
di_main × GDP_per_capita	0.06	0	0	0.00**	0.00***
	(0.05)	(0)	(0)	(0)	(0)
lg_units	−0.00***	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
Number of countries	54	56	56	56	101

* Significant at 5% level; ** significant at 3% level; *** significant at 1% level.
Notes: dependent variable: column 1 = paid_bribe, column 2 = bribe_burden, column 3 = informal_gift, column 4 = bribe%sales, column 5 = corruption_perception, 2007 (see definitions in table 2); estimation method: linear probability (ordinary least squares); standard errors are reported in brackets: columns 1, 2, 5 = heteroskedasticity robust, columns 3, 4 = clustered by country; additional controls are included in all regressions, but not reported here due to a lack of space; these are regional dummies, year dummies, individual and firm controls, population, openness, log(GDP_per_capita), lg_units, local government population size, 1_lg_tier, 2_lg_tier, 3_lg_tier, UK legal_origin, fractionalization, start_business, enforce_contracts.

and each time a different corruption variable was used. To ease the interpretation we restricted the current analysis to only OLS, ignoring the nonlinear nature of the dependent variable.

It can be seen from table 7 that none of the five specifications provides conclusive evidence in favor of the existence of the exit effect in practice. The coefficient of di_main, which corresponds to our β_1 from equation (9), remains economically and statistically significant in almost all specifications, but neither β_2, the coefficient of di_main×lg_area, nor β_3, the coefficient of di_main×lg_units, has the predicted sign and economical significance. $\beta_3 > 0$ in all specifications (statistically significant in only two of them), which is contrary to what we expected, and its magnitude is virtually 0. $\beta_2 > 0$, which is what we expected, in only one specification (column 3) out of five. Therefore, our results do not provide support for the view that decentralization works through an exit channel.

6.2 Does politics matter?

Our main decentralization index is based solely on the fiscal side of decentralization: the expanse of local expenditures is adjusted for how much of these expenditures are financed by own local revenues or by unconditional transfers. So far we have not

Table 8. Does politics matter?

	paid_bribe	bribe_burden	informal_gift	bribe%sales	corruption_perception
	(1)	(2)	(3)	(4)	(5)
di_main	−0.81**	−53.58***	−2.39***	−38.25***	30.86**
	(0.39)	(13.82)	(0.6)	(10.35)	(12.97)
lg_execel	0.14***	0.04	−0.10***	−2.12***	0.54
	(0.02)	(0.87)	(0.02)	(0.51)	(0.82)
di_main × lg_execel	−3.60***	50.14***	2.92***	36.93***	−0.82
	(0.45)	(16.21)	(0.4)	(10.32)	(14.13)
lg_indep	−0.07***	−3.24***	−0.13***	−1.67*	2.21*
	(0.02)	(0.69)	(0.03)	(0.94)	(1.12)
di_main × lg_indep	−1.56***	18.88**	0.79*	28.24**	−16.59
	(0.26)	(8.99)	(0.41)	(13.17)	(13.61)
lg_dirdem	−0.04	−3.03***	0.27***	1.22	−0.46
	(0.03)	(1.03)	(0.04)	(0.92)	(1.05)
di_main × lg_dirdem	0.74**	−7.54	−5.97***	−13.24	14.84
	(0.31)	(11.15)	(0.72)	(16.19)	(11.69)
lg_legel	−0.25***	−2.18**	0.08***		−0.06
	(0.03)	(1.01)	(0.02)		(0.57)
di_main × lg_legel	4.58***	−9.97	0.12		−20.79
	(0.69)	(22.78)	(0.54)		(14.07)
Observations	33 925	33 459	27 217	28 773	72
R^2	0.1	0.05	0.05	0.05	0.93
Number of countries	54	56	56	56	101

* Significant at 5% level; ** significant at 3% level; *** significant at 1% level.

Notes: dependent variable: column 1 = paid_bribe, column 2 = bribe_burden, column 3 = informal_gift, column 4 = bribe%sales, column 5 = corruption_perception, 2007 (see definitions in table 2); estimation method: columns 1, 2, 4, 5 = linear probability (ordinary least squares), column 3 = probit (average partial effects are reported); standard errors are reported in parentheses: columns 1, 2, 5 = heteroskedasticity robust, columns 3, 4 = clustered by country; aditional controls are included in all regressions, but not reported here due to a lack of space, these are regional dummies, year dummies, individual and firm controls, population, openness, lg_units, local government population size, lg_area, 1_lg_tier, 2_lg_tier, 3_lg_tier, UK legal_origin, fractionalization, start_business, enforce_contracts, log(GDP_per_capita).

included political indicators in our analysis. Yet it may make a big difference whether local money—no matter how autonomously obtained—is spent by someone who is elected by local people, or by someone who is appointed from above. In this section we test whether politics matter when local finances are taken into account. The specification we are testing is similar to that in section 6.1:

$$\begin{aligned}\text{corruption} &= \beta_0 + \beta_1 \times \text{decentralization} \\ &\quad + \beta_2 \times \text{decentralization} \times \text{political decentralization} \\ &\quad + \beta_3 \times \text{political decentralization} + \text{other controls}. \end{aligned} \tag{10}$$

Again, if political decentralization of LGs matters, then the more politically decentralized they are the bigger should be the effect of fiscal decentralization on corruption—that is, β_2 should be greater than 0. In addition, politics can work independently from fiscal decentralization. In this case β_3 should not be equal to 0.

We include all political decentralization variables in the regression. As defined in section 3, they are lg_indep, lg_execel, lg_dirdem, and lg_legel. We also include interactions of these variables with our di_main. The results are shown in table 8. Again, we ran five different specifications, each corresponding to a different corruption variable.

The results reported in table 8 definitely suggest that political decentralization is an important factor affecting corruption, even if fiscal decentralization is controlled for. In all specifications di_main still has an economically and statistically significant negative impact on corruption. Yet each political variable in the regression gives new information. In only two of five specifications does the election of an executive at the local level increase the effect of decentralisation on corruption. At the same time, two of five specifications suggest that, when LGs are not fiscally decentralized, the local election of executives may actually worsen corruption [coefficient of lg_execel is positive in equation (1) and equation (2)]. lg_indep is shown to have an independent significant negative effect on corruption in all five specifications. The interaction between di_main and lg_indep does not work as well, suggesting that nominal independence of LGs matters less when they are independent fiscally. The availability of direct democracy mechanisms in local governance generally (in almost all specifications) improves the situation with corruption both independently and in interaction with fiscal decentralization. Finally, the local election of legislative council does not seem to have a significant effect on corruption after controlling for other political decentralization variables.

7 Conclusion

With this paper we have pursued rigorous quantitative analysis to explore the impact of decentralization of LGs on the incidence of corruption in a sample of 158 countries. We have shown that decentralization, when taken to mean moving government closer to people by empowering LGs, has a significant negative (positive in the sense of good governance) effect on corruption, regardless of the choice of the estimation procedures or the measures of corruption used. In terms of various dimensions of decentralized governance, political decentralization matters even when fiscal decentralization is controlled for. Further voice (political accountability) seems to be more important in combating corruption than exit options made available though competition among jurisdictions.

The results of the paper should not be accepted without caution. While we find a strong and robust negative correlation between decentralization in a country and extent of corruption in it, we have not established the cause of these effects. There are at least two obstacles establishing the causal effect of decentalization on corruption.

First, even if decentralization is exogenous in our setup, the right-hand-side of our regressions still contains variables which are clearly endogenous [such as log(GDP_per_capita)]. The second limitation is more serious: the extent of both corruption and decentralization could be driven by the same omitted process—say 'benevolency' of a government, or the 'level of country's development'. In addition, the results may be plagued by measurement error, since the data we use are very scarce and many of the data points are roughly estimated. Part of our reasoning for usage of composite indexes rather than separate variables is because in this way measurement errors may offset each other. However, the chances are that errors are present.

The first and third of these problems are likely to bias the decentralization coefficient upwards, so that the negative relationship between decentralization and corruption is even stronger. The second problem represents a more serious challenge, as it may bias the coefficient in either direction. Its solution is left for further research [we provide further insight on these issues in Ivanyna and Shah (2010)].

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