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CORRUPTION AND SIZE DECENTRALIZATION

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Statistical tests based on newly collected cross-sectional data suggest that countries which have more first-tier subnational governments relative to their population are more corrupt. I measure the strength of association between "corruption" and the variables "population per regional government" and "average area of first-tier unit," both individually and combined as the interaction effect "size decentralization," in 100 randomly selected countries. Two theoretical arguments may explain these associations: (i) the greater the quantity of first-tier subnational units with monopolistic powers, such as legal and regulatory sanctions, the greater the incentives for bribery and extortion; and (ii) elected authorities and public servants of smaller regional governments are more vulnerable to capture by a corrupt private elite, especially when control and accountability mechanisms are weaker than national ones. This paper also provides some support for existing corruption theories, namely that wealthy countries with Protestant societies use democratic systems more effectively to control corruption.

JEL classification codes: R12, R50
Key words: decentralization, corruption, subnational units, regional government

I. Introduction

Decentralization, or the process of devolving powers to regional and local governments by shifting the structure of accountability from the national to the subnational level (Tiebout 1956; Burki, Perry, and Dillinger 1999), tends to be associated to encouraging the efficiency and responsiveness of government (Oates 1972), developing institutional and technological innovations (Beasley and Case 1995), improving public accountability (Seabright 1996), and controlling corruption (Huther and Shah 1998;

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de Mello and Barenstein 2001). However, recent evidence also suggests that certain measures of decentralization such as increasing the quantity and variety of first-tier subnational governments may increase the incentives that drive corruption (Shleifer and Vishny 1993; Bardhan 2002).

The plausible link between decentralization and corruption (defined as "the abuse of entrusted power for private gain" by Transparency International) is a relevant issue that requires further exploration and questioning. Prud'homme (1995) makes an interesting comparison between Western medicine and decentralization. He argues that Western medicine is highly effective, but only when it is correctly applied to the appropriate illness, at the right time, and in the proper dosage. If these conditions are not met, then secondary harmful effects will probably be worse than the disease itself. Unfortunately, in the majority of cases, decentralization is prescribed in excess, with the presence of abusive regulations, without the financial or administrative capabilities needed, under inadequate institutional and democratic controls, and with inefficient public servants and bribe-thirsty elected authorities.

Defining decentralization is a difficult task. This is due mainly because the definition of decentralization must first discuss the deep relationship between decentralized and federal states. According to Riker (1964), a federal constitution has at least two levels of government affecting the same land and people, each level has at least one area of action in which it is autonomous and there is some guarantee (even though merely a statement in the constitution) regarding each government's autonomy. Lijphart (1984) simplifies this concept by suggestion that federalism is a constitutionally guaranteed division of power between central and regional governments. Incidentally, decentralization is commonly defined as "the process of devolving political, fiscal, and administrative powers to subnational units of government" (Burki, Perry, and Dillinger 1999: 3). The similarity between the two concepts is remarkable. Prud'homme (1995: 201) actually defines decentralization using the definition of the theory of pure fiscal federalism: "that is, a system in which pure local governments raise pure local taxes and undertake pure local expenditures without the benefit of central government transfers."

Separating decentralized and centralized states from federal or unitary constitutions is almost an impossible task; given that there can be both centralized and decentralized federations, and centralized and decentralized unitary states (Lijphart 1984). Joumard and Kongsrud (2003) demonstrate that the extent of decentralization is not always encouraged by a federal structure and not always restrained by unitary institutional structure. In their study they found that some unitary countries (e.g., Denmark and Sweden) were more decentralized than the countries identified as federal (e.g.,

Germany, Mexico, and USA). Italy, for example, "though politically decentralized, is not considered a federation since the article in its constitution that enumerates the matters on which regional legislatures can legislate (Article 117) stipulates that they can legislate only 'within the limits of the fundamental principles established by the laws of the State' and 'provided that such legislation is not in contrast with the interests of the Nation or of other Regions'. Regional laws must not contradict fundamental principles established by national laws, and so regional autonomy is limited." (Treisman 2000: 432). A similar argument could be made for Mexico, Pakistan, and Malaysia, which are highly centralized bureaucracies with federal constitutions. A converse argument holds for Finland.

Is decentralization only bad for developing countries? In the majority of cases, the overall extent of decentralization's rate of success appears to be lower in developing countries. A comprehensive theoretical rationale that explains in part this phenomenon is that designing decentralization policy "is particularly difficult in developing countries because institutions, information and capacity are all very weak. The cross-cutting nature of decentralization, the importance of local institutions in influencing the impact of decentralization and the limited empirical evidence on what works and what does not make the design and implementation of decentralization a considerable challenge (for example, matching expenditures and revenues at each level of government, providing a regulatory framework that imposes a hard budget constraint on subnational governments, and incorporating local participation and accountability in decentralization). Evidence suggests that the problems associated with decentralization in developing countries reflect flaws in design and implementation more than any inherent outcome of decentralization." (Litvack, Ahmad, and Bird 1998: 7-8).

On the other side, it is impossible to argue that the specific impact of size decentralization (positive or negative) on corruption is more significant in developing countries, because the theoretical evidence regarding this relevant issue is limited. Statistically, I ran several regression models controlled by a wide range of factors in two subset samples of developing and developed countries.[1] I found that the overall fit of the models and the estimated values of the parameters are similar in the three scenarios, including the whole sample of countries. I also found that in all scenarios the correlations do not vary substantially between the dependent variable

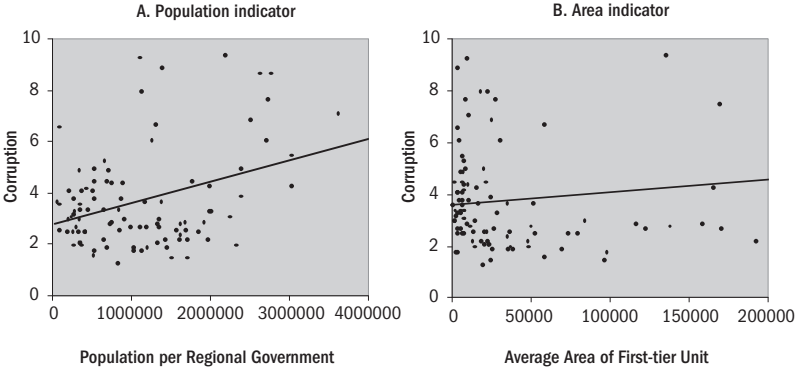
[1] The whole sample of 100 countries was divided in two subset samples of 79 developing and 21 developed countries based on the 2009 Human Development Index (HDI) list of developed countries by the UN. The HDI is arguably the most comprehensive mean to distinguish whether the country is developed or not, since it is a comparative measure of life expectancy, literacy, education and standards of living for countries worldwide.

"corruption" and the two main independent variables "population per regional government" and "average area of first-tier units." From now on I will only make reference to the whole sample of countries.

Figure 1 shows dispersion graphs between the dependent variable "corruption" measured by the Corruption Perception Index (CPI) and the two main independent variables. The unconditional analysis of the tendency lines clearly shows upward slopes, especially "population per regional government," which provides some initial support to the specific hypothesis that countries with more population per regional government tend to be less corrupt since their CPI is relatively higher (higher CPI scores imply less corruption). On the other hand, countries which have more regional or first-tier subnational governments relative to their population tend to be more corrupt since their CPI is generally lower.

The association between the dependent variable "corruption" measured by the CPI and the two main independent variables "population per regional government" and "average area of first-tier unit" (as well as their interaction effect "size decentralization") is the analytical focus of the regressions tests.[2] This does not

Figure 1. Corruption and indicators of size decentralization



Note: The first graph does not show the three outliers (Germany, UK and USA). The second graph does not show the two outliers (Australia and Canada). Their effects, however, are computed in the tendency lines.

[2] In view of the fact that the theoretical relationship between decentralization and corruption in general terms has been thoroughly analyzed over the last few decades; namely, the institutional benefits of administrative and decision-making autonomy such as the power to tax at a subnational level of government.

imply that I do not control for other measures of decentralization, e.g., fiscal, decision, government tiers, and electoral decentralization. The following three hypotheses clarify these points:

Hypothesis 1. Countries which have more first-tier subnational governments relative to their population are more corrupt.

Hypothesis 2. Countries which on average are divided into geographically smaller first-tier subnational governments are more corrupt.

Hypothesis 3. Countries which on average have geographically large first-tier subnational governments and a large population per unit are less corrupt.

Therefore, based on these three hypothesis, the primary objective of this quantitative study is to support the plausible association between the dependent variable "corruption" and the main independent variables "population per regional government" and "average area of first-tier unit" shown in Figure 1, both individually and combined in their interaction effect defined as "size decentralization." The secondary objective is to examine the classical theories of corruption by testing several explanatory factors, including democracy, education, income inequality, share of Protestant population, GDP per capita, liberty of press, openness to trade, and total population.

The paper is organized as follows. The next section describes the data. The third section runs a series of regression tests to examine the relationship between the dependent variable "corruption" and the two main independent variables "population per regional government" and "average area of first-tier unit." The quantitative findings are robust to a wide range of controls (including all of those that have been used in the recent cross-country literature on corruption) and provide strong support for the specific hypothesis that countries which have more first-tier subnational governments relative to their population are more corrupt. The fourth section concludes.

II. Data

Using recent cross-sectional data on a random sample of 100 countries summarized in Table A1, I test various arguments about how increasing the quantity of first-tier subnational governments affects corruption. Specifically, I test the relationship between "corruption" as the dependent variable and two specific sub-measures of "size decentralization" defined as "population per regional government" and "average area of first-tier unit" as the main independent variables (first-tier subnational unit and regional government are used interchangeably throughout the study).

A. Dependent variable

The dependent variable "corruption" is measured with the 2009 Corruption Perception Index (CPI) by Transparency International (TI). The CPI is "the best-known" index available (Tanzi, 1998: 577), and has been used in a number of studies, including Gupta et al. (1998), Alesina and Weder (1999), and Treisman (2000). However, as its name implies, the index measures the perception of corruption (on a scale of 0 to 10, with higher scores corresponding to better corruption ratings), not the actual level of corruption itself. The "corruption" variable and the two main independent variables "population per regional government" and "average area of first-tier unit" are free of endogeneity problems, because it is not plausible that the elements consulted to compile the index were influenced by the countries' administrative divisions.

I tested the validity of the dependent variable with great success against six endogenous government performance variables. Four indexes from the 2008-2009 Global Competitiveness Report (World Economic Forum): "property rights", "strength of auditing and reporting standards", "judicial independence" and "reliability of police services." And two indicators from the 2008 Worldwide Governance Research Dataset (Policy Research Working Paper 4978): "regulatory quality" and "government effectiveness." The unconditional bivariate correlation coefficients ranged anywhere from .75 to .95. These extremely high correlations confirm the dependent variable as an accurate measure of corruption. In fact, it should not come as a surprise that property rights, strength of auditing and reporting standards, judicial independence, reliability of police services, regulatory quality, and government effectiveness, are all highly correlated between themselves and with the CPI, given that they are all just another name for the lack of corruption. Tanzi (1998) best explains this rationale: As a way of life in highly corrupt countries, corruption is hardly ever reported or penalized. Corrupt police officials are by nature not reliable. The legal processes in these countries tend to be rigid and obsolete. Regulations and taxes are generally confusing, some are not public, and they are sometimes modified without previous notification. Laws are so complicated that only trained lawyers can understand them. The social costs for accusers are high. Personal freedom and basic rights such as private property are constantly threatened by corrupt law enforcement officials. And the judges are easily captured by the corrupt private elite.

B. Main independent variables

The first main independent variable "population per regional government," shown in Table A2, is measured dividing a country's total population (numerator) by its total number of first-tier subnational governments (denominator). A country is commonly divided in two subnational tiers of government: regional and local. A country, however, can be divided in three subnational tiers: provinces or states (regional government), counties (intermediate government), and municipalities (local government). For the purpose of this analysis, when a country is divided in three or more tiers, the information on the first-tier (provinces or states in the previous example) will be used as the denominator. If a country's administrative division includes only one subnational tier, then this information will be used as regional governments (e.g., Kuwait's six Governorates).[3]

The information for total population is the 2009 Population Division of the United Nations Department of Economic and Social Affairs. The total number of regional governments is taken from the International Organization for Standardization (ISO) 3166 subdivision codes. Recent versions of the Larousse Atlas of Countries of the World and the National Geographic Atlas were used as corroborating sources of data. From the sample taken, I assume that regional governments of all countries are endowed with a minimal degree of autonomy. Naturally, this autonomy varies from country to country, sometimes tremendously. For example, the delegates chosen by the central government in Russia have considerably less autonomy than elected officials in Spain's autonomous communities.

Consistent with the first hypothesis, "population per regional government" is expected to enter the "corruption" function with a strong positive coefficient, indicating that countries with more population per unit of first-tier subnational government are relatively less corrupt, since their corruption ratings are better (higher). One theoretical rational that explains this association is that "stronger personal links between bureaucrats and their constituents under decentralization might make it easier for corrupt individuals to collaborate, and smaller jurisdictions may make bribery more affordable and limit the resources available for fighting it. In addition, smaller jurisdictions may encourage more-detailed regulation of economic activity, encouraging corruption." (Arikan 2004: 182).

The second main independent variable "average area of first-tier unit" is measured dividing the country's total area in square kilometers (land and internal waters) by

[3] I use the definition of tiers or levels of administration for both governments with or without legislative councils and with or without elected leaders.

the total number of first-tier units (regional governments). The information for total area is the 2008 United Nations Statistic Division. Similar to the variable "population per regional government," and consistent with the second hypothesis, the variable "average area of first tier unit" is expected to enter the regression with a positive coefficient, indicating that countries which on average have geographically large first-tier subnational jurisdictions are less corrupt. One logical argument that explains this plausible association is that the benefits derived from the economies of scale diminishes in geographically small first-tier subnational governments.

If the hypotheses hold true, then why not ask if large populations decrease corruption? Most academics argue that highly populated countries tend to be less corrupt. This is due not only because "larger countries might adopt more decentralized fiscal systems to better cater to the diverse preferences of their citizens while, at the same time, economies of scale might arise in the fight against corruption" (Fisman and Gatti 2002b: 330); but also because according to an industrial development model by Murphy, Shleifer, and Vishny's (1989), market size determines the extent to which firms can benefit from positive spillovers, which in part possibly explains the relatively greater economic development (and less corruption) found in large countries (e.g., USA and Japan).

On the other hand, an alternative rationale argues that highly populated countries could actually be more corrupt, since large population emerges from a trade-off between economies of scale in supplying public goods and the greater cultural-ethnic heterogeneity cost present in populated countries. In practice, this trade-off is usually dominated by the heterogeneity factor (e.g., the former Soviet Union), which increases the incentives of corrupt bureaucrats to favor their own reference group (Alesina and Spolaore 1997), and encourages the armed conflicts and political instabilities that generates corruption (Mauro 1995). In line with these theoretical arguments, Alesina, Spolaore, and Wacziarg (1997) suggest that large countries, in terms of population, can afford to be closed, while small countries face stronger incentives to liberalize trade. Therefore, based on this reasoning, highly populated countries should have a disadvantage against corruption because openness to trade decreases corruption (Ades and Di Tella, 1999).

C. Different dimensions of decentralization

Orthodox theory assumes that decentralization encourages competition among subnational governments (Tiebout 1956; Brennan and Buchanan 1980), and interjurisdictional competition in turn is associated to improving three relevant factors

that disciplines government and decreases the level of corruption: accountability (Tabellini, 2000), bureaucracy (Bahmani and Nasir 2002), and efficiency (Jin, Qian, and Weingast 1999). In fact, "the basic model of interjurisdictional competition predicts a negative relationship between decentralization and corruption" (Fisman and Gatti 2002a: 26), as subnational populations observe and compare the performance of officials or bureaucrats across jurisdictions the level of corruption decreases (Dincer, Ellis, and Waddell 2010). The logic is simple. Subnational governments should compete to attract capital from residents and businesses by providing public goods and services more efficiently. For example, if a corrupt subnational government steals and wastes resources or over-regulates businesses in order to extract bribes, taxpayers and firms should exercise their free option of moving to areas with more efficient governments with fewer regulations. The two most well-known measures of decentralization are generally associated to improving subnational institutions. These beneficial measures are: (i) fiscal decentralization, or the constitutional authority to collect taxes and execute public expenditures by subnational governments; and (ii) decision decentralization, or the scope of issues on which regional and local governments can decide autonomously without being overruled by higher-tier governments.

For the purpose of this study, the information for "fiscal decentralization" is the most recent estimates of the Government Finance Statistics Yearbook (IMF). It measures regional government revenue and expenditure as a percentage of total revenue and expenditure. To be consistent with the units defined by "size decentralization," I will only measure information on the first-tier subnational jurisdiction or regional government. The variable "fiscal decentralization" does not measure any information corresponding to the second or third level of subnational governance, which are commonly referred as intermediate and local governments. The proxy that I propose for "fiscal decentralization" attributes two-thirds weighting to revenue and one-third weighting to expense. I emphasize the income side because the incentives created by subnational revenue generation encourage a series of beneficial spillover effects on regional economic prosperity (Weingast 2009). In the regression model, the variable "fiscal decentralization" is expected to enter the "corruption function" with a strong positive coefficient, indicating that more fiscally decentralized countries have better (higher) corruption ratings. The anticipated findings should support the theory that fiscal decentralization decreases corruption (Huther and Shah 1998; De Mello and Barenstein 2001; Fisman and Gatti 2002b; Dincer et al. 2010). A commonly used argument that explains the theory is that "bureaucrats in a fiscally decentralized economy" have fewer incentives to engage in rent-seeking behavior (Arikan 2004: 192).

Decision decentralization is defined by the dummy variable "federal status." It measure decision-making autonomy at a regional level of government. I use the classification of federal countries by the independent organization The Forum of Federations to measure the variable "federal status." The information regarding a country's federal status has traditionally been used in the academic literature to measure decision decentralization, since the primary characteristic of federalism is a constitutionally guaranteed division of power between national and subnational governments (Lijphart 1984: 170), in which at least one tier of government has at least one autonomous area of action (Riker, 1964: 11). The imperfect dummy that I constructed took the value "2" for federal countries and "1" for unitary states. And since federalism has theoretically been associated to decreasing corruption (Hayek 1948), as autonomous subnational officials with constitutional powers to legislate have greater access to relevant local information that enables providing public services more efficiently (Fisman and Gatti 2002b), the control variable "federal status" is expected to enter the regression with a positive coefficient (indicating that federal countries have better corruption ratings).

In addition to "fiscal decentralization" and "federal status," I also test "electoral decentralization." This dimension of decentralization is defined as the constitutional right to democratically elect subnational authorities. *A priori*, it is possible to constrain corruption with institutions of accountability from below, as democratic forces should punish corruption. "The intuition is that, under decentralization, politicians are held directly accountable for their actions" (Fisman and Gatti 2002a: 26). In the regression model, "electoral decentralization" is expected to share a positive relationship with "corruption," since it is measured by the interaction effect between the variable "federal status" and the variable "democracy" (which I formally define next). This positive relationship implies that countries with more electoral control have better (higher) corruption ratings.

D. Other explanatory variables

"Democracy" is measured by the 2008 Economist Intelligence Unit Democracy Index. The index focuses on electoral processes and pluralism, civil liberties, the functioning of government, generalized participation, and political culture. It ranges from full democracies (scores of 8-10) to authoritarian regimes (scores below 4). *A priori*, democracy decreases corruption, since democratic institutions improve economic policies and outcomes (Besley et al. 2005), encourages power of speech (Besley and Burgess 2002), increases the participation in a generalized interpretation

of the rule of law (Bardhan 2005), "and when it works well, it provides citizens a means to express choices and to hold public officials accountable" (Weingast 2009: 280). Treisman (2000) quantified the effect of democracy on corruption by sustaining that more than 40 consecutive years of democracy should decrease corruption by about 10%; The variable "democracy" should enter the regression model with a strong and significant positive coefficient, indicating that full democracies (scores of 8-10) have better (higher) corruption ratings.

"Education" is measured by the 2008 United Nations Education Index, which attributes two-thirds weighting to the adult literacy rate and one-third weighting to the combined gross school enrolment ratio. The education index's highest possible score is 1, implying perfect education attainment. In the analysis, the variable "education" should also enter the regression model with a positive coefficient, since well-educated societies condemn corruption more vigorously (Ades and Di Tella 1997).

"Inequality" is measured by the 2008 CIA World Factbook Gini Inequality Coefficient. The Gini coefficient is a measure of statistical dispersion of income inequality. It ranges from 0 to 1. Low coefficients refer to equal distributions, with 0 corresponding to complete equality. While higher coefficients represent unequal distributions, with 1 indicating complete inequality. The variable inequality is anticipated to enter the regression model with a negative coefficient, indicating that more equal societies (low Gini coefficients) have better (higher) corruption ratings; given that unequal societies are usually governed by a corrupt elite (Gupta, Davoodi, and Alonso-Terme 1998).

"Protestantism" is measured by the share of Protestant religion in the country. The information used for Protestantism is the USA State Department's 2004 International Religious Freedom Report. Protestantism includes Evangelical, Quaker, Assembly of God, Anglican, Episcopalian, Baptist, Church of God, Church of the Nazarene, Congregationalist, Church of Christ, Lutheran, Calvinist, Holiness, Mennonite, Methodist, Pentecostal, Presbyterian, and Reformist Churches. Treisman (2000) quantifies the effect of Protestantism on corruption by sustaining that an increase of 5% to 10% in the Protestant population should decrease corruption by about 11%. One plausible argument to explain this phenomenon is that Protestants are generally more responsible for their actions and sins, while Catholics, as a converse example, tend to highlight the sinful weaknesses of the individual and the need for a forgiving and protecting Church. In the regression model, "Protestantism" and "corruption" are expected to share a positive relationship.

"GDP per capita at nominal value and at purchasing power parity (PPP)" is measured by the 2008 IMF World Economic Outlook Database. GDP per capita at

nominal value measures the value of all final goods and services produced within a nation in a given year, converted at market exchange rates to current U.S. dollars, divided by the average population for the same year. Alternatively, GDP per capital at PPP estimates are arguably more useful in cross-country analyses because they take into account the countries' relative cost of living and inflation rates, rather than just using exchange rates which may distort the real differences in income. In theory, poor countries are more corrupt (Gould and Amaro-Reyes 1983). This is due mainly because corruption decreases investment rates (Mauro 1995), which is an essential determining factor for economic growth (Levine and Renelt 1992). Wei (1999) quantifies the effect by sustaining that corruption acts like an arbitrary tax equal to 20% of total business returns. The variable "GDP per Capita at PPP" is expected to enter the regression model with a strong positive coefficient, implying that wealthier countries are less corrupt.

"Press freedom" is measured by the 2009 Reporters Without Borders Press Freedom Index. The index refers to the amount of freedom journalists and the media have in each country, and the efforts made by governments to see that press freedom is respected. (Lower scores correspond to better press freedom ratings). "Press freedom" should enter the regression model with an inverse coefficient, since the freedom to report corrupt individuals is a key factor to prevent future acts of corruption (Brunetti and Weder 1998).

"Trade freedom" is measured by the 2009 Heritage Foundation and The Wall Street Journal Trade Freedom Index. The index is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. The index uses a scale from 0 to 100, where 100 represent the maximum expression of openness to trade. "Trade freedom" and "corruption" are anticipated to share a positive relationship, given that countries which are more open to foreign trade tend to be less corrupt because exposure to imports disciplines the market (Ades and Di Tella 1996).

"Tiers of subnational governance" is compiled by the ISO 3166 subdivision codes. Treisman (2002) empirically sustains (using World Bank indicators) that corruption increases from .16 to .21 points in a 3.5 scale for each additional tier of government. One logical rationale that explains this phenomenon is that as vertical divisions of government increases, the waste of public resources resulting from the effects of duplication also increases. In the regression model, "tiers of subnational governance" and the dependent variable "corruption" are likely to share a negative relationship, which implies that countries divided in more tiers of subnational governance have worst (lower) corruption ratings. A commonly used theoretical

rationale to sustain this inverse relationship is the "overgrazing" problem of different tiers of government competing to extract bribes from the same economic actor (Treisman 2000: 433).

Table 1. Summary statistics (cross-country data)

Variables	Observations	Mean	Standard Deviation	Min.	Max.
Main effect					
Corruption	100	3.81	1.98	1.30	9.40
Population per regional government	100	1,264,777	1,141,554	52,000	6,893,523
Average area of first-tier units	100	49,515	125,694	321	961,503
Democracy	100	5.54	2.17	1.52	9.53
Education	98	0.79	0.20	0.27	0.99
Inequality	98	41	9	24	62
Protestantism	100	13%	18%	0%	91%
GDP per capita (PPP)	99	11,875	12,202	400	46,381
GDP per capita (nominal value)	99	12,039	16,483	138	62,097
Press freedom	100	21	25	0	116
Trade freedom	97	76	10	50	90
Measures for lack of corruption					
Property rights	79	4.32	1.05	2.10	6.50
Strength of auditing and reporting standards	79	4.56	0.80	2.80	6.30
Regulatory quality	100	-0.06	0.98	-2.13	1.91
Government effectiveness	100	-0.11	0.96	-1.48	2.19
Reliability of police services	79	4.00	1.17	2.00	6.50
Judicial independence	79	3.60	1.30	1.40	6.70
Decentralization measures					
Fiscal decentralization	64	16%	14%	1.43%	54%
Tiers of subnational governance	100	3	0,91	1	4
Federal status	100	1.1	0.30	1	2
Robustness checks					
Total population	100	23,974,957	37,949,640	520,000	308,493,000
Total area (km^2)	100	885,101	229,524	5,130	17,093,112

III. Methods and findings

A. Unconditional correlations

Initial estimates of the unconditional bivariate correlation matrix (shown in Table 2) is consistent with the hypothetical framework, because the main independent variables "population per regional government" and "average area of first-tier units" generates significant and positive coefficients of .48 and .31, respectively, with the dependent variable "corruption". (Taking into account that extremely high coefficients tend to be more problematic and that "population per regional government" and "average area of first-tier units" have relatively lower correlations with all explanatory variables, which should strengthen the future interpretation of the main independent variables as significant estimators of corruption). Hypotheses 1 and 2 are further marginally reinforced since, on average, the variables "total population" and "total area" per country (not shown Table 2) share a relatively less significant relationship with "corruption," compared to the two main independent variables. Bivariate coefficients of .25 for "total population" compared to .48 for "population per regional government," and .14 for "total area" compared to .31 for "average area of first-tier units." ("Total population" and "total area" are formally controlled in the regression model).

The grouping of the factors, based solely on Table 2, also implies that high corruption is mainly present in weak institutional environments of poor countries governed by authoritarian regimes. And that corruption could additionally be linked to other significant indirect determinants. These vary from inheriting a non-Protestant, uneducated and unequal society, or to experience a lack of openness to trade and liberty of press. (The negative correlation of "inequality" with "corruption" implies that lower Gini coefficients refer to more equally distributed countries, while higher CPI refers to less corrupt countries (the same applies to "press freedom," countries with more liberty of press –lower indexes– have better –higher– corruption ratings).

B. Regressions tests

I ran a series of regression tests with "corruption" as the dependent variable. The log is used to normalize the data of "population per regional government", "GDP per capita" (nominal and PPP), "average area of first-tier units", "total population," and "total area." As in numerous other studies, logs are used to avoid giving excessive weight to extremely high observations, which is precisely the case when dealing

Table 2. Main effect correlation matrix

	Corruption	Population per regional government	Average area of first-tier unit	Democracy	Education	Inequality	Protestant religion	GDP per capita (PPP)	Press freedom	Trade freedom
Corruption	1									
Population per regional government	0.48	1								
Average area of first-tier unit	0.31	0.26	1							
Democracy	0.73	0.29	0.15	1						
Education	0.54	0.18	0.10	0.57	1					
Inequality	-0.44	-0.18	-0.05	-0.25	-0.44	1				
Protestant religion	0.39	0.24	0.15	0.37	0.07	0.04	1			
GDP per capita (PPP)	0.85	0.51	0.30	0.67	0.66	-0.51	0.25	1		
Press freedom	-0.48	-0.14	-0.07	-0.72	-0.19	0.10	-0.35	-0.44	1	
Trade freedom	0.51	0.16	0.14	0.57	0.57	-0.33	0.08	0.54	-0.40	1

with population, geographic area, and GDP. (The significance of the estimates are based on White-corrected standard errors).

The first column of Table 3 shows the explanatory variables effect on the "corruption" function. It is important to highlight that "democracy", "Protestantism", and "GDP per capita at PPP" have strong positive slope coefficients at less than 1%. (I also tested, without any relevant results to report, the effect of nominal GDP per capita instead of PPP, given that PPP are estimates rather than hard facts and should be used with caution, since its measurements tend to vary substantially depending on the source of data). In general, the overall fit of the model is consistent with existing corruption theories because it explains about 70% of the variation in "corruption." That is, wealthy Protestant societies that rely on democratic institutions are in a better position to report and punish corruption (Mauro 1995; Gould and Amaro-Reyes 1983; Wei 1999; Treisman 2000). The puzzling inverse relationship between quality of education and decreasing corruption could be somewhat explained because the inherence of excellent public educational systems in former communist countries came along with a highly corrupt bureaucracy. (The direction of "education," the low coefficient of "inequality," and the insignificance of "press and trade freedom" are subject to further investigation beyond the aims of this study).

When the main independent variables "population per regional government" and "average area of first-tier units" entered the regression, the goodness of fit improves 4 percentage points. The direct effect of "population per regional government" is highly significant. (The null hypothesis that the true slope coefficient is zero is clearly rejected, given that "population per regional government" and "corruption" are uncorrelated in only fourteen out of ten thousand occasions). These findings provide strong support for the first hypothesis that countries with more population per regional government have better (higher CPI) corruption ratings. The size of the partial slope coefficient implies that a one standard deviation increase in "population per regional government" will be associated to an improvement in the country's corruption rating by about 100% of a standard deviation, assuming that all other factors affecting corruption are held constant. (The true value of the coefficient of "population per regional government" lies, within the 95% confidence interval, between .41 and 1.63). On the other hand, the marginal coefficient of "average area of first-tier units" could indicate that its effect on corruption is partially captured by "population per regional government," which could introduce a host of multicullinearity problems, as both variables measure similar effects on corruption. Consequently, I ran an additional regression (not shown in Table 3), excluding "population per regional government and the parameter of "average area of first-tier unit" dramatically improves to .35

(reinforced at a p-value of .05). These results provide some support for the second hypothesis that countries which on average are divided into geographically small first-tier subnational governments are more corrupt.

To test whether the advantages of large population per regional government were increased by large first-tier geographic area (third hypothesis), I used an interaction term defined as "size decentralization" by multiplying "population per regional government" times "average area of first-tier unit" (shown in the third column). The interaction term was not significant under any scenario, including weak inverse coefficient of .07, high p-value of .86, and low absolute t-statistic of .17. These findings do not support the third hypothesis that countries which on average have geographically large first-tier subnational governments and also have a large population per unit are less corrupt. Apparently, the beneficial spillover effects on corruption of having large regional governments, such as the benefits in the economies of scale (Bardhan and Mookherjee 2006) or the greater difficulties in consolidating closer personal ties when there are larger jurisdictions (Tanzi, 1995), are mainly present with large populations, and not necessary with large geographic areas.

The fourth column in Table 3 reports the direct effect on corruption of three specific measures of decentralization. However, only "tiers of subnational governance" is significant at less than 5%. The size of the coefficient implies that if a country decreases its tiers of subnational governments by one unit, *ceteris paribus*, the corruption ratings should improve by .44 points (on a scale of 0 to 10). For example, if Venezuela were to decrease its number of subnational governments from four to three, its forecasted mean corruption score would improve from 1.9 to about 2.4. The theoretical rationale for this phenomenon could be that as competition between different autonomous governments to extract bribes from the same economic actor often leads to the problem of "overgrazing" (Treisman 2000: 433). "Fiscal decentralization" and "federal status," on the other hand, appear to be insignificantly related to corruption, which contradicts classical theories for reasons that are beyond the scope of this study. I also tested an interaction term defined as "electoral decentralization" by multiplying "democracy" times "federal status." The interaction term entered the regression with a positive coefficient of .49, with a p-value of .06; which provides some support to the theoretical argument that having a democratic government closer to the citizens is easier to control, especially when voters have to pay the bills (Fisman and Gatti 2002a).

Additionally, I computed a logarithmic weighted average of six measures and sub-measures of decentralization defined as the "extent of decentralization," and

Table 3. The effect of size decentralization on corruption (OLS cross-country estimates)

Variables	(I) Explanatory effect	(II) Basic estimators	(III) Main interaction	(IV) Decentralization measures	(V) Robustness checks
Population per regional government		1.02***	1.30	1.22**	
		(3.30)	(0.78)	(2.54)	
Average area of first-tier unit		0.02	0.43	0.28	
		(0.09)	(0.18)	(0.90)	
Democracy	0.34***	0.26**	0.26**	0.31*	0.34*
	(3.26)	(2.51)	(2.50)	(1.86)	(1.91)
Education	-3.06***	-2.22**	-2.22**	-3.41**	-3.02*
	(-2.79)	(-2.11)	(-2.10)	(-2.22)	(-1.75)
Inequality	-0.04***	-0.04***	-0.04***	-0.04**	0.05**
	(-2.83)	(-2.79)	(-2.78)	(-2.57)	(-2.44)
Protestantism	2.19***	2.25***	2.27***	1.81**	2.08**
	(3.20)	(3.52)	(3.47)	(2.35)	(2.46)
GDP per capita (PPP)	2.20***	1.94***	1.95***	2.31***	2.37***
	(5.20)	(4.81)	(4.77)	(3.35)	(3.07)
Press freedom	-0.01	-0.01	-0.01	-0.01	-0.01
	(-0.04)	(-0.92)	(-0.92)	(-0.94)	(-0.65)
Trade freedom	0.02	0.02	0.02	0.03	0.02
	(0.90)	(1.11)	(1.11)	(1.06)	(0.78)
Pop. per region * av. area of first-tier unit			-0.07		
			(-0.17)		
Fiscal decentralization				0.41	0.80
				(0.34)	(0.58)
Tiers of subnational governance				-0.44**	-0.35*
				(-2.45)	(1.70)
Federal status				-0.68	-0.42
				(-1.47)	(0.80)
Total population					0.33
					(0.69)
Total area (km^2)					0.24
					(0.68)
Observations	94	94	94	63	63
Adjusted R-squared	0.70	0.74	0.74	0.77	0.72

Note: t-statistics are in parentheses. Standard errors are corrected for heteroscedasticity. In all cases, the computed f-values (between 15 and 40) clearly exceed the critical f-values at 1% hence, the null hypothesis that the collective impact of all explanatory variables is simultaneously equal to zero is rejected.
Significance: * p < 10% ** p < 5% *** p < 1%.

tested its effect on the multiple regression model. Given that the proxies for "population per regional government" and "average area of first-tier unit" explain similar effects of the variation in "corruption," each were assigned with a 15% weight. The same applies to "federal status" and "electoral decentralization". "Fiscal decentralization" and "tiers of subnational governance," on the other hand, made up for the remaining 40%, evenly distributed with 20% each. In line with the theory that the different measures and sub-measures of decentralization are somewhat independent of each other and do not move in tandem (Sharma 2006), the imperfect proxy "extent of decentralization" entered the regression model with an insignificant coefficient. The logic behind these findings could be that some measures of decentralization improve corruption ratings such as "electoral decentralization," and some measures of decentralization worsen corruption ratings such as "tiers of subnational governance." Hence, it is not plausible to accurately explain the overall effect of decentralization on corruption, because its individual measurements tend to cancel each other out.

The fifth column reports the direct effect of "total population" and "total area" on the model. I excluded "population per regional government" and "average area of first-tier unit" to avoid severe problems of multicollinearity. The strength of the direct association of "total population" and "total area" with "corruption" turned out to be insignificant. It should be noted that "GDP per capita (PPP)" is highly significant throughout the regressions tests. The size of the coefficients imply that a one standard deviation increase in "GDP per capita (PPP)" will be associated to an improvement in the country's corruption rating by more than 200% of a standard deviation. As a final point, I would like to add that the specific hypothesis that countries which have more first-tier subnational governments relative to their population are more corrupt is also reinforced because the variance inflation factor (VIF) of "population per regional government" is constantly below what is commonly agreed on as the barrier for multicollinearity of 4. (Naturally, the VIF of "population per regional government" dramatically improves when "average area of first-tier unit" and/or "total population" are/is excluded from the "corruption" function).

IV. Conclusions

From an empirical perspective, it is practically impossible to measure the extent of decentralization. And it is even harder to measure the overall impact of decentralization on corruption. This is due mainly because decentralization is defined and measured differently in different studies (Sharma 2006). For example, some decentralization-related studies use the Government Finance Statistics of the International Monetary

Fund (IMF) as a general measure for the extent of decentralization and its overall impact on corruption such as the case of Fisman and Gatti (2002a; 2002b). However, in reality this variable is only valid as an imperfect proxy for fiscal decentralization, since it does not include information on the level of autonomy of subnational governments in terms of their revenues or expenditures, which is important information when analyzing decentralization. Which country is more decentralized? One that has subnational powers to tax and spend (fiscal decentralization), but the rulers are directly appointed by national headquarters (lack of electoral decentralization or deconcentration of power), or another country where subnational governments are financed by funds and transfers by the central government (fiscal centralization) but are endowed with complete autonomy to legislate (decision decentralization). In addition to the problems of accurately measuring and defining decentralization, its different measures and sub-measures are somewhat independent of each other and do not move in tandem.

In this paper I do not intend to capture the overall effect of decentralization on corruption. I only intend to capture the effect of two specific sub-measures of size decentralization. In particular, I found that the association between the dependent variable "corruption" and "population per regional government" is highly significant and is robust to control for a wide range of potential sources of omitted variable bias,[4] which provide strong support for the first hypothesis that countries which have more first-tier subnational governments relative to their population are more corrupt. The channels that rationalize the above-mentioned hypothesis suggest that the benefits of having a regional government closer to the citizens, which in theory should increase the controls of corruption, is dominated by the argument that in smaller jurisdictions corruption is less costly. It appears to be the case that public servants in small jurisdictions tend to be captured more easily by the corrupt private elite (Prud'homme 1995). This is due mainly because regional control and accountability mechanisms (such as legal and regulatory sanctions, codes of conduct, whistleblowing, and independent watchdogs in the public sector) are weaker compared to national ones (Bardhan and Mookherjee 2006). And also because, public servants in regional governments are relatively more unreliable, underpaid, uncooperative and unmotivated in comparison to their national level counterparts (Bardhan 2002).

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[4] I also found that fully democratic wealthy countries with high share of Protestantism corrupt and less tiers of government are less corrupt. On the other hand, the negative sign of "education" is subject to further investigation because it does not support the classical theories of corruption, as is the case with the insignificant effect of three traditionally significant controls of corruption: income inequalities, liberty of press, and openness to trade.

Besides, family and personal ties between the private sector and corrupt officials tend to be closer in smaller jurisdictions (Tanzi 1995). Another rationale that explains the association between "corruption" and "population per regional government" is that the greater the number of first-tier subnational units with monopolistic regulatory powers to impose independent bribes, the greater the total number of bribes in the country (Shleifer and Vishny 1993).

The direction of causality presents a significant limitation that is very hard to solve. This is why all decentralization and corruption studies must rely on the underlying theory. One statistical solution to this endogenous problem is to develop a research design that observes changes in corruption over time and then to relate these changes to decentralization. For example, it would be feasible, though not entirely accurate, to examine the decentralization variable a few years before the corruption variable. By doing so it may be plausible to verify the influential causality of decentralization on corruption (Treisman 2000).

However, even if a correct research design were to be developed, it is impossible to completely separate decentralization from corruption, because the interaction between the two variables is the result of an extremely complex and continuously changing phenomenon that involves several economic, political, cultural, and historical factors. In fact, separating corruption from anything related to governance is very difficult because it appears that corruption is an integral part of the government. As Bardhan (2002: 203) correctly points out: "Before being too quick to claim that decentralization brought about certain outcomes, it is worth considering that decentralization may have resulted from ongoing political and economic changes that also affected these same outcomes. Separating decentralization from its political and economic causes, so that decentralization is not just a proxy for an ill-defined broad package of social and economic reforms, is a delicate task."

Appendix

Table A1. Definition of the data

Variable	Interpretation	Source	Year
Corruption	Perception of corruption, not the actual level of corruption.	Transparency International	2009
Population per regional government	Total population divided by total number of regional governments (first-tier subnational unit).	UN Department of Economic & Social Affairs, and ISO 3166 Subdivision Codes.	2009
Average area of first-tier unit	Total area (km2) divided by total number of regional governments (first-tier subnational unit)	UN Statistic Division, and ISO 3166 Subdivision Codes.	2008
Democracy	Electoral processes, pluralism, generalized participation, functioning of government, civil liberties, and political culture.	Economist Intelligence Unit index	2008
Education	Two-thirds weighting to adult literacy rate and one-third to combined gross school enrolment ratio.	United Nations index	2008
Inequality	Statistical dispersion of income inequality.	CIA World Factbook Gini inequality coefficient	2008
Protestantism	Share of Protestant Religion in the Country	International Religious Freedom Report (USA State Department)	2004
GDP per capita (PPP)	Value of goods and services divided by population (takes into account relative cost of living and inflation rates).	IMF World Economic Outlook Database.	2008
Press freedom	Freedom of journalists and media, and efforts made by governments to see that press freedom is respected.	Reporters Without Borders	2009
Trade freedom	Measures the absence of tariff and non-tariff barriers.	Heritage Foundation and The Wall Street Journal Trade Freedom index	2009
Property rights	Protection of property rights, including financial assets.	Global Competitiveness Report (World Economic Forum)	2008-2009
Strength of auditing and reporting standards	Financial auditing and reporting standards regarding company financial performance.	Global Competitiveness Report (World Economic Forum)	2008-2009

Table A1. (continued) Definition of the data

Variable	Interpretation	Source	Year
Regulatory quality	Obstacles generated by excessive regulations.	Worldwide Governance Research Dataset (World Bank)	2008
Government effectiveness	Quality of public management, credibility in implementation of public policies, and capabilities of public employees.	Worldwide Governance Research Dataset (World Bank)	2008
Reliability of police services	Police services reliability to enforce law and order.	Global Competitiveness Report (World Economic Forum)	2008-2009
Judicial independence	Judiciary independency from influences of government, citizens, or firms.	Global Competitiveness Report (World Economic Forum)	2008-2009
Fiscal decentralization	Two-thirds weighting to revenue and one-third to expense (regional level of government).	Government Finance Statistics Yearbook (IMF)	2002-2008
Tiers of subnational governance	Total number of vertical subnational levels of government.	ISO 3166 Subdivision Codes	2009
Federal status	Measure decision-making autonomy at a regional level.	The Forum of Federations	2009

Table A2. Main independent variables

Country	First-tier subnational governments (Administrative division between central and local levels)	N° of first-tier units	Total population (2009 est.)	Total area (km^2)	Population per regional government	Average area first-tier unit
Afghanistan	34 Provinces	34	28,150,000	652,230	827,941	19,183
Albania	12 Counties	12	3,170,000	28,748	264,167	2,396
Algeria	48 Provinces	48	34,895,000	2,381,740	726,979	49,620
Angola	18 Provinces	18	18,498,000	1,246,700	1,027,667	69,261
Argentina	23 Provinces, 1 Federal District	24	40,134,425	2,780,400	1,672,268	115,850
Armenia	10 Regions, 1 City	11	3,230,100	29,743	293,645	2,704
Australia	6 States, 2 Territories	8	22,117,000	7,692,024	2,764,625	961,503
Belarus	6 Oblasts	6	9,671,900	207,600	1,611,983	34,600
Belgium	3 Regions	3	10,827,519	30,528	3,609,173	10,176
Benin	12 Departments	12	8,935,000	112,622	744,583	9,385
Bolivia	9 Departments	9	9,879,000	1,098,581	1,097,667	122,065
Bulgaria	28 Regions	28	7,576,751	110,879	270,598	3,960
Burkina Faso	45 Provinces	45	15,757,000	274,200	350,156	6,093
Burundi	16 Provinces	16	8,303,000	27,830	518,938	1,739
Cameroon	10 Regions	10	19,522,000	475,440	1,952,200	47,544
Canada	10 Provinces, 3 Territories	13	33,968,000	9,984,670	2,612,923	768,052
Central African Rep.	16 Prefectures, 1 Capital	17	4,422,000	622,984	260,118	36,646
Chad	22 Regions	22	11,274,106	1,284,000	512,459	58,364
Chile	13 Regions	13	17,020,000	756,102	1,309,231	58,162
Colombia	32 Departments, 1 Capital District	33	45,267,000	1,141,748	1,371,727	34,598

Table A2. (continued) Main independent variables

Country	First-tier subnational governments (Administrative division between central and local levels)	N° of first-tier units	Total population (2009 est.)	Total area (km^2)	Population per regional government	Average area first-tier unit
Costa Rica	7 Provinces	7	4,579,000	51,100	654,143	7,300
Cote d'Ivoire	16 Regions	16	21,075,000	322,463	1,317,188	20,154
Croatia	20 Counties, 1 City	21	4,435,056	56,594	211,193	2,695
Cuba	14 Provinces, 1 Special Municipality	15	11,204,000	110,860	746,933	7,391
Czech Republic	14 Regions, 1 Municipality	15	10,513,397	77,276	700,893	5,152
Denmark	5 Regions	5	5,532,531	43,094	1,106,506	8,619
Dominican Republic	29 Provinces, 1 District	30	10,090,000	48,380	336,333	1,613
Ecuador	22 Provinces	22	14,113,000	276,840	641,500	12,584
El Salvador	14 Departments	14	6,163,000	20,720	440,214	1,480
Eritrea	6 Provinces	6	5,073,000	121,320	845,500	20,220
Estonia	15 Counties	15	1,340,415	43,211	89,361	2,881
France	22 Regions, 4 Overseas Departments	26	65,073,482	640,053	2,502,826	24,617
Georgia	9 Reg., 2 Autonomous Republics, 1 City	12	4,385,400	69,700	365,450	5,808
Germany	16 Lands	16	81,789,573	357,114	5,111,848	22,320
Ghana	10 Regions	10	23,837,000	238,533	2,383,700	23,853
Greece	13 Administrative Regions	13	11,306,183	130,800	869,706	10,062
Guatemala	22 Departments	22	14,027,000	108,430	637,591	4,929
Guinea	7 Governorates	7	10,069,000	245,857	1,438,429	35,122
Guyana	10 Regions	10	762,000	214,696	76,200	21,470
Haiti	9 Departments	9	10,033,000	27,560	1,114,778	3,062

Table A2. (continued) Main independent variables

Country	First-tier subnational governments (Administrative division between central and local levels)	Nº of first-tier units	Total population (2009 est.)	Total area (km^2)	Population per regional government	Average area first-tier unit
Honduras	18 Departments	18	7,466,000	111,890	414,778	6,216
Iraq	18 Governorates	18	30,747,000	435,244	1,708,167	24,180
Ireland	4 Provinces	4	4,459,300	70,273	1,114,825	17,568
Israel	6 Districts	6	7,509,000	22,072	1,251,500	3,679
Italy	20 Regions	20	60,231,214	301,336	3,011,561	15,067
Jamaica	14 Parishes	14	2,719,000	10,831	194,214	774
Japan	47 Prefectures	47	127,530,000	374,744	2,713,404	7,973
Jordan	12 Governorates	12	6,316,000	91,971	526,333	7,664
Kazakhstan	14 Regions, 2 Cities	16	15,776,492	2,724,900	986,031	170,306
Kuwait	6 Governorates	6	2,985,000	17,820	497,500	2,970
Kyrgyzstan	7 Regions, 1 City	8	5,482,000	199,951	685,250	24,994
Laos	16 Provinces, 1 Capital City	17	6,320,000	236,800	371,765	13,929
Lebanon	8 Governorates	8	4,224,000	10,452	528,000	1,307
Liberia	15 Counties	15	3,476,608	111,355	231,774	7,424
Libya	34 Municipalities	34	6,420,000	1,759,540	188,824	51,751
Lithuania	10 Counties	10	3,329,227	65,300	332,923	6,530
Malaysia	13 States, 3 Federal Territories	16	28,306,700	330,803	1,769,169	20,675
Mali	8 Regions, 1 District	9	14,517,176	1,240,000	1,613,020	137,778
Mauritania	12 Regions, 1 District	13	3,291,000	1,025,520	253,154	78,886
Moldova	10 Districts, 2 Territories, 1 City	13	3,567,500	33,846	274,423	2,604

Table A2. (continued) Main independent variables

Country	First-tier subnational governments (Administrative division between central and local levels)	Nº of first-tier units	Total population (2009 est.)	Total area (km^2)	Population per regional government	Average area first-tier unit
Morocco	16 Economic Regions	16	31,698,000	446,550	1,981,125	27,909
Mozambique	10 Provinces, 1 City	11	20,226,296	801,590	1,838,754	72,872
Netherlands	12 Provinces	12	16,582,600	37,354	1,381,883	3,113
New Zealand	2 Islands	2	4,350,600	270,467	2,175,300	135,234
Nicaragua	16 Departments, 2 Autonomous Regions	18	5,743,000	130,373	319,056	7,243
Niger	7 Departments, 1 Urban Community	8	15,290,000	1,267,000	1,911,250	158,375
Panama	9 Provinces, 5 Districts	10	3,454,000	75,417	345,400	7,542
Papua New Guinea	1 District, 19 Provinces	20	6,732,000	462,840	336,600	23,142
Paraguay	17 Departments, 1 Capital City	18	6,349,000	406,752	352,722	22,597
Peru	24 Departments, 1 Constitutional Province	25	29,132,013	1,285,216	1,165,281	51,409
Poland	16 Provinces	16	38,100,700	312,685	2,381,294	19,543
Romania	40 Departments, 1 Municipality	41	21,466,174	238,391	523,565	5,814
Russia	21 Rep, 6 Terr., 50 Reg., 10 Dist., 2 Cities	89	141,915,979	17,098,242	1,594,562	192,115
Rwanda	4 Provinces, 1 Town Council	5	9,998,000	26,338	1,999,600	5,268
Saudi Arabia	13 Provinces	13	25,721,000	2,149,690	1,978,538	165,361
Senegal	14 Regions	14	12,534,000	196,722	895,286	14,052
Sierra Leone	1 Area, 3 Provinces	4	5,696,000	71,740	1,424,000	17,935
Slovakia	8 Regions	8	5,421,937	49,037	677,742	6,130
South Korea	9 Provinces, 6 Metropolitan Cities, 1 Capital	16	48,333,000	99,828	3,020,813	6,239
Spain	17 Autonomous Communities	17	45,967,632	505,992	2,703,978	29,764

Table A2. (continued) Main independent variables

Country	First-tier subnational governments (Administrative division between central and local levels)	Nº of first-tier units	Total population (2009 est.)	Total area (km^2)	Population per regional government	Average area first-tier unit
Sri Lanka	9 Provinces	9	20,238,000	65,610	2,248,667	7,290
Sudan	26 States	26	39,154,490	2,505,813	1,505,942	96,377
Suriname	10 Districts	10	520,000	163,820	52,000	16,382
Syria	14 Provinces	14	21,906,000	185,180	1,564,714	13,227
Tajikistan	1 Autonomous Region, 2 Regions	3	6,952,000	143,100	2,317,333	47,700
Tanzania	26 Regions	26	43,739,000	945,087	1,682,269	36,350
Thailand	75 Prov., 1 Metropolitan Administration	76	63,389,730	513,120	834,075	6,752
Togo	5 Regions	5	6,619,000	56,785	1,323,800	11,357
Trinidad and Tobago	11 Regions, 5 Municipalities	16	1,339,000	5,130	83,688	321
Tunisia	24 Governorates	24	10,327,800	163,610	430,325	6,817
Turkey	81 Provinces	81	71,517,100	783,562	882,927	9,674
Turkmenistan	5 Regions	5	5,110,000	488,100	1,022,000	97,620
Uganda	80 Districts	80	32,710,000	241,550	408,875	3,019
Ukraine	24 Regions, 1 Republic, 2 Cities	27	46,011,345	603,500	1,704,124	22,352
United Kingdom	9 Regions	9	62,041,708	242,900	6,893,523	26,989
USA	50 Sates, 1 District, 6 Outlying Areas	57	308,493,000	9,629,091	5,412,158	168,931
Venezuela	23 States, 1 Federal District	24	28,627,000	912,050	1,192,792	38,002
Vietnam	64 Provinces	64	85,789,573	331,212	1,340,462	5,175
Yemen	19 Governorates, 1 City	20	23,580,000	527,968	1,179,000	26,398
Zambia	9 Provinces	9	12,027,000	752,612	1,336,333	83,624

Note: The total sample is constituted by 100 randomly selected countries. The sample, however, makes no clear distinction between federal and unitary States.

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