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International Center for Public Policy
Andrew Young School of Policy Studies
Georgia State University
Atlanta, Georgia 30303
United States of America

Phone: (404) 651-1144
Fax: (404) 651-4449
Email: hseraphin@gsu.edu
Internet: http://aysps.gsu.edu/isp/index.html

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Do fiscal decentralization and government fragmentation affect corruption in different ways? Evidence from a panel data analysis

Nadia Fiorino,[*] Emma Galli,[**] and Fabio Padovano[***]

**Dipartimento di Sistemi e Istituzioni per l'Economia, Università de l'Aquila*
***Dipartimento di Scienze Sociali, Università di Roma "La Sapienza"*
****CREM-CNRS, Université de Rennes 1 and DIPES, Università Roma Tre[*]*

ABSTRACT

Are countries characterized by more decentralized fiscal and spending powers less corrupt? Or is a higher degree of government fragmentation a more effective way to deter corruption? Is there any evidence that these alternative ways to enhance government accountability reinforce each other? This paper tries to answer these questions by using several indicators of government fragmentation and fiscal decentralization for a panel of 23 countries in the 1995-2007 time interval. Taken separately, while various measures of government fragmentation do not seem to affect corruption in any significant way, fiscal decentralization measured as fiscal and spending autonomy does seem to reduce corruption. This latter effect is reinforced if fiscal decentralization is combined with a high degree of government fragmentation at the local level. The results appear robust to different specifications of the empirical model.

JEL code: H11, H53, H77

Keywords: decentralization, common pool, fiscal autonomy, government fragmentation, corruption

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Corresponding Author. CREM-CNRS et Centre Condorcet, Université Rennes 1, 7 Place Hoche, 35065 Rennes France. E-mail address: fabio.padovano@univ-rennes1.fr. Paper presented at the 2011 meeting of the SIEP (Società Italiana di Economia Pubblica), at the Seminars of Applied Economics at the CREM-Université de Rennes 1, at the International Conference "The Challenge of Local Government Size: Theoretical Experiences and Policy Reforms", held in Coruna, Spain on September 2011 and at the World Meeting of the Public Choice Societies, Miami, 2012. We thank the participants of these conferences and especially Linda Gonçalves Veiga, Santiago Lago, Jorge Martinez-Vasquez, Yvon Rocaboy, Rajeev Goel and Julien Hanoteau for their comments. The usual *caveat* applies.

1. Introduction

Are countries characterized by more decentralized fiscal and spending powers less corrupt? Or is a higher degree of government fragmentation a more effective way to reduce and deter corruption? And finally, is there any evidence that these alternative ways to enhance government accountability reinforce or hinder each other? These are the three questions that the empirical analysis presented in this paper will try to answer.

The idea that centralization brings about high levels of rent-seeking, corruption and lack of accountability of government officials is behind the demand for greater decentralization that characterize many OECD and non OECD countries since the 1990s (Rodden *et al.*, 2003; Arzaghi and Henderson, 2005; Bardhan and Mookherjee, 2006). These decentralization reforms have taken two main directions: the devolution of tax and spending power to sub-national governments, i.e. fiscal decentralization, and/or the increase in the number of sub-national units of government, i.e. government fragmentation. There is still much debate over which of the two facets of decentralization shows a greater effectiveness in deterring corruption and improving the quality of governance. So far neither the theoretical literature has drawn unambiguous predictions nor the empirical one has produced conclusive evidence.

Many reasons explain this inconclusive situation. First, fiscal decentralization and government fragmentation allegedly impact on corruption through different channels. Fiscal decentralization mainly reduces tragedy of the commons-like situation. To the extent that sub-national governments finance their expenditures by means of own revenues rather than grants received from other government levels, the fiscal responsibility of their elected officials is expected to increase (Brennan and Buchanan, 1980). This in turn improves the agency relationship between local voters and policy makers and deters corruption. Government fragmentation, on the other hand, should reduce corruption through the channel of inter-jurisdictional tax and yardstick competition that a large number of horizontally layered government units may bring about.

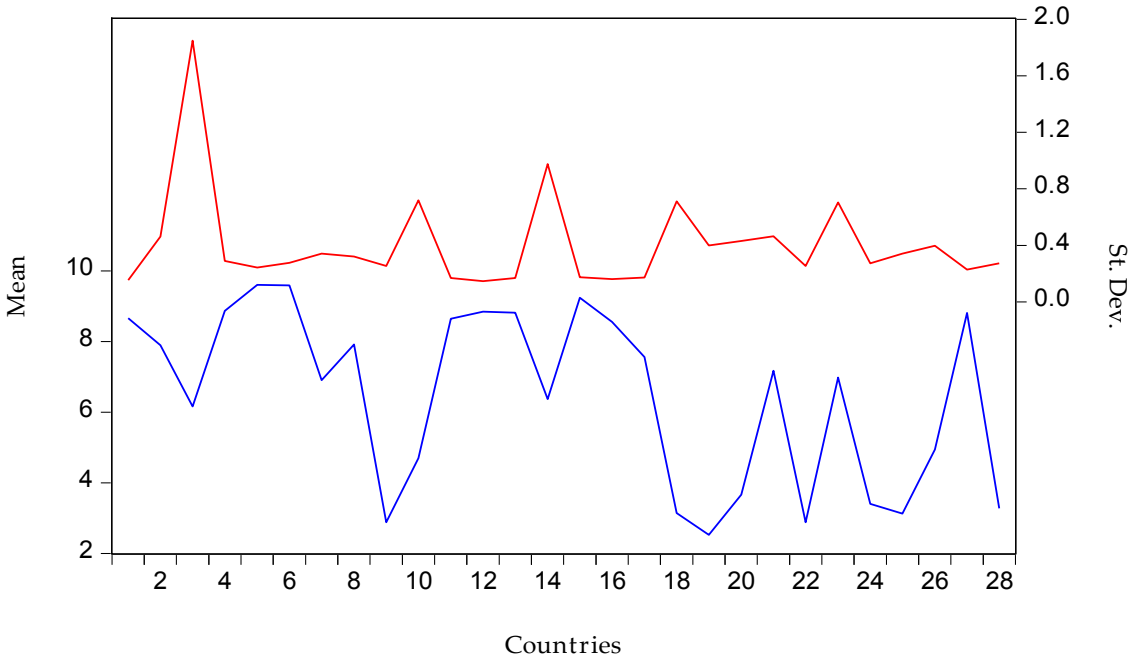
In principle, these two channels should reinforce each other, since they both produce their effect on corruption via enhanced accountability, i.e. via a greater capability of voters to control elected officials. But it is quite conceivable that, if fiscal decentralization and government fragmentation are not implemented in a coherent way, either of them is not devised to maximize accountability, they might hinder each other in reducing corruption. It is therefore important to analyze

how they interact in affecting the level of corruption. Yet, analytical difficulties do not end there. Fiscal decentralization is an articulated process that can take many forms (Madiès and Dafflon, 2008), such as the autonomy to decide expenditures on local services and/or to set and collect taxes; the share represented by grants received from higher level governments in the total revenues of the sub-national government. Each of these dimensions may affect corruption with different degrees of intensity.

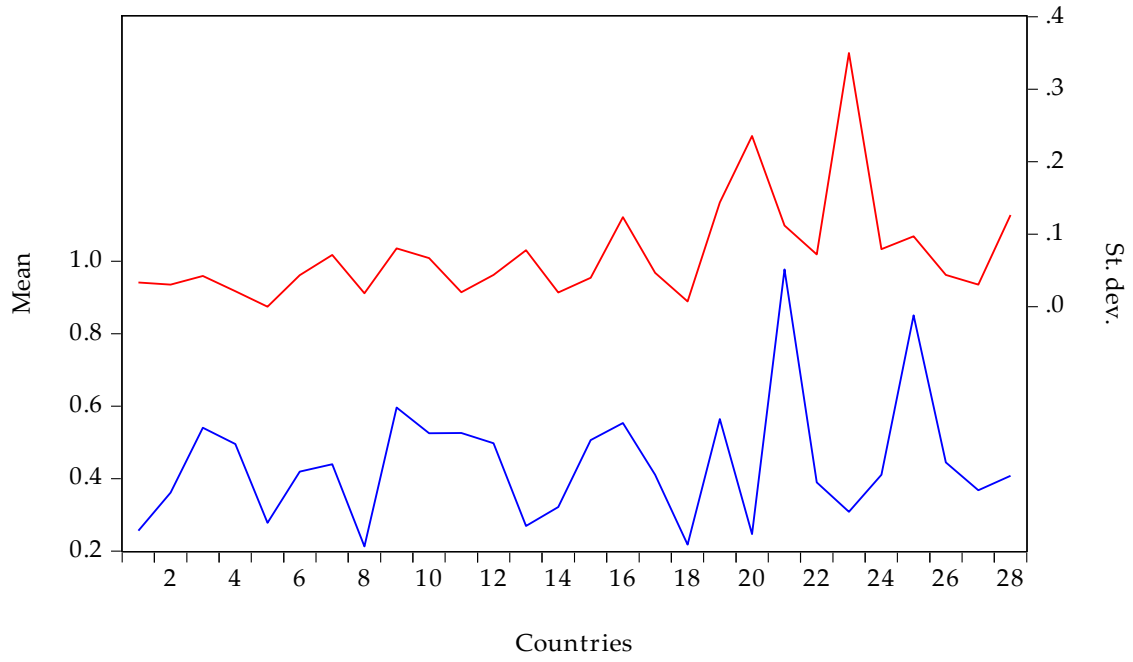
On the nexus between government fragmentation and corruption, consensus is lacking as well. While models of yardstick competition foresee greater efficiency in the provision of public services when the number of government units is larger, others suggest that the multiplication of the levels of government about which each citizen must be informed may worsen the agency relationship between citizen and elected officials (Franzese, 2001) and increase room for malfeasance (Shleifer and Vishny, 1993).

Another problem of interpretation derives from the fact that the existing empirical studies adopt different definitions and measures of corruption. Transparency International's annual corruption perception index (CPI) – and similar subjective measures provided by the World Bank – is the most widely used indicator of corruption. The circumstance that the actual level of corruption is difficult to observe justifies the use of a subjective index. Other potential measures, like the number of prosecuted corruption-related cases in a country, may prove rather noisy; for example, a low arrest rate for bribery may indicate a low diffusion of corruption or, alternatively, widespread corruption with no prevention efforts. Some papers (Treisman, 2007; Fan et al., 2009) instead rely on data issued by the *World Business Environment Survey* or WBES, that reports responses of businessmen and citizens operating in particular countries about their own (or close associates') actual experiences with corrupt officials. The use of different definitions of both decentralization and corruption, together with the variety of samples and of estimation techniques employed in the empirical studies, contribute to the existence of a mixed evidence on the relationship between fiscal decentralization, government fragmentation and corruption.

Graph 1. CPI Values, Country means and st. dev.



Graph 2. Expenditure decentralization values, Country means and st. dev.



Thirdly, most empirical analyses are based on cross country samples[2], if not on case studies, such as India, China and the United States[3]. For a variety of reasons, including data limitations, the

[2] See Huther and Shah, 1998; Treisman, 2000; De Mello and Barenstein, 2001; Fisman and Gatti, 2002a; Fjeldstad, 2003; Arikan, 2004; Bardhan and Mokherjee, 2005; Kunicová and Rose-Ackermann, 2005; Enikolopov and Zhuravskaya, 2007; Fan, Lin, Treisman, 2009; Bjedov, Madies, Schnyder, 2010; Nelson, 2011.

time series dimension of the link between decentralization and corruption has received less attention so far[4]. Although apparently straightforward, cross country analyses make the implicit assumptions that countries are positioned on their steady state equilibria values for both the level of corruption and the vertical distribution of tax and spending powers. This is far from reality: as we have already mentioned, many countries, within and outside the OECD group, are in fact undergoing important processes of decentralization of their fiscal arrangements. Moreover, various indices of corruption, notably Transparency International's Corruption Perception Index (hereafter CPI), denote significant changes of the countries' degrees of corruption during the time interval they cover, i.e., from 1995 onwards (see Graph 1). Hence, averaging out data about government fragmentation, fiscal decentralization and corruption into a single observation for each country does not only involve a loss of information, but also distorts the analysis of the relationship between the two. The availability of time series for the indicators mentioned above allows us to examine the dynamic profile of fiscal decentralization and government fragmentation. It is worth noting that both have changed over time because of the reforms in the tax and expenditure assignments to the various government tiers as well as to changes in the number of tiers and of government units they contain. The politico-administrative process of decentralization, however, does not always coincide with the devolution of spending and taxing power to local governments: the two processes are far from going hand in hand.

Our paper improves on the existing literature along several dimensions. First, we fully exploit the time dimension of the data set in order to have more efficient estimates of the effect of fiscal decentralization and government fragmentation on corruption. Second, we consider various indicators of both processes to evaluate their relative impact on corruption, with the aim of identifying which of the two deters corruption the most. Finally, we consider a series of interactive terms to evaluate which (and when) the two processes reinforce or obstruct each other in dealing with corruption. Particular attention is devoted to the effective type of fiscal decentralization. Taking into account the contributions of the literature on fiscal decentralization and government size, we explicitly consider the impact on corruption of the alternative ways (own revenues vs. common pool situations) decentralized governments finance their expenditures. By doing so we account for the possibility that fiscal decentralization improves the agency problems between voters and elected officials provided

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[3] Montinola et al. 1995; Zhuravskaja, 2000; Fisman and Gatti, 2002b; Schlesinger et al., 2002; Qian and Weingast, 2005; Dincer et al, 2010; Goel and Nelson, 2011.

[4] In this respect Kyriacou and Roca-Sagales (2011) represent an exception, although they refer to a comparatively corruption free OECD sample and therefore focus on government quality rather than specifically on corruption.

that it is conducted simultaneously on the revenue and the spending side of the budget (Ashworth, Galli and Padovano, 2010; Rodden, 2003). Most of the studies on this subject consider each side of the budget alternatively. Concentrating only on one side of the budget, while neglecting the other, biases the analysis of the impact of decentralization on corruption. Grant financing of local expenditures in a highly centralized country, where local spending is a small percentage of GDP or of total revenues, has consequences for corruption altogether different than grant financing in a highly decentralized country, where most of government spending is decided locally. While it is indeed relevant to verify the effects of alternative ways to finance sub-national government spending, it is also important to consider, at the same time, the degree of decentralization of government spending.

We empirically examine these issues using information for a sample of 23 developed and developing countries in the 1995-2007 time interval. To anticipate the results, we find evidence that it is the degree of fiscal decentralization rather than government fragmentation that carries the highest explanatory potential with respect to corruption. More precisely, the reduction of common pool type of situations proves to be the most effective restraining force on corrupt practices. But the estimates also suggest that the virtuous role of fiscal decentralization in reducing corruption is strengthen provided that it is accompanied by a higher degree of government fragmentation at the lowest level, i.e. that of the municipalities. Instead, reducing common pool while increasing the number of government levels does not show any impact on corruption. This result is consistent with the hypothesis that a more complex vertical organization of the state worsens the citizens' ability to control public officials.

The rest of the paper is organized as follows. Section 2 provides a survey of the literature on fiscal decentralization, government fragmentation and corruption. In section 3 we illustrate the empirical strategy, the data set and the specification of the model; in section 4 we present the estimates. Section 5 provides the concluding remarks.

2. Decentralization, fragmentation and corruption: a literature review

The literature on decentralization and corruption is quite composite. It distinguishes between fiscal decentralization and government fragmentation and, with respect to each of these facets, develops a series of contrasting theoretical predictions that result in mixed evidence. The empirical studies on the issue are mostly based on cross country regression analyses, if not on case studies. Although some authors empirically assess the beneficial impact of decentralization on corruption, others argue that the effects are ambiguous and context-dependent, with some at the opposite extreme suggesting that decentralization may worsen problems of corruption.

2.1 Fiscal decentralization and corruption. Models of public choice and political economics argue that greater decentralization could reduce wasteful public spending through a variety of channels: by increasing competition between local governments, by improving political transparency, by reducing agency problems and stimulating efficiency-enhancing policy. Common pool theory, however, shows that the effects of a move towards greater decentralization are conditional on the choice of the financial instruments, chiefly grants versus the ability to raise taxes at the decentralized level. On the empirical ground, Huther and Shah (1998), De Mello and Barenstein (2001), Fisman and Gatti (2002), and Arikan (2004) notice that a larger subnational share of public expenditures is associated with lower perceived corruption. Enikolopov and Zhuravskaya (2007) find instead that a larger subnational revenue share is associated with lower perceived corruption in developing countries with older political parties and few parties in government.

2.2. Government fragmentation and corruption. This strand of literature emphasizes the role played by the monitoring and accountability of the public officials in decentralized systems. Some contributions argue that more fragmented governments guarantee greater efficiency in the provision of public services as a result of inter-jurisdictional competition, be it of the resource mobility type *à la* Tiebout (1956) or of the spillover type such as yardstick competition (Besley and Case, 1995; Brueckner, 2003) and, through this channel, reduce corruption (Kurrlid-Klitgaard, 1988; Tanzi, 1994; Breton, 1996; Shah, 2006). Others instead contend that government fragmentation worsens the agency relationship between citizens and elected officials because it multiplies the levels of government about which each citizen must be informed (Franzese, 2001). Moreover, the creation of multi-level government structures may lead to fiscal or regulatory "over-grazing" and increase room for malfeasance (Shleifer and Vishny, 1993). Along a similar line of thought, Prud'homme (1995), Tanzi (1996, 1998), Lambsdorff and Teksoz (2004) argue that when the relationship between citizens and government officials is closer and more frequent the potential briber needs to affect only a limited segment of the government. This lowers the opportunity cost of engaging in corrupt activity and raises the probability of the capture of sub-national politicians by private interests. This is all the more true if local bureaucrats are poorly trained and less competent than those operating in the top notches of government.

So far the empirical literature has not managed to solve the puzzle. Examining the effect of the vertical structure of states, Treisman (2002), for example, found that a larger number of administrative tiers is correlated with higher perceived corruption. In this respect the fact that sub-national

governments were appointed or elected seemed irrelevant. Goldsmith (1999) and Kunicová and Rose-Ackerman (2005) instead report that a federal structure is associated with higher perceived corruption. More recently, Nelson (2011) finds little evidence that the size of municipal governments affect corruption, while smaller units of local governments at the bottom tier (excluding municipalities) seem to be associated with more widespread corrupt behavior.

2.3. Mixed contributions. Some authors made a step into the direction of combining fiscal decentralization and government fragmentation. Fan *et al*., (2009), for example, include into the analysis various dimensions of fiscal and administrative decentralization, like the number of government units, the share of local taxes and the share of transfers to sub-national governments. They show that neither the (negative) expenditure decentralization effect nor the (positive) federalism effects are robust. The fiscal decentralization effect appears weakened after controlling for national characteristics, and the federal effect disappears when the number of countries in the sample is expanded. Kyriacou and Roca-Sagalés (2011) re-examine the relation between decentralization and quality of government in the OECD countries. They acknowledge that measures of administrative decentralization are inherently imprecise, since countries characterized by similar structures of administrative decentralization show a large variety of degrees of fiscal decentralization. They use OECD data on sub-national expenditures and revenues which subtract intergovernmental grants and transfers and measure government quality indicators by averaging four dimensions of government quality namely, control of corruption, rule of law, regulatory quality and government effectiveness. They find that fiscal decentralization has a positive impact on government quality even though this effect is mitigated in the presence of regional elections and multi-level government.

A major shortcoming of all these studies is that they consider measures of tax and expenditures decentralization alternatively. This is highly problematic, because grant financing of local expenditures in a highly centralized country, where local spending is a small percentage of GDP or of total revenues, has consequences for corruption altogether different than in a highly decentralized country, where most of government spending is decided locally. As Ashworth et al. (2011, 2010) show, it is important to simultaneously control for both tax and expenditure decentralization in order to have a correct representation of the effects of the decentralization process on corruption as well as on other phenomena. They propose a way to minimize problems of collinearity between the expenditure and the revenue sides of the budget that we shall follow in this paper as well.

3. *Empirics*

3.1. Empirical strategy. To test whether fiscal decentralization and government fragmentation affect corruption in different ways, we estimate a series of regressions in three steps. In the first step we focus on fiscal degree of decentralization using GFS data. The second step compares the explanatory power of fiscal decentralization with that of indicators of government fragmentation, to ascertain which dimension of decentralization really matters in deterring corruption. Finally, in the third step we include an interaction term between government fractionalization and fiscal decentralization to verify whether government fragmentation reinforces or reduces the effect of fiscal decentralization on corruption.

To deal with the problem of two-way causality between corruption and some of the covariates, mainly total public expenditures, endowment of natural resources, level of per capita GDP and education, we resort to the instrumental variable (IV) methods, by using the lagged values of those endogenous variables as instruments.

3.2. Sample data and model specification. The empirical analysis employs a panel of 23 countries between 1995 and 2007. Data availability for measures of fiscal decentralization determines the size of the cross section, while the CPI series sets the boundaries of the time interval. In our sample, which is driven by data availability of both government fragmentation and fiscal decentralization measures, the choice of the CPI is quite straightforward, because CPI data have a time series dimension which is absent in the WBES data. In any case, the correlation between the CPI and the WBES indices, for the countries and years where they overlap, is very high (r = 0,73, significant at the 5% level).

Overall we have 299 observations per variable, which should ensure enough degrees of freedom to achieve efficient estimates. The countries considered are Australia, Austria, Belgium, Bolivia, Canada, Chile, Denmark, Finland, France, Germany, Ireland, Israel, Italy, the Netherlands, Norway, Romania, South Africa, Spain, Sweden, Switzerland, Thailand, the United Kingdom and the United States. The majority of them are developed countries, but about one third are either developing or non-OECD countries. With respect to the cross-countries data generally used so far in empirical analyses of corruption, our panel includes a large variety of institutional systems, geographic locations and degrees of fiscal and politico-administrative decentralization, which span through (nominally) federal and centralized countries. Importantly, the time dimension allows to capture the processes of decentralization (or, conversely, centralization) that generally exert their equilibrium effects on the level of corruption in the long run.

There is a widespread consensus in the literature to explain variations in perceived corruption by means of a mixture of measures of economic, legal and political variables. We therefore derive our empirical model taking into account the results of this literature and focusing also on the different measures of decentralization[5]. Equation (1) lists the variables as follows:

$$CPI_{it} = a_0 + a_1 \boldsymbol{FISCDEC}_{it} + a_2 \boldsymbol{GOVFRAC}_{it} + a_3 \boldsymbol{DECENTRALIZATION}_{it} +$$

$$+ a_4 \boldsymbol{ECON}_{it} + a_5 \boldsymbol{SOCDEMO}_{it} + a_6 \boldsymbol{POLITICS}_{it} + a_7 \boldsymbol{LEGAL}_{it} + u_{it} \qquad (1)$$

where *i* denotes the country and *t* the year. The variables can be described as follows:

1) *CPI*, the dependent variable, is the corruption perception index provided by the Transparency International from 1995 to 2007. Data about corruption have not the same reliability as those, to make just an example, of GDP; they are based on surveys, collected with annual and sometimes biannual frequency and they are not subject to periodical revisions. These survey-based indicators of corruption do not allow to focus on short-run year-to-year changes since they are often subject to modifications in samples and methodologies; they are, however, able to capture the trends over longer periods, which is perfectly consistent with our perspective. The original ordering of the CPI goes from 0 (most corrupt) to 10 (least corrupt). To facilitate the interpretation of the signs of the estimated coefficients we have reversed the order of the index by multiplying the reported CPI scores for each country by -1 to obtain an indicator increasing in perceived corruption.

2) ***FISCDEC*** is a vector of variables which includes different measures of fiscal decentralization. *GRANTS* and *OWNREV* capture fiscal decentralization. Specifically, *GRANTS* are revenues raised by the central government and transferred to sub-national governments (state-regional and local governments) over total revenues. Data come from GFS (various years). According to the common pool theory, the expected sign on this variable is positive, more grants implying more corruption. *OWNREV* is revenue raised and retained by state, regional and local government units (mainly local taxes, user fees and interest income) over total revenues, from the GFS (various years). These data fail to properly distinguish between tax revenues that are legislated and collected locally from those that accrue to the sub-national governments through revenue-sharing schemes. To the extent the latter case is relevant this covariate may overestimate actual tax autonomy. Public choice and common pool theory predict a negative sign on the coefficient of *OWNREV*. To verify the robustness of the

[5] Treisman (2002) provides an excellent review on the determinants of corruption.

estimated correlations and to correct the tendency of GFS data to overestimate actual tax autonomy, we have also controlled for an indicator provided by Stegarescu (2005), *RD1*, which includes own non-tax and capital revenue and autonomous own taxes of sub-central governments. We therefore estimate equation (1) by considering *RD1* as an alternative to GFS data, although this indicator of tax autonomy is available for a more limited and homogeneous sample of 18 OECD countries in the 1995-2001 time interval. For the results on fiscal decentralization to be robust, we expect that the estimated coefficients of *RD1* are not qualitatively different from those obtained using *OWNREV*. Finally, in the first step of our analysis, we have also controlled whether *expenditure* decentralization, holding the vertical distribution of the power to *tax* constant, similarly affects the level of corruption. To this end we have used two variables from the GFS dataset, *CGEXP* and *SGEXP*, which represent, respectively, the share of total expenditures that pertain to the central and to the sub-central government levels. Inasmuch as expenditure decentralization betters the satisfaction of individual preferences for public goods and services and improves the agency relationship between citizens and public officials, corrupt practices should become less pervasive; we then expect a negative sign on *SGEXP* and a positive sign on *CGEXP*. When this specification is adopted, we control for revenue decentralization by means of dummies drawn from the classification in quartiles of the variable *OWNREV*.

3) ***GOVFRAG*** is a vector of variables which includes different measures of politico-administrative fractionalization, specifically *TIER* and *MUNICIPAL*[6]. *TIER* is the number of tiers of government (including the central government) that characterize the country's public sector. This variable comes from Fan et al. (2009) and captures the degree of administrative decentralization of a country. *MUNICIPAL* is based on World Bank (2000) estimates for 1999 and measures the number of lowest tier governmental units. Every unit has limited geographical boundaries and is characterized by an executive body empowered to administer a public budget and to provide multiple public services, regardless of whether it has policymaking autonomy and/or local electoral accountability.

4) ***DECENTRALIZATION*** is a vector which includes a number of dummy variables that capture the degree of decentralization of public expenditures (or, alternatively, revenues) when we control for the effects of fiscal decentralization on the spending (alternatively, taxing) side of the budget. To

[6] We have also performed several sets of regressions including a) the alternative measure of the lowest tiers of government drawn from Fan *et al*. (1999) and available on Treisman's website; and b) a measure of the average size of local population and of the average size of the land area. In neither case we find a significant correlation, most likely because they are either time invariant or not available for the whole sample.

construct these dummies we divide the percentage of total spending supplied (alternatively, of total revenues collected) by sub-central government levels in quartiles, ranging from very highly decentralized (highest quartile), to highly centralized spending (lowest quartile), with two middle categories reflecting medium decentralized and highly centralized. The variable equals 1 when the observation falls within that quartile and 0 otherwise. The qualitative structure of the variable minimizes collinearity with the continuous fiscal covariates. The introduction of this variable is novel but important. The basic premise of our analysis has two themes: to what extent the spending is localized and how any local spending is financed using grants or own taxes. Having just *GRANTS* and *OWNREV* does not capture fiscal decentralization entirely, without adjusting for the underlying preferences for the government level at which spending is carried out. Furthermore, because there is no guarantee that *GRANTS* and *OWNREV* sum to unity, examining the type of expenditure preferences is a way of taking account of any missing revenues. While we expect a negative sign on the highly decentralized countries (highest quartile) and a positive one on the low decentralized dummy, the whole range of signs on the intermediate dummies is *a priori* undetermined.

5) ***ECON*** is a vector of economic variables. *GDPPC* is per capita GDP in U.S. dollars, measured at purchasing power parity and taken from Penn World Tables mark 6.2 (hereafter, PWT). According to the so-called 'Lipset hypothesis' (Lipset, 1960), voters with higher income are expected to be both more willing to monitor public employees and eventually to take action when the latter violate the law. A negative sign is expected. *TOTEXP* is the total public expenditure as a percentage of the GDP. The benefits of corruption derive from bureaucrats and politicians being able to distract public resources to private individuals. Greater numbers of regulations also increase the opportunities for helping private actors evade or elude these regulations, therefore increasing the possibilities for corruption. The larger the public sector, the greater the possibilities for corrupt activities (Tanzi, 1994; Glaeser and Shleifer, 2003; Adsera *et al.*, 2003). Because of the lack of continuous data about regulations or bureaucracy size we examine the effect of the size of government, concentrating on the amount of public spending. Considered alongside *GRANTS* and *OWNREV*, this variable has also the advantage of controlling to what extent the country's budget is balanced, i.e. it provides a measure of fiscal responsibility. A positive sign is expected. *OPEN* is the sum of exports and imports over GDP in percentage terms and come from PWT. This variable tests the prediction that increasing trade interdependence improves the competitiveness and productivity of the economy, which should leave less room for corrupt practices. A negative sign is expected. Finally, *FUEL* is the percentage of mineral fuels in manufacturing exports

(WDI, World Bank, 2007). Ades and Di Tella (1999) found that countries with high endowments of natural resources, inasmuch as they constitute a rent, are characterized by greater perceived corruption.

6) ***SOCDEMO*** is a vector which takes into account a series of socio-demographic variables. *SCHOOL* is the secondary school enrollment for male and female population and comes from the Barro-Lee dataset. Again, the Lipset hypothesis (1960) states that education is a way to lead individuals towards a higher involvement in political life. A negative sign is expected. *POP*, the country population in millions of units, comes from the PWT. The variable acts as a control for country size. If large countries exploit economies of scale in the provision of public services (Alesina and Wacziarg 1997) and have therefore a low ratio of public service outlets per population, individuals might revert to bribes "to get ahead of the queue". At the same time, larger countries might adopt more decentralized fiscal systems to better cater the diverse preferences of their citizens. Again, for a given level of decentralization, a larger population implies a lower degree of satisfaction of individual preferences for public services, with greater incentives to resort to briberies. We expect that more populated countries be also more corrupt. A set of studies on the determinants of corruption has focused on the effect of ethnic fragmentation on corruption (Mauro, 1995; Fearon and Laitin, 1996; Alesina *et al.*, 2002). If an area is worn out by ethnic divisions and leaders tend to allocate resources towards groups of their own ethnicity, members of one ethnic group might continue to support a leader of their own group, even if he/she is known to be corrupt. Furthermore, ethnically divided societies may strengthen corrupt "contracts" as these communities may provide internal sanctions against those who betray the ethnic group. To account for this effect, we use the variable *ETF*, which is the average of the five indices of ethnic fractionalization provided by La Porta, Shleifer and Vishny (1999).

7) ***POLITICS*** is a vector of politico-institutional factors. *DEMOCRACY* is a multivariate qualitative variable that ranges from -10 to +10. These values are the sum of the country scores for democracy and autocracy for every year, with data drawn from the Polity IV database. In the autocratic systems small *élites* monopolize the power, with few or no constraints to prevent them from exercising their own interest. Because of that, a high level of corruption should prevail in autocratic regimes. In contrast, democratic systems are characterized by diffuse authority, where the executive branches of government are balanced by an elected parliament and an independent judiciary, and where elections allow an alternation in power that should deter corruption. As alternatives, we use the Freedom House indexes of political rights (*PR*) and of civil liberties (*CL*), both also scaled from 0 to 10, where a higher score indicates a higher level of political rights and freedom. *SYSTEM*, in turn, is a multivariate dummy that takes the value of 0 when the government is presidential, 1 when presidents

or prime ministers are elected by the assembly and 2 when the system is parliamentary. The values are from the World Bank Database of Political Institutions (hereafter, DPI). Persson and Tabellini (1999) and Persson *et al.* (2003) suggest the existence of a systematic link between corruption and government systems. Presidential systems are more accountable because voters seek consensus among individuals rather than among parties, which should restrict rent extraction. The sign on this variable is expected to be positive. *VETO* mirrors the values of the variable "CHECKS(2A)" in the DPI/2010, which captures both the effects of the number of the institutional veto players in alternative government and electoral systems. This variable refers to the literature that relates divided governments in presidential systems and fragmented governing coalitions in parliamentary systems to "wars of attrition" and budget deficits (Alesina and Drazen, 1991; Tsebelis, 2002). Political fragmentation tends to disperse decision making power among different political actors; this slows down the implementation of policies and creates more room for malfeasance. The sign on this variable is expected to be negative since, when the value of *VETO* becomes large, too many players inhibit the decision making process and the potential for corruption.

8) ***LEGAL*** is a vector consisting of a set of variables aiming at capturing the effectiveness of the country's legal system. The latter is rooted not only in the formulations of laws but also in the 'legal culture', i.e. the expectations and practices that inform the way laws get enforced. Therefore different conceptions of the social role of law may imply dissimilar perceptions of the gravity of corruption. The effectiveness of the legal system has been demonstrated to be greater - and corruption lower - in Britain and its former colonies (La Porta *et al.*, 1999; Treisman, 2000). To represent this effect we use the dummy *BRIT*, which takes the value 1 if the country is a former British colony, 0 otherwise, from Fan *et al*., (2009). Legal culture has also been shown to be correlated with the protestant work ethic and with a common law legal system. We control for these phenomena with the variables *PROT*, the percentage of Protestants in the population, from Barro and McClearly (2005); and *LEG*, a dummy variable that takes the value 1 if the country is characterized by a common law legal system, 0 otherwise, again from Fan et al., (2009). With respect to all three variables we expect a negative sign.

Table 1 reports the descriptive statistics for all variables[7]. The table of correlation coefficients, available upon request, shows some high values of correlation (e.g., between common law system and British legacy), that will likely force an alternative use of the covariates to avoid multicollinearity in the estimates.

[7] The correlation coefficients among the covariates are available upon request.

Table 1. Descriptive statistics

	mean	*median*	*st. dev*	*min*	*max*	*obs.*
BRT	0.21	0.00	0.41	0.00	1.00	23
CGEXP	0.31	0.32	0.10	0.00	0.45	23
CL	1.57	1.22	0.76	1.00	3.50	23
CPI	6.93	7.72	2.36	2.53	9.61	23
DEM	9.56	10.00	0.77	7.69	10.00	23
ETF	0.18	0.12	0.15	0.03	0.60	23
FUEL	2.96	2.27	2.34	0.40	8.61	23
GDPPC	24747.44	26048.71	11053.15	3111.28	55946.97	23
GRD1NT	0.13	0.13	0.07	0.00	0.24	23
HIDECEXP	0.24	0.19	0.25	0.00	0.92	23
HIDECTAX	0.25	0.15	0.30	0.00	0.85	23
LEG	0.33	0.00	0.48	0.00	1.00	23
LOWDECEXP	0.23	0.00	0.41	0.00	1.00	23
LOWDECTAX	0.23	0.00	0.42	0.00	1.00	23
MIDDECEXP	0.36	0.38	0.29	0.00	1.00	23
MIDDECTAX	0.28	0.27	0.26	0.00	0.77	23
MUNICIPAL	6869,52	589	15712,09	80	70500	23
OPEN	37.99	32.57	20.96	12.38	109.24	23
OWNREV	0.19	0.19	0.13	0.03	0.47	23
POP/1000000	35.77	15.66	58.19	0.44	286.15	23
PR	1.29	1.00	0.61	1.00	3.11	23
PROT	0.24	0.05	0.30	0.00	0.90	23
RD1	1179.50	26.01	4884.67	9.61	20752.00	23
SCHOOL	9.67	9.64	1.37	6.09	12.31	23
SGEXP	0.15	0.15	0.08	0.01	0.32	23
SYS	1.63	2.00	0.76	0.00	2.00	23
TIERS	3.64	4	0.84	2.00	5.00	23
TOTEXP	0.43	0.42	0.17	0.08	0.98	23
VETO	4.39	4.35	0.93	3.07	6.54	23
VHIDECEXP	0.17	0.00	0.26	0.00	0.77	23
VHIDECTAX	0.24	0.07	0.33	0.00	1.00	23
VOICELOW	75,35	80,38	14,76	23,44	94,26	23
VOICEUP	91,93	99,76	13,45	32,54	100	23

3. Results

Table 3 presents the results of the various estimates of equation (1), where only the fiscal measures of decentralization are considered (step 1). Subsequently, we estimate equation (1) using the politico-administrative indicators decentralization (step 2) and the interactive terms as well (step 3).

Table 2. Estimates of Equation (1) – Fiscal Decentralization only

Model	*1*	*2*	*3*	*4*
Estimation method	*Pooled EGLS*	*Pooled IV-Two stages EGLS*	*Pooled IV-Two stages EGLS*	*Pooled EGLS*
Dependent variable	*CPI*	*CPI*	*CPI*	*CPI*
Sample	*All countries 1997-2007*	*All countries 1997-2007*	*All countries 1997-2007*	*OECD countries 1997-2000*
C	-3.62** (2.09)	45.89** (22.92)	-11.67*** (5.03)	-0.26 (0.95)
GRANT	0.04 (0.09)	3.64* 2.25)		12.82*** (2.35)
OWNREV	-0.10** (0.05)	-30.41*** (9.05)		
RD1				-0.04*** (0.00)
CGEXP			4.06** (2.26)	
SGEXP			-21.82*** (6.03)	
TOTEXP	-0.03 (0.09)	5.05*** (1.29)	-1.08 (1.28)	-1.56 (0.95)
MIDDECEXP	-0.03 (0.05)	-5.75*** (1.41)		-1.84*** (0.16)
HIDECEXP	-0.16*** (0.06)	-6.12*** (1.43)		-1.43*** (0.15)
VHIDECEXP	-0.18*** (0.06)	3.89 (4.54)		-1.29*** (0.15)
MIDDECTAX			-0.1 (0.16)	
HIDECTAX			-0.42** (0.28)	
VHIDECTAX			-0.17 (0.22)	
GDPPC	3.11^{-06} (4.73^{-06})	-3.42^{-05}*** $(1.1)^{-05}$	-9.41^{-06} (2.71^{-05})	-9.67^{-05}*** (2.39^{-05})
POP	0.01*** (0.00)	0.01 (0.01)	0.01*** (0.00)	-0.37 (0.12)
FUEL	0.01** (0.00)	0.1** (0.03)	-0.05* (0.03)	
SCHOOL	-0.29*** (0.12)	-0.09 (0.13)	0.86 (0.36)	

Table 2. Estimates of Equation (1) – Fiscal Decentralization only (cont.)

OPEN	-0.007* (0.00)	-0.11*** (0.01)	-0.01 (0.02)	
PR	-0.15*** (0.07)	-3.31* (1.9)	-0.56 (0.46)	
ETF	7.74*** (2.54)	-16.56*** (7.31)	10.64*** (3.54)	
DEM	-0.09*** (0.04)	-2.23 (1.79)	-0.29 (0.19)	
BRT	-0.81 (1.53)	-3.38*** (0.65)	0.39 (1.04)	
LEG	-0.28 (1.91)	-3.11** (1.38)	-0.85 (1.41)	
SYSTEM	0.19*** (0.03)	6.01*** (1.83)		1.12*** (0.09)
VETO	-0.02 (0.02)	-2.43 (3.32)	-0.14* (0.08)	-0.24*** (0.05)
PROT	-2.89*** (1.1)	-11.28*** (2.84)	-10.88*** (2.21)	-2.07*** (0.38)
CL	-0.004 (0.12)	-0.36 (0.58)		
AR(-1)	Yes	Yes	Yes	Yes
Adj. R^2	0.99	0.92	0.97	0.97
DW	1.83	1.42	1.95	2.73
F-statistic	1177.12***	851.73***	1318.02***	104.09***
N.	259	144	260	54
Instruments		$TOTEXP_{t-1}$. $GDPPC_{t-1}$. $GDPPC_{t-2}$. $FUEL_{t-2}$. $FUEL_{t-3}$. $SCHOOL_{t-2}$. $SCHL_{t-3}$	$TOTEXP_{t-1}$. $GDPPC_{t-1}$. $GDPPC_{t-2}$. $FUEL_{t-2}$. $FUEL_{t-3}$. $SCHOOL_{t-2}$. $SCHL_{t-3}$	
Sargan test p-value		1.834 0.61	1.245 0.89	
Hausman test p-value		-1.55^{-11} 0.00	-2.44^{-11} 0.00	

Note: clustered standard errors in parentheses. *. **. and *** denote significance at 10%. 5%. and 1% levels. respectively.

Stage 1. Model 1 proposes the estimates for the entire sample, via pooled EGLS with cross section weighted coefficients, to allow for cross sectional heteroskedasticity, and clustered standard errors, to avoid the risk of inflating the significance of the estimates in the absence of fixed effects. These cannot be introduced because most of the variables of the vectors ***POLITICS*** and ***CULTURE*** are time

invariant. The results strongly support the view that fiscal decentralization, as well as the way local expenditure is financed, matter for corruption. If decentralization is carried out on both sides of the budget, i.e., by increasing the amount of taxes that are spent locally, corruption is relatively low. Grant financing produces the opposite effect, but it is not statistically significant, at least in this specification. Importantly, controlling for the level of expenditure decentralization is also relevant, since corruption is low only if expenditure decentralization is carried out at a level well above the sample average, i.e., the 60%-80% and 80%-100% quartiles, and the latter even more than the former. Coming to the controlling factors, the dimension of the public sector is statistically insignificant, probably because of its collinearity with *GRANTS* and *OWNREV*. While GDP per capita does not appear significant, the presence of natural resources, introduced at its initial value to better represent their characteristic of being an endowment, is significant with the expected positive sign. Further, openness to international trade is negatively correlated with corruption, although only at the 10% level. Within ***SOCDEMO*** vector, *POP* has the expected positive, "jump the queue" effect. The level of education confirms the Lipset hypothesis, by showing a significant negative sign. Education too was introduced at its initial value, to account for the very long lag with which it produces its effects. Also the degree of ethnic fractionalization has the predicted sign and is significant and robust to changes of the covariates. Among the political control variables, while the degree of democracy and the presidential government affect corruption with the predicted signs, the same cannot be said for the number of legislative veto players.

Finally, the share of protestant believers in the population is the only variable within the ***CULTURE*** vector that influences corruption with the expected negative sign. Neither the British colonial legacy, nor the common law legal system appears to influence the degree of corruption, most likely because all these variables are time invariant and capture highly correlated phenomena. As we have mentioned before, using per capita income, total government expenditures, endowment of natural resources and level of education as independent variables may generate a problem of endogeneity. To overcome it, Model 2 presents the estimates of equation (1) via pooled IV-Two Stages EGLS, again with cross section weights and clustered standard errors. Specifically, we use the lagged value of the potential endogenous regressors as instruments. We have, however, departed from this practice in the case of *FUEL* and *SCHOOL*, which are likely to have a dynamically slow impact on the dependent variable. These variables have been instrumented with the second and third lagged value, the longer excursion that the time dimension of the data set allows. The overidentification tests (Sargan tests) reported in Table 3 and 4 show that the instruments are uncorrelated with the error terms in the second

stage equations, which suggests that these variables do not have an independent impact on the level of corruption; the exclusion restrictions are therefore valid. Under IV estimation, the results specifically related with the correlation between fiscal decentralization and corruption appear even more consistent with the theoretical predictions; *OWNREV* keeps its negative estimated coefficient, while *GRANT* appears positively correlated with corruption and becomes statistically significant. Also the size of the public sector becomes statistically significant, supporting the view that more public spending generally multiplies the opportunities for malfeasance. Once more, this result is conditional on the government level where public spending is carried out, because expenditure decentralization, provided that it is accompanied by tax decentralization, confirms to be an effective constraint on corruption. The other controls maintain their signs and statistical significance; only the estimated coefficient of per capita GDP, once instrumented, becomes negative and acquires significance, at the cost of subtracting it to education – but both covariates refer to the Lipset hypothesis.

As a further control of the robustness of the correlation between fiscal decentralization and corruption, we have examined this relationship by looking at it 'from the other side of the budget'; in other words, we have introduced the share of expenditures supplied by the central government and the sub-central governments as continuous variables, while controlling for tax decentralization by means of dummies that identify the quartiles of medium, high and very high decentralization of own revenues. Again the estimation method is pooled IV-2SLS, with instruments both valid and informative. The results, reported in Model 3, confirm that local spending, controlling for tax decentralization, is correlated with low corruption, while the opposite is true for central government spending. The likely explanations for this effect are the better satisfaction of individual preferences and the improvements of the agency relationship between citizens and elected officials that decentralization brings about. These results are once more conditional on effective tax decentralization, as shown by the own revenue decentralization dummies, which are all positive and become significant at the quartiles between 51% and 75% of the interval, where most of the decentralized countries are clustered. In this specification it would have been ideal to control for the size of the public sector by the share of tax revenues over GDP; yet, as GFS has not published such data for the entire sample under investigation, we had to resort to the share of total expenditure. This, being collinear with *SGEXP* and *CGEXP*, presents the correct sign but is not significant. All the other variables basically show the same signs and levels of significance already found in the previous models. To verify the robustness of the estimated correlations, we have controlled for the alternative specification of fiscal decentralization provided by Stegarescu (2005) for the eighteen OECD countries

in 1995-2000 period. The more limited time dimension does not allow using the lagged values of potentially endogenous covariates as instruments. We thus resort to an EGLS estimator as in Model 1, which still confirms the IV estimates of Model 2. Furthermore, to preserve degrees of freedom, we estimate a more parsimonious specification of Equation (1), using the *RD1* variable instead of *OWNREV* and excluding some covariates like the colonial past, the enjoyment of civil and political rights and the degree of democracy that, as it is to be expected in the more homogeneous OECD sub-sample, do not attain any significance level, even when considered in isolation. Model 4 shows that common pool financing of decentralization is correlated with corrupt practices, while tax financing, here autonomously decided by sub-central governments, is instead associated with low levels of corruption. Also expenditure decentralization confirms to be correlated with low levels of corruption, but in this specification, where the sample of countries is more homogeneous and the definition of tax autonomy more precise, the effect of expenditure decentralization appears more evident. The significance of the control variables reflects the greater homogeneity of the OECD sample: the number of veto players, the government system and the protestant work ethic show the expected sign.

Stage 2. Table 4 reports the estimates of the Equation (1) that include also the indicators of government fragmentation. We insert separately *TIERS* and *MUNICIPAL* since they are highly correlated. The inclusion of these variables together with the measures of fiscal decentralization allows us to verify whether it is government fragmentation or fiscal decentralization that affect corruption the most. Do to their lower time variability, these indicators also provide a test of whether the consideration of the time series dimension actually increases our understanding of the link between decentralization and corruption. Model 5 reports the results of the IV estimates, with the Sargan test in line with those for Model 2 and 4. Its specification basically replicates Model 2, with the addition of *TIERS*. Interestingly, *TIERS* turns out not significant, while *OWNREV* maintains its sign and significance level. *GRANT* remains positive but loses significance, probably because countries characterized by many government levels rely more heavily on transfers. The expenditure decentralization dummies are all highly significant, and the other controls remain basically unchanged. The inclusion of *MUNICIPAL* in Model 6 does not change the results which remain in line with those presented in Model 5. From both these sets of estimates it emerges that it is fiscal decentralization rather than government fragmentation that matter for corruption. Two are the possible explanations for this result. One is clearly that the removal of common pool situations is the most relevant factor in reducing corruption. Yet it is also possible that this result derives from the greater time variability of fiscal decentralization data compared to those on government fragmentation. Given the current data

availability, it is not possible to sort out which of the two effects is actually taking place. Importantly, these results suggest that the neglect of the time series dimension in the data does not only produce a loss of information, but also leads to different findings with respect to cross-countries analyses like Fan et al. (2009).

Stage 3. Finally, we test whether a higher degree of government fragmentation reduces or reinforces the effect that the revenue raised and retained locally exerts on corruption. To this end we sequentially introduce two interaction terms obtained by multiplying *OWNREV* by *TIERS* and *MUNICIPAL* respectively (Model 7 and Model 8). The interactive term is significant only when the lowest tiers of government are considered (Model 8). This result shows that government fragmentation reinforces the corruption deterring effect of fiscal decentralization provided it is implemented at the lowest government level where most of the inter-jurisdictional competition is likely to take place. In other words, to minimize corrupt practices, governments should promote fiscal responsibility and reduce common pool situations in government units where voters have the possibility to compare the relative efficiency of the elected officials. The fight to corruption passes through greater accountability. This result is corroborated by the lack of statistical significance of the interaction term *OWNREV*TIERS* in Model 8. This is most likely because while *OWNREV* is negatively correlated with corruption, *TIERS* varies directly with it. A larger number of government levels seem to reduce accountability, either because it increases the information voters must have to effectively monitor their elected officials or because a more complex government structure is more likely to generate a form of regulatory overgrazing.

Table 3. Estimates of Equation (1) - Fiscal decentralization and Government Fragmentation, and their interaction

Model	*5*	*6*	*7*	*8*
Estimation method	*Pooled IV-Two stages EGLS*	*Pooled IV-Two stages EGLS*	*Pooled IV-Two stages EGLS*	*Pooled IV-Two stages EGLS*
Dependent variable	*CPI*	*CPI*	*CPI*	*CPI*
Sample	*All countries 1997-2007*	*All countries 1997-2007*	*All countries 1997-2007*	*All countries 1997-2007*
C	-60.21* (36.84)	66-56 (65.07)	-21.6 (13.6)	-1.35 (3.90)
GRANT	*0.64* *(0.57)*	0.25 (0.37)	-1.69 (1.34)	5.84** (2.31)
OWNREV	-5.16** (2.64)	0.12 (0.42)		
TIERS	-0.18 (0.37)			
MUNICIPAL		0.004 (0.003)		
*OWNREV*TIERS*			0.08 (0.1)	
*OWNREV*MUNICIPAL*				-6.49E-05* (3.77E-05)
TOTEXP	2.02 (1.46)	-0.17 (0.33)		-3-02*** (0.73)
MIDDECEXP	-6.26*** (0.81)	1.09** (0.50)	0.22 (0.67)	-5.54** (2.37)
HIDECEXP	-6.6*** (0.74)	0.96** (0.49)	0.27 (0.64)	-5.64** (2.37)
VHIDECEXP	-4.84*** (1.87)	0.93* (0.51)	0.62 (0.68)	-5.68** (2.46)
GDPPC	-1.06^{-05} (1.25^{-05})	-1.54^{-05} (3.59^{-05})	-3.31^{-05} (5.13^{-05})	4.26^{-06} (1.40^{-05})
POP	0.009** (0.004)	1.23^{-06}** (4.82^{-07})	-1.40^{-08} (1.55^{-08})	1.52^{-08}*** (5.53^{-09})
FUEL	0.03** (0.01)	-0.014 (0.017)	-0.024 (0.02)	0.006 (0.009)
SCHOOL	-0.15 (0.22)	1.08 (0.68)	1.50 (1.009)	-0.008 (0.1)
OPEN	-0.04** (0.01)	-0.001 (0.038)	0.04 (0.07)	-0.02** (0.01)
PR	7.71* (4.48)	-0.45 (0.66)	-0.68 (1.36)	-0.02 (1.6)
ETF	3.21** (1.64)	63.4 (60.7)	7.99 (9.33)	0.76 (1.03)

Table 3. Estimates of Equation (1) - Fiscal decentralization and Government Fragmentation, and their interaction (cont.)

BRT	1.33 (0.88)	-17.9 (22.28)	2.49 (3.88)	-1.45*** (0.28)
SYSTEM	0.24 (0.6)	-43.15 (30.44)	-2.41 (2.07)	0.54 (0.48)
PROT	-3.12*** (0.88)	10.04 (22.61)	2.26 (4.49)	-2.19*** (0.27)
CL	-0.15 (0.29)	0.47 (0.53)	-0.91 (1.03)	
VETO			-0.23 (0.19)	
AR(-1)	Yes	Yes	Yes	Yes
Adj. R^2	0.78	0.96	0.95	0.90
DW	1.88	1.83	1.99	1.79
F-statistic	186.37***	713.38***	681.3***	318.51***
N.	259	253	253	253
Instruments	$TOTEXP_{t-1}$. $GDPPC_{t-1}$. $GDPPC_{t-2}$. $FUEL_{t-2}$. $FUEL_{t-3}$. $SCHOOL_{t-2}$. $SCHL_{t-3}$	C $GDPPC_{t-1}$. $GDPPC_{t-2}$. $FUEL_{t-2}$. $FUEL_{t-3}$. $SCHOOL_{t-2}$. $SCHL_{t-3}$ $TOTEXP_{t-1}$.	C $GDPPC_{t-1}$. $GDPPC_{t-2}$. $FUEL_{t-2}$. $FUEL_{t-3}$. $SCHOOL_{t-2}$. $SCHL_{t-3}$ $TOTEXP_{t-1}$.	C $GDPPC_{t-1}$. $GDPPC_{t-2}$. $FUEL_{t-2}$. $FUEL_{t-3}$. $SCHOOL_{t-2}$. $SCHL_{t-3}$ $TOTEXP_{t-1}$.
Sargan test p-value	1.792 0.65	1.652 0.57	1.691 0.59	1.783 0.66
Hausman test p-value	-3.82^{-10} 0.00	-4.01^{-10} 0.00	-3.71^{-10} 0.00	-4.22^{-10} 0.00

Note: clustered standard errors in parentheses. *. **. and *** denote significance at 10%. 5%. and 1% levels. respectively.

4. Conclusion

Our analysis has compared the impact of fiscal decentralization and that of government fragmentation on perceived corruption. We innovate on the previous literature by considering a panel, rather than a simple cross-section of 23 developed and developing countries in the 1995-2007 time interval. Furthermore we have examined the impact on corruption of alternative ways (own revenues vs. common pool situations) in which decentralized governments finance their expenditures. Our results show that fiscal decentralization, more than government fragmentation, has the largest impact on corruption. More precisely, the reduction of common pool type of situations, by increasing the ability of sub-central government levels to self-finance their expenditures proves to be the most

effective restraining force on corrupt practices. These results turn out to be robust in all specifications of the model. We also find evidence that the virtuous role of fiscal decentralization in reducing corruption is strengthened if it is accompanied by a higher degree of government fragmentation at the lowest possible tier, i.e. that of municipalities. On the other hand, reducing common pool, while at the same time increasing the number of government levels, does not show any impact on corruption; this supports the hypothesis that more complex vertical organizations of the state worsen the citizens' ability to control public officials. These findings are interesting also in terms of policy implications, as they allow to identify the facets of decentralization that seem to be more effective in reducing corruption and improving the quality of governance.

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