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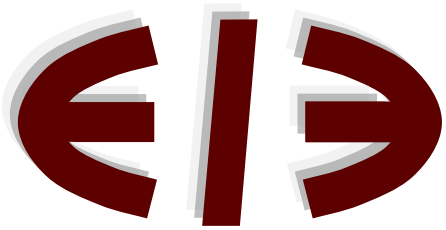

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The Effect of the Decentralization Degree on Corruption: A New Interpretation

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Abstract

This work contributes to empirical studies on decentralization and corruption by trying to resolve the uncertainty that the literature so far has shown. It also gives reasons supporting the 'best' decentralization structure which a country can adopt to discourage corrupt behaviour, and suggests an intermediate degree of decentralization. The trade-off between the moral hazard and the adverse selection aspect of the principal-agent framework, that emerges in this literature, can be better captured by a non-linear specification (e.g. cubic, as the more general non-linear model); neither very small nor very high degrees of decentralization are appropriate against corruption, but an intermediate one. Being monitored by the voters, local politicians, in a intermediate decentralized setting, have an incentive to perform in the voters' interest and, being local resources they manage not very much, they have little incentive to appropriate part of such resources for personal use.

JEL Classification: H7, D73, C33

Keywords: Corruption, Decentralization, Principal-agent theory

1. Introduction

The impact of government decentralization on economic performance is a hotly contested issue. In recent years decentralization policies have been widespread in a growing number of countries: more and more countries are devolving political, fiscal, and administrative powers to subnational governments (World Bank, 2000). The reasons for this become clear when one considers the advantages of decentralization. In particular, the standard argument in favour of decentralization is the greater accountability of local governors: being closer to the people, local authorities can more easily identify the citizens' needs and thus supply the appropriate form and level of public services and improve government efficiency and responsiveness (Enemu, 2000; Rondinelli et al., 1989; Oates, 1972). Also, communities will be more willing to pay local taxes when the amounts they contribute can be directly related to the services received (Livingstone and Charlton, 1998; Westergaard and Alam, 1995).

In the present work we put forward the following question: can decentralization be a useful institutional reform to reduce corruption, or might corruption increase as political power shifts downwards?

It is well known that corruption involves government officials and it is often identified as the greatest obstacle to economic and social development (World Bank). This is the reason why a growing number of theoretical and empirical papers in the field of economics have studied the causes of corruption; in particular, public economics has concentrated on the relationship between decentralization and corruption. On this point, both theoretical and empirical evidence vary widely, providing inconclusive, insignificant and context-dependent results. This work contributes to empirical studies by attempting to resolve the uncertainties, and gives reasons in support of the idea that an *intermediate* degree of decentralization[1] is the 'best' structure a country can adopt to deter corrupt behaviour.[2]

The literature tends to compare two opposite situations: the theoretical one compares complete centralization vs. complete decentralization; the empirical one tests linear models (meaning a biunivocal relationship) of decentralization and corruption. Theoretically, the natural consequence is to find motivations *for* and *against* decentralization. Empirically, however, it means to find positive, negative or insignificant relationships according to the type of corruption and decentralization indicators or datasets used. Yet where there are trade-offs, the best solution is often

[1] As will widely discuss in the following, we are dealing with *fiscal decentralization* and a higher/intermediate/lower degree of decentralization means that a greater/intermediate/smaller share of local revenue and expenses are decided by local governors.

[2] In this paper we are dealing with *fiscal decentralization,* and a higher/intermediate/lower degree of decentralization means that a greater/intermediate/smaller share of local revenue and expenses are decided by local governors.

in the middle. This reasoning led us to hypothesize and estimate a non-linear (e.g. possibly univocal) relationship between the degree of fiscal decentralization and corruption.

The principal agent theory defines the relationship between the level of decentralization and the corruption of politicians and bureaucrats (Persson and Tabellini, 2000): the latter are the agents and instead the voters are the principal. Because of the asymmetry of information, politicians face a trade-off between appearing incorrupt and honest to their voters in order to increase the probability of re-election and the fear of being caught and punished (moral hazard aspect) for adopting rent-seeking practices (adverse selection aspect). Thus, a higher level of decentralization means that local politicians are closer to their local constituency voters and, consequently, they are more accountable to their electorate. This increases the monitoring power and effectiveness of voters because the responsibility is clearer and local governors have an incentive to act in the voters' interest and not to adopt corruption practices (Fisman and Gatti, 2002a). On the contrary, a decentralized government structure produces a proliferation of agents and, if the decentralization is strong, local politicians will manage a wider range of local revenue and expenditure. This encourages rent-seeking behaviour of local governors, who then make personal use of public resources, thus increasing corruption.[3]

These two contrary effects drive corruption in opposite directions. Hence, we argue that the total effect of decentralization on corruption, that is the incentive to extract rent by local politicians and the effectiveness of the their voters' monitoring,, depends on the degree of decentralization that a country decides to adopt. With respect to a centralized state, a 'middle' decision-making power of local governors may either approach the objective function of principals and agents, or allow voters to better monitor the latter.. This double effect is surely beneficial for the reduction of corruption.

In terms of the empirical model, we expect a nonlinear (e.g. parabolic) curve expressing the relationship between decentralization and corruption, with corruption assuming its minimum value within the range of decentralization values.

We conducted a cross-country analysis of over 85 countries from 1984 to 2010 using various decentralization and corruption indexes. The results confirm that intermediate decentralized structures work better than extreme ones. Graphically, this illustrates the relationship between the decentralization degree and the efficiency of government and business as an inverted-U function, which indicates our measures of corruption; this functional form is notably distinctive in this kind of analysis and supports our argumentation. When one moves from centralized to mixed structures, although the number of agents increases, corruption reduces. This is because agents' rent seeking

[3] The two aspects of the principal-agent setup that encourage and discourage corruption may be reversed if we deal with a lower level of decentralization (that is, higher centralization).

incentives are not strong enough, being in charge of limited funds and, at the same time, they can be easily monitored by local voters. However, the reverse happens when one shifts from very high to lower levels of decentralization: although the monitoring power of local voters remains, the rent-seeking incentive of local agents reduces, thus the effect on corruption does not change, and is actually minimised.

The remainder of this article is organised as follows. The next section summarises the theoretical and empirical literature on the link between decentralization and corruption, and clarifies the theoretical framework for the empirical analysis. Then we present a description of data and variables. In section 4 we discuss the empirical model; in section 5 the results and the robustness checks; followed by the concluding remarks.

2. The literature and the theoretical framework

A source of ambiguity in the analysis of the effects of decentralization on economic and political variables concerns the notion of decentralization. The literature on this distinguishes between *de-concentration*, *delegation*, and *devolution* (Litvack et al. 1998; Rondinelli 1981). De-concentration is "the transfer of administrative responsibility for specified functions to lower levels within central government bureaucracy, generally on some spatial basis" (Ferguson and Chandrasekharan, 2005). This suggests the dispersion of certain responsibilities from central government to its regional offices. Delegation refers to the transfer of responsibilities and authority to subnational governments that then respond to central government but are not totally controlled by it.[4] Devolution refers to the transfer of government responsibility for specified functions from central government to sub-national levels, which are largely outside its direct control. This takes place when central government transfers authority for decision-making to subnational governments. Under devolution, local governments elect their leaders and raise their own revenue to finance the previously identified necessary expenditures. In this work we are interested in studying the effect of *fiscal devolution* on corruption. Fiscal devolution (or decentralization) occurs when previously concentrated powers to levy taxes and withdraw revenues are distributed to other levels of government, e.g. local authorities have the right to raise revenue (through taxes) and to decide how to spend it.[5] Since corruption is defined as the abuse of public office for private gain, a public

[4] In this case, central government relocates responsibility from decision-making and administration of functions to subnational governments. Even if they have some discretion, subnational governments are held accountable to central government.

[5] Depending on what functions are involved, the devolution is *fiscal*, *administrative*, or *political*. We said in the main text about fiscal decentralization. Administrative decentralization occurs when different levels of government administer resources and matters that have been delegated to them. We refer to political decentralization when groups at different levels of government–central and local–are empowered to make decisions related to what affects them.

official, to be corrupt, has to be responsible for financial resources, which occurs under fiscal decentralization.

Theoretical economic literature considers accountability and inter-jurisdictional competition to be the most important channels linking decentralization and corruption. However, theories differ in their predictions of what the direction of the relationship between them should be.

The traditional literature on fiscal federalism stresses the role of competition between sub-jurisdictions in reducing corruption as it promotes more honest and efficient governors (Breton, 1996; Weingast, 1995). Moreover, competition between local governments encourages them to perform in the citizen's interest in order to attract residents from abroad (Brennan and Buchanan, 1980) and discourages governments from establishing interventionist and distortionary policies that might drive away valuable factors of production (Jin et al., 1999). Therefore inter-jurisdictional competition predicts lower levels of corruption in decentralized economies.

The new 'second generation' literature focuses on accountability and incentives of government officials as the main arguments linking decentralization and corruption (Qian and Weingast, 1997; Bardhan, 2002; Bardhan and Mookherjee, 2006a, 2006b). This theory emphasizes that under decentralization, local governments are held directly accountable for their actions and citizens are likely to be more vigilant, while in a centralized system the government cares more about aggregate performance, i.e. inflation, economic growth etc. (Tabellini, 2000). Accountability is the key argument in the relationship between decentralization and corruption in the principal-agent framework (Persson and Tabellini, 2000): decentralization strengthens the link between effort and rewards. Indeed, under decentralization, each politician is responsible for a specific task within his jurisdiction; by contrast, in a centralized bureaucracy, agents are responsible for a multitude of tasks affecting many localities. Thus, the direct accountability that decentralization implies improves politicians' performances and discourages corrupt behaviour. This argument seems to predict a negative link between decentralization and corruption. However, depending on the monitoring effectiveness of superiors, decentralization may also increase corruption. Indeed, if the people in charge of detecting and punishing corruption of local politicians are corrupt themselves, decentralization actually increases corruption. If, instead, the higher-ranking officials benefit from uncovering many bribery cases, decentralization can improve their incentives to monitor corrupt local agents (Carbonara, 1999).

Theories that focus on coordination of rent-seeking or bureaucratic competence often take a negative view of decentralization. Prud'homme (1995) argues that localization increases opportunities for corruption and makes it easier to establish unethical relationships. This is due to a greater influence of interest groups at the local level, a greater discretion available to local officials

and a longer tenure of local officials in the same place. . This view is enforced by other factors: in decentralized political systems, a potential corrupter only needs to influence a small section of the government; there are fewer centralized forces and agencies to encourage honesty; and finally monitoring may be more intense at the national office rather than at the local level since the former is more prestigious and powerful (Banfield, 1979; Persson and Tabellini, 2000).

The ambiguous results of the theoretical literature repeat in empirical works. A section of the empirical literature analysing the effect of the extent of decentralization on corruption (both in cross-country and within country settings) fails to find a relationship (Oates, 1972; Oates, 1985; Forbes and Zampelli, 1989). Conversely, a number of papers using US data find that competing jurisdictions constrain rent-seeking behaviour (Giertz,1981, Nelson, 1987, Eberts and Gronberg, 1988, and Zax, 1989) and reduce the level of 'corrupt earnings' (tax revenue appropriated by bureaucrats) (Arikan, 2004).

It is confirmed that decentralization supports greater accountability in the public sector and reduces corruption, even if it has a greater negative impact on corruption in unitary countries rather than in federal ones (Gurgur and Shah, 2005; Huther and Shah, 1998). Fisman and Gatti (2002a) provide evidence for fiscal decentralization in government expenditure to be consistently associated with a lower measure of corruption across countries because politicians can be directly accountable for their actions. This evidence appears to be more common in developed countries than in developing countries, even after allowing for endogeneity (Nupia, 2005). Opposing evidence is provided by Triesman (2000b): by creating many levels of government and a more complex system, decentralization reduces accountability.

The literature has paid very little attention to the analysis of the impact of decentralization on corruption within a single country. Fisman and Gatti (2002b) find a strong positive relationship between corruption and the proportion of a state's expenditures derived from federal transfers. These results on federal transfers suggest that decentralizing government expenditures may not be beneficial, unless accompanied by the decentralization of revenue generation. A recent study on Italy provides evidence of a correlation between high decentralization and low levels of corruption; furthermore, what matters is the degree of fiscal, rather than administrative decentralization (Fiorino et al., 2014).

The literature discussed above suggests the unlikelihood that there exists, a priori, a unique link? in the relationship between decentralization and corruption. Results are sensitive to different contexts and geographical settings, , to measurement concepts of both decentralization and corruption as well as to the sample of countries.

We believe that the principal-agent theory is the common framework used to identify the advantages and disadvantages of decentralization in terms of corruption (Mookherjee, 2003). On the one hand, the delegation of decision-making leads to decisions concerning taxation and expenditure allocations being made by better (local) informed politicians. In addition, given that much information possessed by citizens, and which is helpful in evaluating government officials, is not verifiable, it cannot be used to control the behaviour of officials via contractual means. In this case, decentralized structures become a means for citizens to evaluate the performance of officials and to decide who should be reappointed (moral hazard aspect). On the other hand, local agents' objective functions differ from that of the principal (voters); the greater the decision-making power of local politicians (in terms of the public resources they manage), the greater their incentive to abuse their power: this translates into a higher incentive to engage in corrupt practices (adverse selection aspect). The same arguments can be reversed if we deal with a centralized government structure. So from a theoretical point of view, the overall effect of decentralization on corruption depends on the relative importance of these two problems. We argue that an intermediate level of decentralization may mitigate the trade-off between the moral hazard and the adverse selection aspect of the principal-agent problem, leading to a lower level of corruption. In such a setting, the voters are close to the politicians, maintaining their possibility to monitor them. At the same time, the objective functions of the two parties combine because the decision-making power of local politicians is not high. From an empirical point of view, the trade-off can be better captured by a non-linear empirical model: if intermediate levels of decentralization minimize corruption, we may expect an inverted-U relationship between the degree of decentralization and corruption.

Therefore, in our opinion, the misspecification of the empirical model is the underlying weakness within the empirical literature on the subject in question.

3. Variables and Data

The dependent variable of our basic empirical model is the Corruption index[6] provided by the International Country Risk Guide (ICRG)[7]; the database of the ICRG offers the longest time series of corruption data (from 1984 to 2010[8]) for about 150 countries.

The Corruption index (thereafter *corr_icrg*) summarises the valuation of corruption within the political system and it is expressed on a scale which reflects the perception of respondents. In

[6] The indices measuring corruption can be divided into two categories. One contains indices based on corruption perceptions; the other includes indices of experienced corruption.

[7] At a macroeconomic level, the three most popular indices based on corruption perception are the Corruption Perception Index (Transparency International), the Control of Corruption index (the World Bank) and the Corruption index (the International Country Risk Guide - ICRG).

[8] ICRG table 3B, published by The PRS Group.

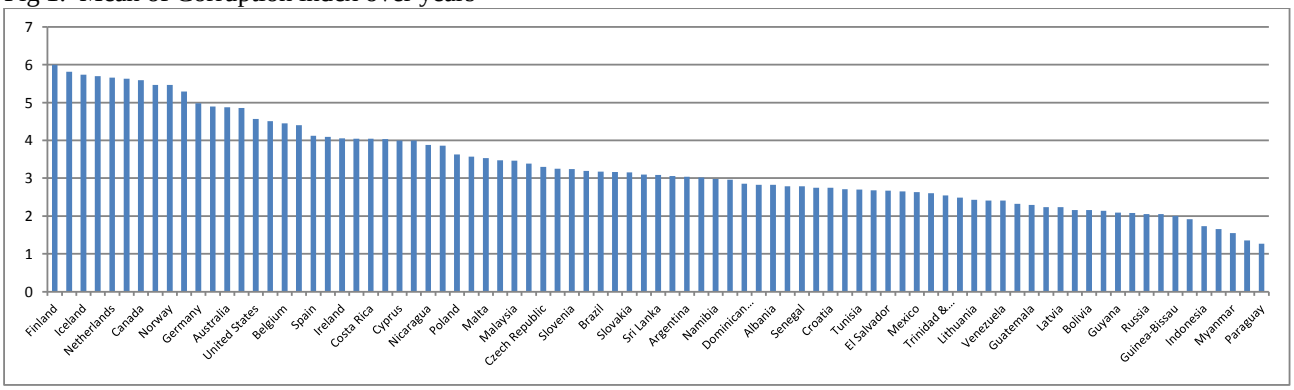
particular, the presence of corruption is a threat to foreign investment because it "distorts the economic and financial environment; reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introduces an inherent instability into the political process".[9] The result is that corruption makes it difficult to conduct business and, in some cases, it may force the withdrawal of investments. The Corruption index is based on comparable information, assigning a risk point between the interval [0, 6] where 0 represents the highest risk of corruption and 6 the lowest. The first row of table 1 below shows the descriptive statistics of *corr_icrg*[10]

Table 1: Corruption indexes statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
corr_icrg	3.4	1.41	0	6	N = 2160 (n=85;T=25)
corr_ti	5.02	2.4	0.4	10	N = 1223 (n=85;T=14)
corr_wb	0.34	1.08	-1.72	2.57	N = 1105 (n=85;T=13)

Figure 1 shows an overview of the corruption distribution for different countries. For each country in the figure we calculated the mean over years (1984-2010). To the left with a high index value (meaning low corruption risk) we find the Scandinavian countries and the three countries of Oceania (Australia, New Zealand and Papua New Guinea). European countries in the dataset show low/medium level of corruption while countries in Asia, Africa and South America have the highest value.

Fig 1. Mean of Corruption index over years



This measure of corruption (like all corruption measures based on perception) has various drawbacks (Lambsdorff, 2005), a significant gap between perception and facts being the major one.

Financial responsibility is a core component of decentralization. If local governments ".. are to carry out decentralized functions effectively, they must have an adequate level of revenues - either raised locally or transferred from the central government - as well as the authority to make decisions

[9] http://www.prsgroup.com/ICRG_methodology.aspx

[10] The second and third row of table 1 refer to the other two corruption indexes we will use in the following robustness analysis.

about expenditures".[11] Fiscal decentralization can take many forms. The most common are: a) self-financing; b) co-financing or co-production in providing services; c) expansion of local revenues through property or sales taxes; d) intergovernmental transfers that shift general revenues from taxes collected by central government to local governments for general or specific uses.

Usually, the share of local spending/revenues over total spending/revenues has been widely used as a proxy for the extent of decentralization (Pryor, 1968; Oates, 1972; Panizza, 1999). For our purpose, it is fundamental what we mean for *decentralization degree*: the greater the share of local spending/revenue that local politicians and governors manage, the greater the decentralization degree of a country. Following Oates (1972), in the basic analysis we measure decentralization with two indexes:

a) the subnational share of total government revenue, as a percentage of the total government revenue (hereafter *sub_rev*). It measures the percentage of total revenues collected by subnational governments. It varies from 0 (perfect centralization) to 100 (perfect decentralization).

b) the subnational government share of property tax revenue as a percentage of total government property tax revenue (hereafter *property_tax*). It measures the percentage of property tax revenues collected by subnational governments. It varies from 0 (perfect centralization) to 100 (perfect decentralization).[12]

They belong to the *revenue measures* that include the variety of tax instruments available at local level that allow local government to finance their revenue needs.[13] They are recorded on a *cash* basis, that is, flows are recorded when cash is received or disbursed within an assigned time.[14] These should be a good measure of fiscal decentralization since ".. the extent of a public authority's activities in taxation and in the expenditure of public funds is surely a component of fundamental importance in determining its influence on the allocation of resources." (Oates, 1972, p. 197).

The data are drawn from The World Bank, Inter-governmental Relations and Subnational Finance, for the years 1980–2010.[15] The first two rows of table 2 below show the descriptive statistics of the decentralization indexes as described above. The rest of table 2 will be discussed in the robustness checks paragraph.

[11] http://www1.worldbank.org/publicsector/decentralization/fiscal.htm.

[12] See table A.1 in Appendix for the detailed description of all the variables.

[13] Fiscal decentralization indicators may belong to three categories: *revenue measures, expenditure measures* and *vertical imbalance measures.* For robustness analysis we will use decentralization indexes belonging to all the categories.

[14] We highlight the aspect of the *basis* of the decentralization indexes because it will be important in the robustness checks of the empirical analysis where we will introduce indexes recorded on accrual basis.

[15] The World Bank's decentralization indicators are aimed at providing an overview of the fiscal arrangements of countries. In particular it considers subnational (second and third tiers) revenues and expenditures, intergovernmental transfers and vertical gap.

Table 2: Decentralization indexes statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
sub_rev	26.5	13.67	0.8	61.7	N = 821(n=55;T=15)
property_tax	9.68	10	0	62.4	N = 759 (n=53;T=14)
sub_tax	21.2	16.6	1.08	55.5	N = 449 (n=39;T=11.5)
sub_exp	22.6	13	0.5	98.7	N = 814 (n=57;T=14.2)
grants	43.05	18.7	3.54	85	N = 423 (n=37;T=11.4)

The literature studying the causes of corruption names a long list of variables, claimed as statistically significant determinants. They can be divided into four groups: 1) economic and demographic; 2) political; 3) judicial and bureaucratic; 4) religious and geo-cultural (de Haan and Seldadyo, 2005).[16] A typical empirical study limits its attention to a small number of variables of particular interest. Unfortunately it is almost impossible to find the 'true determinants' of corruption: a variable found significant in a particular specification of the model becomes insignificant in an alternative model, or when other variables are incorporated. In our empirical model, we include control variables that belong to the four groups mentioned above. The list of control variables is the following:

- Per capita GDP, in natural log (thereafter *lngdp*): it controls for structural differences in economic development (de Haan and Seldadyo, 2005). By far the strongest and most consistent finding of the new empirical work is that lower perceived corruption correlates closely with higher economic development (La Porta et al. 1999, Ades & Di Tella 1999, Treisman, 2000a) and it can be found in every region of the world (Treisman 2007). Kaufmann et al. (1999) and Hall and Jones (1999) question the causal relationship between corruption and income: the per capita GDP is high because of low corruption. For this reason we lagged *lngdp* by one year in the estimated equation (*lngdp(-1)*).
- The natural log of the population (thereafter *lnpop*). It controls for the demographic factors affecting corruption. In the literature there is conflicting evidence: Knack and Azfar (2003) show that as population increases, corruption also rises, while Tavares (2003) reports that population negatively affects corruption. Population is considered as strictly exogenous.
- Government stability (thereafter *gov_stab*): it controls for quality of government. The higher the quality of government, the lower the probability of corruption (de Haan and Seldadyo, 2005). For this variable there is no presumption of endogeneity, therefore we treat it as strictly exogenous.
- Democratic accountability (thereafter *dem*): it controls for the level of democracy of a country. There is a general consensus that democracy reduces corruption (de Haan and Seldadyo, 2005). We treat this variable as strictly exogenous.

[16] For theoretical literature on the causes of corruption see e.g. Tanzi (1998), Rose-Ackerman (1999), Jain (2001); for empirical literature on the same topic see e.g. Treisman (2000a).

- Women (thereafter *wom*): it is the proportion of seats held by women in national parliaments (%); it controls for the gender dimension of corruption. Conventional wisdom states that women in public life can be an effective anticorruption strategy because women are less corruptible than men. While the concept of women inherently possessing a higher level of integrity has been challenged, studies have confirmed that there is a link between higher representation of women in government and lower levels of corruption (Dollar et al., 1999; Goetz, 2007; Sung, 2003). We treat this variable as strictly exogenous.
- General government consumption expenditure (thereafter *G*) – as a percentage of GDP: it controls for government size. There is no consensus among authors on the theoretical relationship between government size and corruption (Fisman and Gatti, 2002a; Bonaglia et al., 2001; Ali and Isse, 2003). We treat this variable as strictly exogenous.
- Trade openness (thereafter *export*) negatively affects corruption (Fisman and Gatti, 2002a; Bonaglia et al., 2001). It is proxied by the share of export/GDP and it is treated as exogenous.
- Ethno-linguistic fractionalization (thereafter *ethnic*), as cultural variables, tends to increase corruption (Lederman et al., 2005; La Porta et al., 1999). We treat this variable as strictly exogenous.

Table 3 below shows the descriptive statistics of all the variables.[17]

Table 3: Control variables **s**tatistics

Variable	Mean	Std. Dev.	Min	Max	Observations
lngdp	8.25	1.46	5	10.9	N = 2566 (n=83;T=31)
lnpop	16.14	1.64	12.25	20.9	N = 2688 (n=84;T=32)
dem	4.92	1.79	0	11.5	N = 2153 (n=85;T=25)
gov_stab	7.63	2.01	1	11.5	N = 2153 (n=85;T=25)
wom	14.4	10.15	0	47.3	N = 2347 (n=84;T=28)
G	16.34	6	3	43.4	N = 2526 (n=83;T=30)
export	0.27	0.3	2.93e-06	6.85	N = 2470 (n=80;T=31)
ethnic	0.36	0.23	0.002	0.93	N = 2656 (n=83;T=32)

4. Econometric specification

In order to test the hypothesis specified in section 2 we choose a cubic specification of the link between decentralization indexes and corruption as the more general nonlinear function. The estimated equation is

$$corr_{i,t} = \sum corr_{i,t-j} + \beta_1 Dec + \beta_2 Dec^2 + \beta_3 Dec^3 + \sum \delta\, regressors_{i,t} + \alpha_i + \mu_t + \varepsilon_{i,t} \quad (1)$$

of country *i* at time *t*; α_i is a country-specific effect, μ_t is a time-specific effect. Two lags of the dependent variable are introduced in the estimated equation because of the dynamic of corruption.[18]

[17] Table A.1 and A.2, Appendix A, provides respectively the detailed description of all the variables and the correlation matrix of regressors.

[18] The estimation of equation (1) - without lags of *corr* - using fixed effect panel data techniques showed autocorrelation of residuals. In order to solve this problem, we introduced two lags of the dependent variable on the right-side of the

Indeed, previous empirical analyses on corruption consider corruption as a dynamic phenomenon, where past levels of corruption affect present levels (Aidt, 2003). The linear, quadratic and cubic terms of *Dec* catch the nonlinear specification of the model. The other regressors are those described in the previous section.

Equation (1) is a dynamic panel data model which has been estimated using Arellano-Bover (1995)/Blundell-Bond (1998) system GMM panel data techniques.[19] The empirical analysis has been conducted on a panel of 85 countries[20] over 27 years (from 1984 to 2010). An important issue here is to deal with the potential endogeneity of fiscal decentralization variables with respect to corruption. Corrupt officials of central government might be reluctant to allow fiscal decentralization, as this would reduce their ability to extract rents. A more subtle argument for the existence of endogeneity is the following: corruption might affect the organization of public spending, particularly as different spending programs may have different potentials for rent extraction. If this is the case, corrupt central government officials may lobby to keep the administration of activities with high rent extraction potential (e.g. defence programs) at the centre, while they decentralize activities with low rent extraction potential (e.g. education spending). (Arikan, 2004; Fisman and Gatti, 2002a). It follows that the estimated coefficients are biased. In order to deal with this reverse causation (and the general endogeneity issue), the system GMM treats the model as a system of equations - one for each time period - where the predetermined and endogenous variables in first differences are instrumented with suitable lags of their own levels. For the decentralization indexes we use the surface area of the country in square kilometres (thereafter *area*) (Arikan, 2004). An ideal instrument must be exogenous, that is, it must be a variable that is correlated to the endogenous regressor and orthogonal to the error term; in our case the IV should affect how decentralized a country is, but not how much corruption exists. It would seem reasonable to assume that the area of a country should not have any direct impact on the level of corruption. On the contrary, *area* is a variable that has often been used as an explanatory variable for the degree of fiscal decentralization. Panizza (1999) finds a strong correlation between decentralization and country size. The argument justifying this correlation comes from fiscal federalism literature. It suggests that the benefits of decentralization can be offset by market failures. The most important of

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equation (1).

[19] We used the Stata command *xtabond2* provided by David Roodman (Roodman, 2009).

[20] Countries are: Albania; Argentina; Australia; Austria; Bahamas; Bangladesh; Belgium; Bolivia; Botswana; Brazil; Bulgaria; Canada; Chile; Colombia; Costa Rica; Croatia; Cyprus; Czech Republic; Denmark; Dominican Republic; Ecuador; El Salvador; Finland; France; Germany; Greece; Guatemala; Guinea-Bissau; Guyana; Honduras; Hungary; Iceland; India; Indonesia; Ireland; Israel; Italy; Jamaica; Japan; South Korea; Latvia; Lithuania; Luxembourg; Malaysia; Malta; Mexico; Moldova; Mongolia; Mozambique; Myanmar; Namibia; Netherlands; New Zealand; Nicaragua; Niger; Norway; Papua New Guinea; Paraguay; Peru; Philippines; Poland; Portugal; Romania; Russia; Senegal; Slovakia; Slovenia; South Africa; Spain; Sri Lanka; Suriname; Sweden; Switzerland; Taiwan; Thailand; Trinidad & Tobago; Tunisia; Turkey; Uganda; Ukraine; United Kingdom; United States; Uruguay; Venezuela; Zambia.

these market failures relates to the presence of spillovers across jurisdictions. These externalities are likely to be inversely correlated to the size of the jurisdictions. So, to the extent that larger countries have larger jurisdictions, land area will be an appropriate proxy for country size.

Therefore, all the decentralization indexes we use will be treated as endogenous regressors and will be instrumented with the *area*; in the next section we test the validity of the land area as a good IV for the decentralization.

As mentioned above, the basic analysis tests equation (1) using two decentralization indexes, the subnational government share of revenue and the subnational government share of property tax revenue. We start estimating equation (1) by including *lngdp, lnpop, dem* and *gov_stab* as control variables and we add a set of control variables as the most robust determinants of corruption in order to test the robustness of the results.

Then we provide a set of robustness checks on our results that concern both the right and left side of equation (1). On the right, we use other decentralization indexes belonging to three different categories: a) another 'revenue measure', the *subnational government share of tax revenue (as a percentage of the total government tax revenue)* – thereafter *sub_tax* – but recorded in *accrual* basis (instead of *cash*); b) an 'expenditure measure' as the *subnational government share of expenditure (as a percentage of the total government expenditure)* – thereafter *sub_exp*; c) a 'vertical imbalance measure' as the *vertical grants (as share of subnational government revenue)* – thereafter *grants*. On the left, we use other corruption measures, such as the Corruption Perception Index (Transparency International) and the Control of Corruption index (World Bank).

5. Results

Table 4 shows the estimations of equation (1). As stated above, our basic analysis uses the Corruption Index of the ICRG (*corr_icrg)* as the dependent variable and the *sub_rev* and *property_tax* as the decentralization indexes. In order to control for heteroskedasticity, every estimated equation has robust standard errors. The second to last row of table 4 shows the Chi^2 (and the p-value in parenthesis) of the Hansen test, whose null hypothesis is that over-identification restrictions are valid; the null is not rejected and the model can be considered correctly specified.[21] The last row of table 4 displays the p-value of the Arellano-Bond test for second-order autocorrelation in the first differenced residuals: in all the specifications there is no autocorrelation of residuals.[22]

[21] We also calculate, but we do not show, the difference-in-Hansen test in order to test the joint validity of the full instrument set; we do not reject the null.

[22] All specifications in table 4 are estimated by using the two-step options with Windmeijer (2005) correction. Windmeijer (2005) finds that the two-step efficient GMM performs somewhat better than the one-step in estimating

Referring to column (a), we control for the natural log of the per capita GDP (one year lagged), the log of the population, the democracy index and government stability. The coefficients of *sub_rev*, *sub_rev*^{2} and *sub_rev*^{3} are all significant, as well as the two lags of *corr_icrg*. In order to graph the effect of the decentralization on corruption, we use the following long-run equation:

$$corr\_icrg = \frac{0.33}{0.2} sub\_rev - \frac{0.012}{0.2} sub\_rev^2 + \frac{0.0001}{0.2} sub\_rev^3 \qquad (2)$$

Table 4: Dependent variable: *corr_icrg*

	(a)	(b)	(c)	(d)	(e)	(f)
corr_icrg(-1)	1.13***	1.03***	1.02***	1.01***	1.17***	1.06***
	(7.5)	(10)	(11)	(11)	(8.7)	(6)
corr_icrg(-2)	-0.33***	-0.31***	-0.31***	-0.28***	-0.3***	-0.3***
	(-3.4)	(-3.4)	(-3.4)	(-3.3)	(-3.2)	(-2.9)
sub_rev	0.33*	0.35**	0.35**	0.3**		
	(1.77)	(2.03)	(2.05)	(2.12)		
sub_rev^2	-0.012**	-0.012**	-0.012**	-0.011**		
	(-2.07)	(-2.37)	(-2.38)	(-2.5)		
sub_rev^3	0.0001**	0.0001**	0.0001**	0.0001***		
	(2.25)	(2.54)	(2.56)	(2.6)		
property_tax					0.26*	0.26*
					(1.74)	(1.67)
property_tax^2					-0.017*	-0.019**
					(-1.74)	(-2.07)
property_tax^3					0.0002*	0.0003**
					(1.7)	(2.3)
lngdp(-1)	0.09	0.07	0.14*	0.03	0.07	0.13
	(1)	(1.05)	(1.71)	(0.4)	(0.7)	(0.94)
lnpop	-0.03	-0.03	-0.02	-0.02	0.03	0.04
	(-0.5)	(-0.4)	(-0.35)	(-0.37)	(0.64)	(0.76)
dem	0.006	-0.005	-0.001	-0.03	-0.07*	-0.15
	(0.2)	(-0.2)	(-0.05)	(-1.5)	(-1.85)	(-1.3)
gov_stab	-0.01	-0.01	-0.003	0.01	-0.06	-0.05
	(-0.34)	(-0.34)	(-0.01)	(0.34)	(-1)	(-0.34)
wom		0.01*	0.01**	0.01***		-0.01
		(1.67)	(2.05)	(2.7)		(1.12)
G		-0.003	-0.01	-0.01		
		(-0.2)	(-0.45)	(-0.6)		
export			-0.5	-0.5*		-0.34
			(-1.4)	(-1.7)		(-0.5)
ethnic				-1.34***		-1.76*
				(-2.66)		(-1.9)
Time dummies	yes	yes	yes	yes	yes	yes
N. obs.	586	549	545	545	571	530
N. instrum	36	38	39	40	38	41
Chi^2 (dof) Hansen test (p-value)	1.87 (2) (0.4)	0.5 (2) (0.7)	0.35 (2) (0.8)	1.16 (2) (0.6)	2.27 (4) (0.7)	4.41 (4) (0.35)
p-value 2nd order autocorrelation	0.9	0.36	0.35	0.4	0.15	0.7

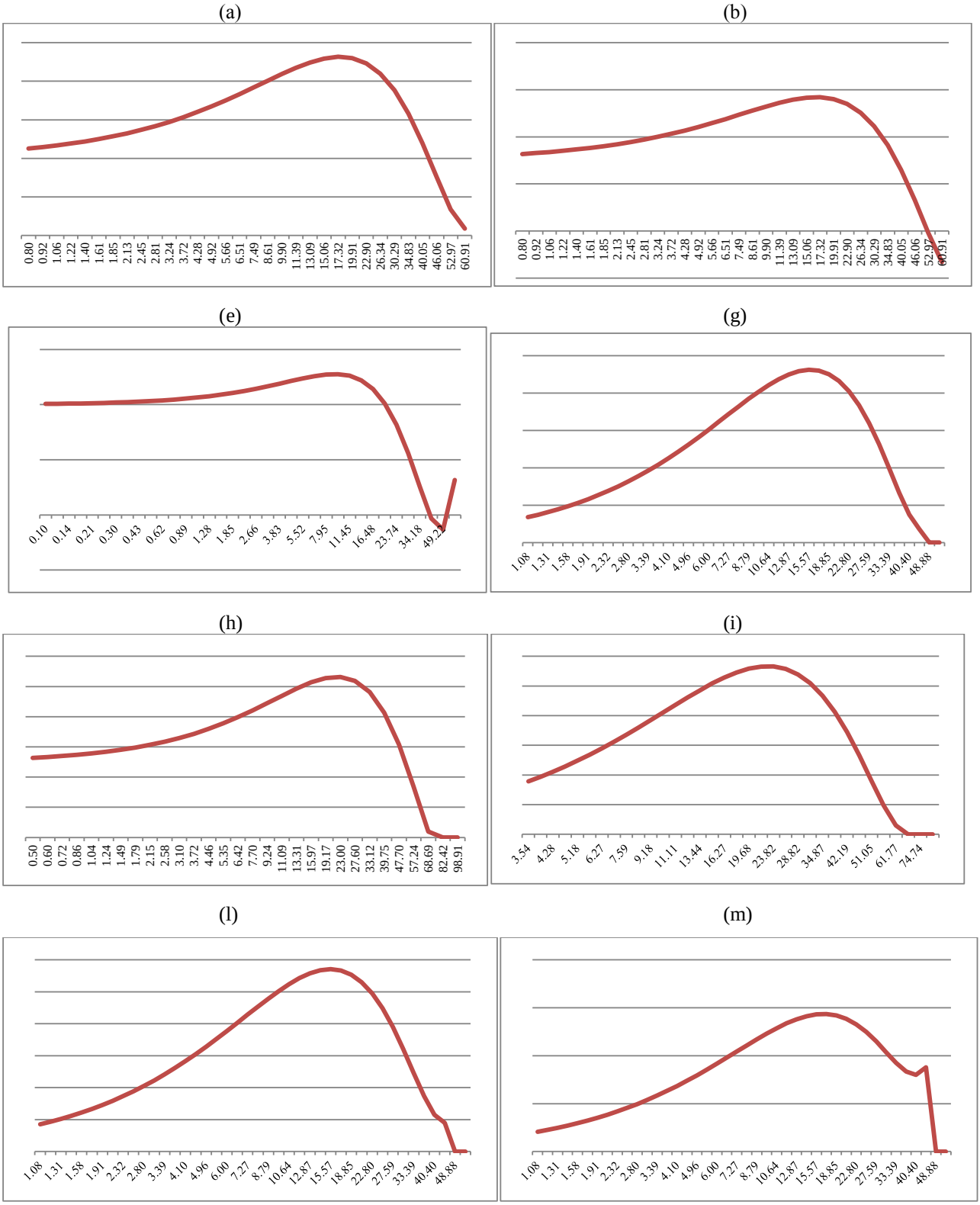
Notes. All regressions contain calendar year dummies (results not reported); the time span is 1984-2010. The dependent variable is *corr_icrg*. Standardised normal z-test values are in parentheses; robust standard errors. In every regression *sub_rev*, *sub_rev*^{2} and *sub_rev*^{3}, *property_tax, property_tax*^{2} and *property_tax*^{3} are treated as endogenous and they are instrumented with *area, area*^{2} and *area*^{3}. Significant coefficients are indicated by * (10% level), ** (5% level) and *** (1% level). Two-step estimations with Windmeijer (2005) correction.

In figure 2 below, on the horizontal axis we have constructed a scale of the decentralization index values (*sub_rev*) starting with the minimum value (among countries) and increasing it by 1.1 to the maximum value; then we calculate the Corruption index according to equation (2) using the

coefficients, with lower bias and standard errors. And the two-step estimation with corrected errors is superior to robust one-step.

estimated coefficients of *sub_rev*, sub_rev^2 and sub_rev^3 (the control variables *lngdp(-1); lnpop, dem* and *gov_stab* are not significant, therefore they are not considered in the long run equation).[23]

Figure 2: Parametric fit of the relationship between the Corruption index and the decentralization indexes



[23] Figure 2 shows the graph of the relationship between the Corruption index and the decentralization index for some specifications in table 4. The letters above show that each paragraph refers to the corresponding letter in the table of estimations.

It emerges from the graph that the relationship between the degree of decentralization and the Corruption index has a maximum value. The value of *sub_rev* which maximises the Corruption index (that is, which minimises the level of corruption) is about 18. The shape of the graph offers a new interpretation of the relationship between the degree of decentralization and corruption.

Under fiscal decentralization some policy decisions are taken by smaller political units closer to the people. This implies a trade-off involved in the delegation of decision-making: the principal-agent setup applied to a fiscal decentralization context can be split into its two standard problems: a moral hazard and an adverse selection problem. A high level of decentralization solves the moral hazard aspect due to the accountability of local governors - they are closer to voters who can better monitor them. Consequently governors are encouraged to perform in their voters interests and not to adopt corrupt behaviour in order to maximize the probability of re-election. On the contrary, a high fiscal decentralization exacerbates the adverse selection problem. Actually, higher decentralization involves agents in local decision-making processes, that is, they manage a greater quantity of money. Consequently the objective function of agents may differ from the objective function of the principal (voters), allowing and encouraging local politicians to abuse their power and adopt corruptive practices.

In these circumstances, the optimal level of fiscal decentralization should be an intermediate one. Indeed, if the decision-making process is 'partially' devolved to local jurisdictions, the accountability of local politicians remains and the moral hazard aspect of the principal-agent setup is resolved. Moreover, the incentive to distort public resources for personal use is reduced when politicians manage a lower level of those resources and so they are less inclined to be engaged in corrupt behaviour.

The result is confirmed when the decentralization index is *property_tax*, as column (e) shows. In terms of the graphs in figure 2, moving from left to right on the horizontal axis, the strengthening of the adverse selection aspect is overcompensated for by the weakening of the moral hazard aspect, which leads to a lower Corruption index. (We increased the level of fiscal decentralization for every decentralization index we used, except for *grants,* for which the contrary held), This occurs until the degree of decentralization maximizes the curve (minimizes corruption); after this point the reverse happens and corruption starts increasing. This result suggests that the 'best' degree of decentralization minimizing corruption can be calculated.

In order to support the results, it is necessary to consider the technical validity of the land area as IV for the decentralization indexes. Following Clougherty and Seldeslachts (2013), we provide a simple diagnostic test and the results are shown in table A.3 (Appendix). We estimate fixed effects panel data regressions of both *sub_rev* and *property_tax* on *area, area* ^{2} and *area* ^{3}. The last row of

table A.3 shows the Wald test that *area, area* ^{2} and *area* ^{3} are jointly significantly different from zero. The Wald test is distributed as an F (the degrees of freedom are in parentheses). The null hypothesis of the Wald test is that coefficients are jointly equal to zero, and for every regression in table A.3 the null is rejected at 5%.

Moreover, we test the over-identifying restrictions in order to provide further evidence of the instruments' validity (Baum et al., 2003). The test is performed as follows: after the estimation of equation (1), if the Hansen test improves with the additional instruments, the indication is that these instruments influence corruption only indirectly via the decentralization index. See table A.4 (Appendix). We estimate equation (1) with and without *area, area* ^{2} and *area* ^{3} as IV. Column (A) and (A') respectively show the results of two estimations when the decentralization index is *sub_rev*; column (B) and (B') respectively show the results of two estimations when the decentralization index is *property_tax.* Firstly, we notice that the coefficients of the decentralization indexes (and their square and cube) lose significance when *area, area* ^{2} and *area* ^{3} are not included in the instrumental variables. Moreover, the last row of table A.4 displays the Chi^2 (and the p-value) of the Hansen test whose null is that the over-identification restrictions are valid. It is clear that the Hansen test in (A) and (B) is better than in (A') and (B'), confirming that *area, area* ^{2} and *area* ^{3} are good instruments for the decentralization indexes used.

Returning to table 4, the relationship between corruption and the two decentralization indexes remains robust with the introduction of all the control variables, as shown in columns (b), (c), (d) and (f). *Lngdp(-1)* is always positive as expected, but never significant (except in (c)), meaning that a greater level of economic development is correlated to less perceived corruption. *Lnpop, gov_stab* and *G* are never significant; *dem* is significant only in (e) but it is negative, not as expected. *Wom* is positive and significant when the decentralization index is the local government revenue, meaning that the presence of women in the public sector improves its quality, also in terms of less corruption. This result confirms the theoretical expectations. *Export* is significant only in (d) and it is negative as expected: a greater trade openness leads to more corruption. Finally, the *ethnic* coefficient is negative and significant when both the decentralization indexes are used; this sign confirms that a higher ethno-linguistic fractionalization increases corruption.

Robustness checks

We provide a set of robustness checks on our analysis. Checks are performed both on the right and left side of equation (1).

We start with the right side. We estimate equation (1) by using three other decentralization indexes belonging to different categories. The first one is an *accrual* 'revenue measure' showing the *subnational government share of tax revenue (as a percentage of total government tax revenue)*

called *sub_tax*. We choose an accrual decentralization measure because with the cash basis (as with the previous decentralization indexes), the time of recording may diverge significantly from the time of the economic activities and transactions to which they relate. Under the accrual basis, transactions are recorded at the time the economic value is created, transformed, exchanged, transferred or extinguished. Therefore the benefits resulting from the use of accrual data provide the most comprehensive information, since all resource flows are recorded, including internal transactions, in-kind transactions, and other economic flows. *Sub_tax* shows/is? the percentage of tax revenues collected by subnational governments. It varies from 0 (perfect centralization) to 100 (perfect decentralization).[24]

The second decentralization index used belongs to the *expenditure* category of decentralization measures. An expenditure measure provides a synthetic breakdown of expenditures by function that is a useful tool in analysing interjurisdictional aspects of decentralization.[25] The subnational government share of expenditure (as a percentage of the total government expenditure), called *sub_exp,* measures the percentage of total expenditures accounted for by subnational governments. It varies from 0 (perfect centralization) to 100 (perfect decentralization). The third decentralization index, called *grants,* is a 'vertical imbalance measure', that summarizes the degree to which subnational governments rely on central government revenues to support their expenditures, measured by intergovernmental transfers as a share of sub-national expenditures. It indicates the vertical grants (transfers) from other levels of government received by local and state governments as a percentage of total subnational revenues. It varies from 0 (perfect decentralization) to 100 (perfect centralization).

See table 5: columns (g), (h) and (i) show that the coefficients of the three decentralization indexes just described have the same alternation of sign as the decentralization indexes *sub_rev* and *property_tax* in the basic analysis. Therefore, the relationship with the corruption index of the ICRG remains the same, as the graphs (g), (h) and (i) in figure 2 display. In (g) the introduced control variables (*lngdp(-1), lnpop* and *gov_stab*) become significant with the expected sign, except for *dem*.

[24] See table A.1 Appendix for a detailed description and table 2 in the main text for the descriptive statistics.

[25] Less can be said about expenditure autonomy due to the existence of expenditures that are mandated by central government which appear as sub-national expenditures, even though subnational governments may have no autonomy in these spending decisions.

Table 5. Robustness results

	(g) *corr_icrg*	(h) *corr_icrg*	(i) *corr_icrg*	(l) *corr_ti*	(m) *corr_wb*
corr (-1)	0.63***	1.06***	1.07***	-0.1	-0.14
	(3.6)	(5.17)	(9)	(-0.67)	(-0.4)
corr(-2)	-0.24***	-0.31***	-0.21***		
	(-5.07)	(-4.3)	(-2.7)		
sub_tax	0.33**			0.83*	0.4*
	(2.54)			(1.74)	(1.8)
sub_tax^2	-0.014**			-0.03*	-0.017*
	(-2.52)			(-1.72)	(-1.8)
sub_tax^3	0.00015**			0.0004*	0.0002*
	(2.45)			(1.7)	(1.74)
sub_exp		0.05*			
		(1.9)			
sub_exp^2		-0.0016**			
		(-1.96)			
sub_exp^3		0.00001*			
		(1.75)			
grants			0.28*		
			(1.68)		
$grants^2$			-0.008*		
			(-1.82)		
$grants^3$			0.00006*		
			(1.84)		
lngdp(-1)	0.46***	0.12	0.06	1.82***	0.83***
	(3.1)	(0.9)	(0.5)	(6.2)	(3.7)
lnpop	-0.1*	-0.03	-0.06	-0.26	-0.1
	(-1.67)	(-0.96)	(-1.58)	(-1.08)	(-1.1)
dem	0.01	0.03	0.07	0.02	-0.01
	(0.6)	(0.7)	(1.19)	(0.13)	(-0.23)
gov_stab	0.17**	0.02	-0.12	0.15	0.04
	(2.2)	(1.13)	(-1.44)	(1.63)	(1.04)
Time dummies	yes	yes	yes	yes	yes
N. obs.	440	595	417	411	279
N. instrum	33	39	28	27	20
Chi^2 (dof) Hansen test (p-value)	0.17 (4) (0.9)	8.8 (5) (0.11)	3.53 (3) (0.31)	1.06 (4) (0.9)	3.4 (4) (0.5)
p-value 2nd order autocorrelation	0.4	0.9	0.23	0.9	0.8

Notes. All regressions contain calendar year dummies (results not reported); the time span is 1984-2010. The dependent variable is *corr_icrg*. Standardised normal z-test values are in parentheses; robust standard errors. In every regression *sub_tax*, sub_tax^2 and sub_tax^3, *sub_exp*, sub_exp^2 and sub_exp^3, *grants*, $grants^2$ and $grants^3$ are treated as endogenous and they are instrumented with *area*, $area^2$ and $area^3$. Significant coefficients are indicated by * (10% level), ** (5% level) and *** (1% level). Two-step estimations with Windmeijer (2005) correction.

In order to re-enforce our results, we change the left side of equation (1) by using two other alternative indexes of perceived corruption. One is the Corruption Perceptions Index (CPI) provided by Transparency International (hereafter *corr_ti*); the CPI is the most widely used indicator of corruption worldwide. It was first launched in 1995 and it "has been a powerful tool in raising awareness of the issue of corruption at the global level, providing an incentive for governments to improve their position by fighting corruption in their public institutions".[26] The index varies within a scale of 0-10, where 0 equals the highest level of perceived corruption and 10 equals the lowest level of perceived corruption.[27]

[26] http://www.transparency.org/cpi2012/in_detail.

[27] The Corruption Perception Index is accompanied by a standard error and confidence interval associated with the score, which capture the variation in scores of the data sources available for that country/territory. This is done by

The other, called *corr_wb,* is provided by the World Bank. It reflects perceptions of the extent to which public power is exercised for private gain, capturing all forms of corruption where elite and private interests take advantage of the public sector.[28] The estimated data of governance ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance.

Columns (l) and (m) of table 5 show that the results of the estimation of equation (1) do not change, using the above corruption indexes and the decentralization index *sub_tax*.

The relationship between corruption and decentralization indexes remains robust even with the change in corruption measures, as graphs (l) and (m) in figure 2 show.

6. Concluding remarks

In our view, the ambiguous results shown in the empirical literature on decentralization and corruption are due to the misspecification of the empirical model. Indeed, our reasoning is that the trade-off between the moral hazard and the adverse selection aspect of the principal-agent framework that emerges in this literature, can be better captured by a non-linear specification (e.g. cubic, as a more general non-linear model); neither very small nor very high degrees of decentralization are appropriate for corruption, but the intermediate ones. Local politicians, in a decentralized setting like this, have an incentive to perform in the voters' interests because they are monitored by them. Being local resources they manage not very much, they have little incentive to distort part of such resources for personal use. In empirical terms, the significance of the coefficients of decentralization indexes confirms our theory that an inverted-U relationship between decentralization and corruption can be demonstrated graphically.

subtracting the mean of the data set and dividing by the standard deviation and results in z-scores, which are then adjusted to have a mean of approximately 45 and a standard deviation of approximately 20 so that the data set fits the Corruption Perception Index's 0-100 scale.

[28] The used data are selected from the Worldwide Governance Indicators (WGI) research dataset which estimates the quality of governance. The estimation has been done, by Kaufmann, Kraay and Mastruzzi (2010), on a large data survey of interviews with enterprises, citizen and experts, operating in industrial and developing countries.

References

Ades, A., and Di Tella, R., 1999. Rents, Competition, and Corruption. *American Economic Review* 89 (4): 982-92.

Aidt, T.S., 2003. Economic Analysis of Corruption: A Survey. *The Economic Journal* 113: 632-652.

Ali, A. M., and Isse, H. S., 2003. Determinants of Economic Corruption: A Cross-Country Comparison,. *Cato Journal* 22 (3): 449-466.

Arellano, M., and Bover, O., 1995. Another Look at the Instrumental Variable Estimation of Error-components Models. *Journal of Econometrics* 68: 29-52.

Arikan, G.G., 2004. Cross-Country Fiscal Decentralization: A Remedy for Corruption?. *International Tax and Public Finance,* 11: 175–195

Banfield. E.C., 1979. Corruption as a Feature of Governmental Organization, in M. Ekpo, (ed.) Bureaucratic Corruption in Sub-Saharan Africa: Towards a Search for Causes and Consequences. Washington D.C.: University Press of America.

Bardhan, P., 2002. Decentralization of Governance and Development. *Journal of Economic Perspectives*, 16(4): 185-206.

Bardhan, P., and Mookherjee, D., 2006a. Decentralization and Local Governments in Developing Countries: A Comparative Perspective. (Vol. 1). The MIT Press.

Bardhan, P., and Mookherjee, D., 2006b. Accountability and Decentralization of Infrastructure Delivery in Developing Countries. *The Economic Journal*, 116(508), 101-127..

Baum, C. F., Schaffer, M. E. and Stillman, S., 2003. Instrumental variables and GMM: Estimation and testing. *Stata Journal,* 3: 1–31

Blundell, R. and Bond, S., 1998. GMM Estimation with Persistent Panel Data: An Application To Production Functions. *Institute for Fiscal Studies, Working Paper Series* 99/4.

Bonaglia, F., de Macedo, J.B., and Bussolo, M., 2001. How Globalization Improves Governance. *Discussion Paper no 2992, Centre for Economic Policy Research, Organization for Economic Co-operation and Development.* Paris: France.

Brennan, G., and Buchanan, J. M., 1980. The power to tax: Analytic Foundations of a Fiscal Constitution. Cambridge University Press.

Breton, A., 1996. Competitive Governments. An Economic Theory of Politics and Public Finance. New York: Cambridge University Press.

Carbonara, E., 1999. Corruption and decentralization. *Working paper*.

Clougherty, J. A., and Seldeslachts, J., 2013. The Deterrence Effects of US Merger Policy Instruments. *Journal of Law Economincs and Organization*, 29 (5).

de Haan, J., and Seldadyo, H., 2005. The Determinants of Corruption: A Reinvestigation, unpublished paper prepared for the EPCS-2005 Conference Durham, 31 March /3 April Durham, England.

Dollar, D., Fisman, R., and Garri, R., 1999. Are Women Really the Fairer Sex? Corruption and Women in Government. *World Bank Working Paper Series*, no 4.

Eberts, R. W., and Gronberg, T. J., 1988. Can Competition Among Local Governments Constrain Government Spending?. *Economic Review* (Federal Reserve Bank of Cleveland) 1(24), 2–9.

Enemu, F. C., 2000. Problems and prospects of local governance. chapter, 7, 181-204.

Ferguson, I., and Chandrasekharan, C., 2005. Paths and pitfalls of decentralization for sustainable forest management: experiences of the Asia-Pacific region. In Colfer & Capistrano (Eds.) The politics of decentralization: forests, power and people. Earthscan.

Fiorino, N., Galli, E., and Padovano, F., 2012. Do fiscal decentralization and government fragmentation affect corruption in different ways. Evidence from a panel data analysis. *International Center for Public Policy Working Paper*, Georgia State University, 12-17.

Fisman, R., and Gatti, R., 2002a. Decentralization and corruption: evidence across Countries. *Journal of Public Economics*, 83: 325–345

Fisman, R., and Gatti, R., 2002b. Decentralization and corruption: Evidence from U.S. federal transfer programs. *Public Choice*, 113: 25–35

Forbes, K., and Zampelli, E., 1989. Is Leviathan a Mythical Beast?. *American Economic Review*, 79.

Giertz, J. F., 1981. Centralization and government budget size. *Publius: The Journal of Federalism*, 11(1): 119-128.

Goetz, A.M., 2007. Political Cleaners: Women as the New Anti-Corruption Force?. *Development and Change*, 38(1): 87-105.

Gurgur, T., and Shah, A., 2005. Localization and Corruption: Panacea or Pandora's Box?. *World Bank Policy Research Working Paper*, no 3486

Hall, R. E., and Jones, C. I., 1999. Why do Some Countries Produce so much more Output per Worker than Others. *Quarterly Journal of Economics* 114: 83-116.

Huther, J., and Shah, A., 1998. Applying a Simple Measure of Good Governance to the Debate on Fiscal Decentralization. *World Bank Working Papers, Macroeconomics and Growth*.

Jain, A. K., 2001. Corruption: A Review. *Journal of Economic Surveys* 15(1): 71–121.

Jin, H., Qian, Y., and Weingast, B. R., 1999. Regional decentralization and fiscal incentives: federalism.

Kancs, D. 2008. Advances in Economics and Econometrics. *Journal of Economics and Econometrics*, 51(1): 20-36.

Kaufmann, D., Kraay, A., and Mastruzzi, M., 1999. Governance Matters. *World Bank Policy Research Working Paper*, no 2196.

Kielyte, J. (2008), Estimating Panel Data Models in the Presence of Endogeneity and Selection. *Journal of Economics and Econometrics*, 51(2): 1-19.

Knack, S., and Azfar, O., 2003. Trade Intensity, Country Size and Corruption. *Economics of Governance* 4: 1-18.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R.W., 1999. The Quality of Government. *Journal of Law, Economics, and Organization* 15: 222-79.

Lambsdorff, J. G., 2005. *Consequences and Causes of Corruption: What do We Know from a Cross-Section of Countries?*. Vol. 34. No. 05. Passauer Diskussionspapiere: Volkswirtschaftliche Reihe.

Lederman, D., Loayza, N. V., and Soares, R. R., 2005. Accountability and Corruption: Political Institutions Matter. *Economics & Politics*, 17(1): 1-35.

Li, Q., and Racine, J. S., 2007. Nonparametric Econometrics. Theory and Practice. Princeton University Press, Princeton.

Litvack, J., Ahmad, J., and Bird. R.M., 1998. Rethinking Decentralization in Developing Countries. *World Bank Sector Studies Series. ** changed titles to capitals*

Livingstone, I., and Charlton, R., 1998. Raising local authority district revenues through direct taxation in a low-income developing country: evaluating Uganda's GPT. *Public Administration and Development*, 18(5): 499-517.

Marshall, M.G., and Jaggers, K., 2002. Polity IV Project – Dataset Users' Manual. *Program Center for International Development and Conflict Management*, University of Maryland, College Park (Manual).

Mookherjee, D., 2003. Delegation and Contractual Hierarchies: An Overview. *Working Paper*, Department of Economics, Boston University.

Nelson, M.A., 1987. Searching for Leviathan: Comment and extension. *American Economic Review* 77 (March): 198–204

Nupia, O., 2005. Corruption, Political Accountability, and decentralization in developing countries. Mimeo. Pompeu Fabra University.

Oates, W. E., 1972. Fiscal Federalism. NY: Harcourt Brace Jovanovich.

Oates, W. E., 1985. Searching for Leviathan: An empirical study. *American Economic Review* 75 (September): 748–758.

Panizza, U., 1999. On the determinants of fiscal centralization: Theory and evidence. *Journal of Public Economics* 74, no. 1: 97.

Persson, T., and Tabellini, G., 2000. Political Economics: Explaining Economic Policy. The MIT Press, Cambridge, MA.

Prud'homme, R., 1995. On the Dangers of Decentralization. *World Bank Policy Research Working Paper*, no 1252

Pryor, F. L., 1968. Public expenditures in communist and capitalist nations (p. 375). London: Allen and Unwin.

Qian, Y., and Weingast, B., 1997. Federalism as a Commitment to Preserving Market Incentives. *Journal of Economic Perspectives*, 11(4): 83-92.

Rondinelli, D. A., 1980. Government decentralization in comparative perspective theory and practice in developing countries. *International review of administrative sciences*, 47(2): 133-145.

Rondinelli, D. A., McCullough, J. S., and Johnson, R. W., 1989. Analyzing decentralization policies in developing countries: a political-economy framework. *Development and change*, 20(1): 57-87.

Roodman, D., 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9: 86-136.

Rose-Ackerman, S., 1999. Corruption and Government, Causes, Consequences and Reform. Cambridge University Press, Cambridge, UK.

Sung, H., 2003. Fairer Sex or Fairer System? Gender and Corruption Revisited. *Social Forces* 82(2): 703-723.

Tabellini, G., 2000. Constitutional determinants of government spending. *IGIER Working Paper* 162.

Tanzi, V., 1998. Corruption Around the World: Causes, Consequences, Scope and Cures. *IMF Staff Papers*, 45(4): 559–94.

Tavares, J., 2003. Does Foreign Aid Corrupt?. *Economic Letters* 79: 99-106.

Treisman, D., 2000a. The Causes of Corruption: A Cross-national Study. *Journal of Public Economics*, 76: 399–57.

Treisman, D., 2000b. Decentralization and the Quality of Government. Manuscript UCLA.

Treisman, D., 2007. What Have We Learned About the Causes of Corruption from Ten Years of Cross-National Empirical Research?. *Annual Review of Political Science* 10: 211-244.

Weingast, B. R., 1995. Economic Role of Political Institutions: Market-Preserving Federalism and Economic Development. *The JL Econ. & Org.*, 11, 1.

Westergaard, K., & Alam, M. M., 1995. Local government in Bangladesh: Past experiences and yet another try. *World Development*, 23(4): 679-690.

Windmeijer, F., 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* 126: 25–51.

World Bank, 2000. Entering the 21st century: World Development Report 1999/2000. New York, NY: Oxford University Press.

Zax, J. S., 1989. Is There a Leviathan in Your Neighborhood. *American Economic Review* 79(3): 560–567.

Appendix A

Table A.1: Variables description

corr_icrg	Corruption Index. Source: ICRG, 1984-2010.
corr_ti	Corruption Perceptions Index (CPI). It annually ranks countries by their perceived levels of public sector corruption in countries worldwide, as determined by expert assessments and opinion surveys. The CPI generally defines corruption as the misuse of public power for private benefit. The quantitative information collected by Transparency International standardises data in a scale of 0-10, where a 0 equals the highest level of perceived corruption and 10 equals the lowest level of perceived corruption. Source: Transparency International.
corr_wb	Control of Corruption Index. It reflects perceptions of the extent to which public power is exercised for private gain capturing all the forms of corruption by which elite and private interests take advantage of the public sector. The used data are selected from the Worldwide Governance Indicators (WGI) research dataset which estimates the quality of governance. The estimation has been done, by Kaufmann, Kraay and Mastruzzi (2010), on a large data survey of interviews with enterprises, citizen and experts, operating in industrial and developing countries. The estimated data of governance ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance Source: The World Bank, 1996-2011.
sub_rev	Subnational Share of Total Government Revenue. It indicates the percentage of total revenues collected by subnational governments, measured as the sum of local and state total revenues minus grants from state to local government, divided by the sum of local, state, and national revenues (in cash). This index ranges from 0 (perfect centralization) to 100 (perfect decentralization). Source: The World Bank, Inter-governmental Relations and Subnational Finance, 1980–2010.
property_tax	Subnational Government Share of Property Tax Revenue as percentage of Total Government Property Tax Revenue. It indicates the percentage of property tax revenues collected by subnational governments, measured as the sum of local and state property tax revenues, divided by the sum of local, state, and national property tax revenues (in cash). This index ranges from 0 (perfect centralization) to 100 (perfect decentralization). Source: The World Bank, Inter-governmental Relations and Subnational Finance, 1980–2010.
sub_tax	Subnational Government Share of Tax Revenue as a percentage of Total Government Tax Revenue. It indicates the percentage of tax revenues collected by subnational governments, measured as the sum of local and state tax revenues, divided by the sum of local, state, and national tax revenues (in accrual). This index ranges from 0 (perfect centralization) to 100 (perfect decentralization). Source: The World Bank, Inter-governmental Relations and Subnational Finance, 1980–2010.
sub_exp	Subnational Government Share of Expenditure as a percentage of Total Government Expenditure. It indicates the percentage of total expenditures accounted for by subnational governments, measured as the sum of local and state total expenditures minus grants from state to local government, divided by the sum of national, state, and local expenditures (in cash). This index ranges from 0 (perfect centralization) to 100 (perfect decentralization). Source: The World Bank, Inter-governmental Relations and Subnational Finance, 1980–2010.
grants	Vertical Grants as Share of Subnational Government Revenue. It indicates grants (transfers) from other levels of government received by local and state governments as a percentage of total subnational revenues, measured as the sum of state and local grant revenue minus state to local grants, relative to total subnational revenues (in accrual). This index ranges from 0 (perfect decentralization) to 100 (perfect centralization). Source: The World Bank, Inter-governmental Relations and Subnational Finance, 1980–2010.
lngdp	Natural logarithm of gross domestic product at constant price 2000 US. Source: World Bank, 1980-2011.
lnpop	Urban population refers to people living in urban areas as defined by national statistical offices. Source: World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects, 1980-2011.
gov_stab	Government stability. It is an assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents (Government Unity, Legislative Strength, Popular Support), each with a maximum score of four points and a minimum score of 0 points. A score of 4 points equates to Very Low Risk and a score of 0 points to Very High Risk. This index ranges in the interval (0, 12). Source: ICRG, 1984-2010.
dem	Democratic accountability. Measure of how responsive a government is to its people: the more responsive a government is, it's more likely itto fall peacefully in a democratic society, but possibly violently in a non-democratic one. The points in this component are awarded on the basis of the type of governance the country in question has. This index ranges in the interval (0, 6). Source: ICRG, 1984-2010.
wom	Proportion of seats held by women in national parliaments (%). The data refer to Unicameral assembly or lower chamber of bicameral assembly. These data are comparable with United Nations Women's Indicators and Statistics Database – Wistat published by World Bank. Source: PARLIA database, 1980-2011. http://www.ipu.org/wmn-e/classif-arc.htm, http://www.ipu.org/parline-e/parlinesearch.asp, http://databank.worldbank.org/data/views/reports/tableview.aspx
export	Share of merchandise exports at current PPPs. This category follows the definitions of the System of

	National Accounts (SNA). Source Penn World Table 8.0. 1980-2011.
G	General government final consumption expenditure (% of GDP). Source: Penn World Table, 1980- 2011.
ethnic	The variable ethnic fractionalisation combines the language variable above with other information on racial characteristics (normally skin colour). Groups were classified as different if they spoke a different language and/or had different physical characteristics. Data source Source Key: eb=Encyclopaedia Brit, cia=CIA, sm=Scarrit and Mozaffar; lev=Levinson, wdm=World Directory of Minorities, census=national census data; upload from http://www.anderson.ucla.edu/faculty_pages/romain.wacziarg/downloads/fractionalisation.xls, 1980-2011.

Table A.2: Correlations

	sub_rev	*property_tax*	*sub_tax*	*sub_exp*	*grants*	*lngdp*	*lnpop*	*dem*	*gov_stab*	*wom*	*export*	*G*	*ethnic*
sub_rev	1												
property_tax	-0.6	1											
sub_tax	0.8	-0.4	1										
sub_exp	0.9	-0.6	0.8	1									
grants	-0.3	0.04	-0.6	-0.3	1								
lngdp	0.3	-0.3	0.1	0.4	-0.08	1							
lnpop	-0.2	0.1	-0.07	-0.3	0.3	-0.6	1						
dem	0.2	-0.3	0.1	0.1	0.1	-0.5	0.4	1					
gov_stab	0.1	0.08	0.2	0.1	-0.2	-0.3	-0.01	0.3	1				
wom	0.5	-0.5	0.3	0.6	-0.1	0.6	-0.6	-0.1	0.03	1			
G	-0.2	-0.4	-0.3	-0.1	0.2	0.1	-0.01	0.1	-0.3	0.3	1		
export	0.5	-0.4	0.3	0.6	-0.1	0.7	-0.6	-0.05	0.00	0.7	-0.04	1	
ethnic	0.6	0.06	0.5	0.5	-0.2	0.08	-0.02	0.03	0.1	-0.04	-0.7	0.25	1

Table A.3: fixed effect panel data estimations.

	(a) *sub_rev*	(a') *sub_rev*^{2}	(a'') *sub_rev*^{3}	(b) *property_tax*	(b') *property_tax*^{2}	(b'') *property_tax*^{3}
area	0.003**	0.14**	5.8**	-0.001***	-0.23***	-5.4***
	(2.57)	(2.5)	(2.04)	(-7.9)	(-5.7)	(-3.8)
area^2	-3.65e-10**	-1.49e-08**	-6.04e-07*	7.16e-10***	1.73e-08***	3.57e-07**
	(-2.43)	(-2.1)	(-1.67)	(6.6)	(4.4)	(2.4)
area^3	9.89e-18**	3.83e-16*	1.46e-14	-1.72e-17***	-4.12e-16***	-7.99e-15*
	(2.1)	(1.67)	(1.2)	(-5.5)	(-3.5)	(-1.75)
Time dummies	yes	yes	yes	yes	yes	yes
N. obs	785	785	785	750	750	750
F (dof)	6.6 (1, 52)	3.6 (2, 52)	3.42 (3, 52)	62.3 (1, 51)	19 (2, 51)	9.17 (2, 51)
(p-value)	(0.01)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)

Notes. All regressions contain calendar year dummies (results not reported). Standardised normal z-test values are in parentheses; robust standard errors. The last raw contains the F of the Wald test. Significant coefficients are indicated by * (10% level), ** (5% level) and *** (1% level).

Table A.4: Estimations with and without IV.

	(A)	(A')	(B)	(B')
corr_icrg(-1)	1.04***	1.03***	1.17***	1***
	(10)	(10)	(8)	(5.2)
corr_icrg(-2)	-0.26***	-0.24***	-0.3***	-0.26***
	(-3.7)	(-3)	(-3.18)	(-3.2)
sub_rev	0.2*	0.2		
	(1.66)	(0.06)		
sub_rev^2	-0.008*	-0.004		
	(-1.68)	(-0.03)		
sub_rev^3	0.0001*	9.96e-06		
	(1.67)	(0.05)		
property_tax			0.25*	0.08
			(1.74)	(0.32)
property_tax^2			-0.07*	-0.004
			(-1.74)	(-0.3)
property_tax^3			0.0002*	0.0001
			(1.7)	(0.3)
lngdp(-1)	0.11	0.05	0.07	0.14
	(1.3)	(0.5)	(0.7)	(1.23)
lnpop	-0.05	-0.1	0.03	-0.02
	(-1.06)	(-0.7)	(0.64)	(-0.3)
dem	0.01	0.01	-0.07*	0.02
	(0.7)	(0.6)	(-1.85)	(0.3)
gov_stab	0.05	0.01	-0.06	-0.02
	(0.2)	(0.04)	(-1)	(-0.4)
Time dummies	Yes	Yes	Yes	Yes
N. obs	586	609	571	573
Chi^2 Hansen test (dof)	4.85 (4)	1.63 (1)	2.27 (4)	0.76 (1)
(p-value)	(0.3)	(0.2)	(0.7)	(0.38)

Notes. All regressions contain calendar year dummies (results not reported); the time span is 1984-2010. The dependent variable is *corr_icrg*. Standardised normal z-test values are in parentheses; robust standard errors. Estimation in columns (A) and (B) contains *area*, *area*^{2} and *area*^{3} as IV, columns (A') and (B') do not. Significant coefficients are indicated by * (10% level), ** (5% level) and *** (1% level). Two-step estimations with Windmeijer (2005) correction.