CSEF

Centre for Studies in Economics and Finance

WORKING PAPER NO. 429

The Determinants of the Contract of Corruption: Theory and Evidence

Salvatore Capasso and Lodovico Santoro

February 2016

University of Naples Federico II **University of Salerno** **Bocconi University, Milan**

CSEF - Centre for Studies in Economics and Finance
DEPARTMENT OF ECONOMICS – UNIVERSITY OF NAPLES
80126 NAPLES - ITALY
Tel. and fax +39 081 675372 – e-mail: csef@unisa.it

CSEF
Centre for Studies in Economics and Finance

WORKING PAPER NO. 429

The Determinants of the Contract of Corruption: Theory and Evidence

Salvatore Capasso* **and Lodovico Santoro****

Abstract
This paper develops the notion that corruption is a contract between a public official and a private agent and that the features of this contract depend on the allocation of bargaining power between the parties. Active corruption thus occurs when the public official fixes the terms of the contract and is otherwise considered passive. Employing Italian data on various corruption-based regional-level crimes, the paper empirically reassesses the causes of corruption. A simple theoretical model highlights the differences between these two forms of corruption in terms of bribery and emphasizes the implications both for aggregate corruption and its measurement.

JEL classification: D73, H57

Keywords: active corruption, passive corruption, bargaining power,

* Institute for Studies on Mediterranean Societies (ISSM) - CNR and CSEF, Italy. Corresponding author: capasso@issm.cnr.it

** Institute for Research on Innovation and Services for Development (IRISS) - CNR, Italy

Table of contents

1. Introduction

Corruption is a major issue in both poor and wealthy countries. Indeed, empirical evidence shows that corruption is pervasive and deeply rooted in the vast majority of countries. Given that corruption can have significant detrimental effects on social welfare and economic growth, it is a significant source of concern. By distorting resource allocation, corruption may indeed cause serious inefficiencies in capital accumulation and lead to the emergence of poverty traps. Therefore, many economists have studied the phenomenon, but many questions remain open in spite of these efforts. What are the real causes of corruption? What are the main factors driving public officials to corruption? The evidence remains puzzling and a definitive and exhaustive answer to the above questions has not been revealed. Not surprisingly, it is even difficult to define corruption, given its multiple features and complex nature; similarly, it is also difficult to measure. Tanzi (1998) argued that corruption can be ingrained and deeply rooted in the social fabric to such a degree that it is extremely difficult to understand its real nature and to disentangle its determinants. Moreover, there is uncertainty regarding not only the direction of causality but also the nature of the interrelationship between corruption and other relevant socio-economic variables.

Since corruption mainly involves the public sector, economists have identified institutional factors as the main cause of bribery. In fact, although the electoral system, the degree of political competition, and the form of government are not direct causes of corruption, these are the frameworks within which policy decisions are made and that create opportunities for rent-seeking activities. Many empirical studies have highlighted the crucial role played by democracy in containing the spread of corruption[1]. For example, Persson et al. (2003) found the *proportional voting system* to be an institutional framework that spurs corruption: unlike a *majority voting system*, a lower degree of direct accountability might induce politicians into more opportunistic behavior. However, not all economists agree on this issue. Thus, Bardhan and Yang (2004) argue that excessive political competition that reduces the likelihood of re-election may increase incentives toward rent-seeking behavior.

The institutional framework is just one cause of corruption, as many countries with similar political-institutional systems experience different levels of public sector corruption. Social capital, social norms, the level of public wages and the degree of trust and compliance also play a crucial role in determining levels of corruption (Haque and Sahay 1996; Acemoglu and Verdier 2000; Van Rijckeghem and Weder 2001; Blackburn, Bose, and Emranul Haque 2006). For example, Putnam (1994) shows that regional governments are less effective in Italy in those places in which the measurements related to *civic virtues* are lower. Economic factors are also relevant. Glaeser *et al.* (2004) suggests that higher per capita income, higher educational levels and higher civic engagement should lead to less corruption due to greater aversion to illegal behavior and closer monitoring of public officials' activities.

Despite researchers' efforts, the literature has not managed to sufficiently highlight an important feature of corruption. Corruption is a *contract* through which a public official receives a payment in exchange for a favorable decision on a specific matter. In addition, as with every agreement, its outcome depends on the bargaining power of the parties involved. For example, if the public official has relatively greater power, the bribe tends to be higher and the benefits to the private agent lower, and the opposite occurs when the private agent has more bargaining power than the public official. These circumstances can

[1] See, among others, Paldam (2002).

lead to completely different contracts. The corollary is that corruption may strongly depend on the allocation of bargaining power and on the factors that affect such allocation. Given these premises, it might be argued that there may be at least two extreme forms of corruption. In the first, the bureaucrat has all the bargaining power and can set the level of the bribe and the main features of the unlawful exchange. We refer to this as *active corruption* because it is the bureaucrat who "demands" and sets the bribe. In the second, the private agent has all the bargaining power. We refer to the latter as *passive corruption* because the private agent sets the terms of the contract and proposes the bribe. Moreover, in some legal systems, such as in Italy, the legislator distinguishes between *concussione* (active corruption) and *corruzione* (passive corruption).

Whether corruption is active or passive depends on many factors, including the nature of the public goods, the size of the public contract, and the level of competitiveness in the market between firms and bureaucrats, among others.

Based on these premises, we delve deeper into the causes of corruption and attempt to explain the phenomenon as determined by factors influenced by the bargaining power between bureaucrats and private agents, among others. We believe that previous studies have missed important features of corruption and its determinants by not distinguishing between active and passive corruption and have yielded potentially misleading policy implications as a result.

To reinvestigate the causes of corruption by focusing on its *contractual nature*, we build a simple theoretical model that can help explain how some factors can affect total corruption through its components, i.e., active and passive corruption. We consider an economy in which bureaucrats are in charge of procuring two public goods with different technological contents. The level of technological content is a proxy for signaling the allocation of bargaining power: goods with higher technological content signal greater relative bargaining power in the hands of the firm supplying the goods (because fewer firms can supply these goods). This power structure implies that procuring this type of good involves more passive corruption because the firm can impose the terms of the contract on the bureaucrat. The opposite scenario results in the procurement of more standardized goods because active corruption predominates, i.e., the bureaucrat fixes the terms of the bribe. Hence, the total amount of the two public goods required to be purchased and the corresponding procurement contracts determine the equilibrium level of active and passive corruption in the economy – as well as the level of total corruption. Since the two contracts have specific features, a change in certain exogenous parameters (such as the opportunity cost of corruption for bureaucrats or the amount of rent seeking) asymmetrically affects active and passive corruption.

The model predicts that with a given allocation of bargaining power in the economy (i.e., a given amount of the two goods to be purchased), richer regions should exhibit lower levels of total corruption (active and passive). As the economy becomes richer and average wages increase, the model also predicts that corruption decreases only when a threshold level of income is crossed. Conversely, by increasing the possibility of rent seeking, the model indicates that an increase in the volume of government expenditure should positively affect both active and passive corruption. However, in both cases, the rate of change in active corruption should be greater than the rate of change in passive corruption.

Using Italian data on active and passive corruption (*concussione* and *corruzione*, respectively), we reinvestigate the determinants of corruption and aim to show that the new interpretation and measurement of corruption may help explain certain empirical puzzles. We perform regressions on a measurement of active and passive corruption, government expenditure identified through its *components* (healthcare, education, defense and welfare)

and as its *categories* (current and capital). The notion is that goods in sectors such as healthcare or defense have a higher technological specificity and the supply of these goods thus involves a higher level of passive corruption. If so, one should observe a greater impact on active corruption following an increase in government expenditures when this increase is connected to government expenditures in welfare or education (as opposed to increases in healthcare or defense). The results confirm this prediction and further reveal that an empirical analysis that considers corruption as an aggregate variable is limited.

As a robustness check, we consider the level of local public debt as a further indicator of the allocation of bargaining power in corruption. Higher debt should be associated with less bargaining power in the hands of bureaucrats and should thus lead to increases in passive as opposed to active corruption. The results confirm this intuition.

The paper is organized as follows. Section 2 presents a simple benchmark model of active and passive corruption. Section 3 presents the empirical estimates. Section 4 concludes.

2. A Simple Model

Let us consider an economy in which public goods must be procured. The government assigns public officials (bureaucrats) the task of procuring this good, which is produced in the market by a given number of firms. The interactions between bureaucrats and firms occur pursuant to contracts that might entail some form of corruption. Corruption, which is ultimately a component of the contract between the public official and the firm[2], results in a benefit accruing to the firm and a bribe accruing to the bureaucrat. As in any standard form of contract, the size of the benefit and bribe depends, among other factors, on the allocation of bargaining power among the parties. In other words, the greater the bargaining power of the bureaucrat, the larger the bribe. In addition – and symmetrically – the lower the bureaucrat's bargaining power, the lower the bribe (and the higher the firm's private benefit). To simplify the matter, we will consider two extreme cases. In the first case, bargaining power is (mainly) in the hands of the bureaucrat, which is equivalent to assuming that the bureaucrat can approach the firm and ask for a bribe. We label this case "active corruption" or concussion because the bureaucrat assumes an active role in the contract. In the second case, the bargaining power is in the hands of the firm; thus, it is the firm that can approach the bureaucrat and offer a bribe. We label this case "passive corruption" because the bureaucrat assumes a passive role in the contract. The two types of contracts lead to two different sets of results.

We will first design a contract that entails active corruption and then a contract that entails passive corruption.

2.1 A contract with Active Corruption

Several factors might explain why the bureaucrat holds bargaining power. For example, active corruption might emerge when a large number of firms supply the good, when the bureaucrat in charge of securing the public contract can act without much oversight or, finally, in the presence of a standardized good whose production does not involve special skills or specific technologies. To detect these conditions, we will assume that the government must supply two kinds of public goods, G_1 and G_2. The government

[2] It might be considered as a shadow contract in a formal contract of public procurement.

nominates z_1 bureaucrats to procure G_1, whose production does not require any specialized technology. A large number of firms, n, produce this good either for the government or for the private sector.

In procuring G_1, each bureaucrat shows a relatively higher bargaining power and has competence regarding a limited number of firms. By assuming that $z_1 < n$, each bureaucrat will approach $h = n / z_1$ firms.

Firms can produce the good for the market and obtain price q or they can supply this good to the government. By paying a bribe, b, firms can obtain a higher price, $\hat{q}$[3]. The higher price is due to a surcharge applied by the bureaucrat to the government. Therefore, the firm's expected profit is

$$u_F = \begin{cases} q & if\ b = 0 \\ \hat{q} - b & if\ b > 0 \end{cases} \tag{0}$$

The bureaucrat may (or may not) ask for a bribe. We let μ be the fraction of corrupt bureaucrats procuring good G_1. Each firm will accept the public contract only if the expected profit is no less than what it is possible to obtain by supplying goods to the market. Hence, the firm's participation constraint is

$$\hat{q} - b \geq q\ . \tag{0}$$

The latter implicitly defines the maximum bribe that each firm is willing to pay

$$b = \hat{q} - q\ . \tag{0}$$

A corrupt bureaucrat escapes prosecution and retains the wage w and the bribe with a probability of p. He gets caught with probability 1-p. If he is caught, the bureaucrat will not be paid any salary, and the bribe will be confiscated by the government[4]. In general, w can be considered to be a bureaucrat's opportunity costs of corruption, which includes not only the expected loss of salary but also the social stigma. Hence, recalling that each bureaucrat has competence that is equal to an equal number of firms, h, the expected utility of a bureaucrat is

$$u_B = \begin{cases} w & if\ b = 0 \\ p(w + hb) & if\ b > 0 \end{cases} \tag{0}$$

It is straightforward to verify that it is optimal to be corrupt if

$$p(w + hb) \geq w \tag{0}$$

which implies that a necessary condition for corruption to occur is

[3] We are assuming that production costs do not depend on whether the firm sells the good to the government or to the private sector. We also assume linearity in pricing and bribing and prices thus do not depend on the supply of public goods.

[4] We do not explicitly model a penalty for firms paying a bribe. The result would not be affected by a constant penalty.

$$b \geq \frac{(1-p)w}{ph}. \qquad (0)$$

The latter implicitly defines the minimum level of bribe below which there is no corruption:

$$\tilde{b} = \frac{(1-p)w}{ph}. \qquad (0)$$

Combining (0) and (0), the necessary condition for corruption to occur becomes

$$\frac{ph(\hat{q}-q)}{1-p} \geq w. \qquad (0)$$

The latter is the active corruption condition: $ph(\hat{q}-q)$ is the net return from corruption, and $w(1-p)$ represents the bureaucrat's expected opportunity cost. We assume that $\hat{q}$ is a decreasing function of the share of bureaucrats who are corrupt, μ, $\hat{q} = \hat{q}(\mu)$ and $\hat{q}'(\mu) < 0$. It can be argued that a fixed amount of resources is provided by the government to procure the good. As corruption can be financed with a price surcharge, as the number of corrupt bureaucrats increases, the amount of resources left over for rent seeking decreases.
If bargaining power is in the hands of the bureaucrats, the bureaucrat will appraise all the rent extracted from over-pricing, $\hat{q}-q$, and the firm's participation constraint, eq. (0), will be binding. Hence the optimal level of bribe will be

$$b^* = \hat{q} - q. \qquad (0)$$

The equilibrium value of active corruption

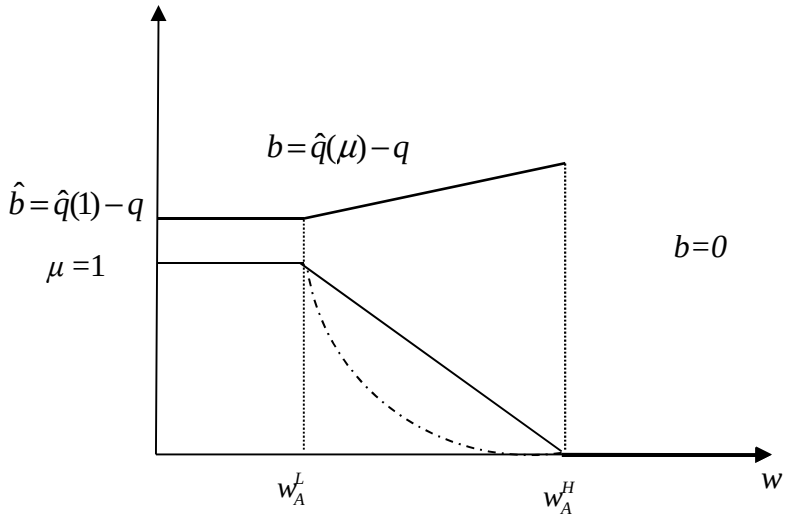
We now determine the aggregate level of active corruption. We measure corruption by the number of corrupt bureaucrats in the economy. Because punishment does not depend on how many firms the bureaucrat is accepting bribes from, a corrupt bureaucrat will request bribes from all the firms under his supervision. Whether or not it is optimal for a bureaucrat to be corrupt, as shown by eq. (0), crucially depends on the behavior of other bureaucrats. In fact, the higher price, $\hat{q} = \hat{q}(\mu)$, depends on the overall number of corrupt bureaucrats in the economy.
Let $\hat{q}(0) = \hat{q}_0$ and $\hat{q}(1) = \hat{q}_1$ with $\hat{q}_0 > \hat{q}_1$. By recalling that $\mu \in [0,1]$, $\hat{q}_1$ defines the minimum value of $\hat{q}$, and $\hat{q}_0$ defines the maximum value of $\hat{q}$. If this is the case, the equilibrium level of corruption is summarized in the following proposition:

Proposition 1:
Corruption is maximum, $\mu = 1$, i.e., all bureaucrats are corrupt and no one has incentive to deviate, if $\frac{ph(\hat{q}_1 - q)}{1-p} = w_A^L \geq w$.
Corruption is minimum, $\mu = 0$, i.e., all bureaucrats are not corrupt and no one has incentive to deviate if $\frac{ph(\hat{q}_0 - q)}{1-p} = w_A^H \leq w$.

Corruption is at an intermediate equilibrium level, $\mu = \mu^* \in]0,1[$, if $\frac{ph[\hat{q}(\mu^*) - q]}{1-p} = w$, where $w_A^H > w > w_A^L$.

The proof of the above proposition is as follows. Let us begin by assuming that all bureaucrats choose to be corrupt, i.e., $\mu = 1$. This implies that the level of overpricing is minimum, $\hat{q}(1) = \hat{q}_1$. Since by assumption, $\frac{ph(\hat{q}_1 - q)}{1-p} \geq w$, the condition to be corrupt, i.e., eq. (0), is always satisfied, and no bureaucrat is incentivized to deviate and not to be corrupt (recall q is decreasing in μ). Let us assume that no bureaucrat is corrupt, i.e., $\mu = 0$, which implies that the amount of overpricing that bureaucrats may impose on each contract is the maximum, $\hat{q}(0) = \hat{q}_0$

Fig. 1 - The equilibrium value of active corruption



Since by assumption, $\frac{ph(\hat{q}_0 - q)}{1-p} < w$, the condition to be corrupt, eq. (0), is not satisfied for each and every μ, and no bureaucrat is incentivized to deviate and become corrupt. Finally, let us suppose that $\hat{q}(1) = \hat{q}_1$ and $\hat{q}(0) = \hat{q}_0$ are such that $\frac{ph(\hat{q}_1 - q)}{1-p} < w < \frac{ph(\hat{q}_0 - q)}{1-p}$. If this is the case, when all bureaucrats choose to be corrupt and $\mu = 1$, then the condition to be corrupt would be violated, $\frac{ph(\hat{q}_1 - q)}{1-p} < w$, and bureaucrats would deviate and choose to be honest. Similarly, if all bureaucrats choose not to be corrupt and $\mu = 0$, then the condition to be corrupt would hold, i.e., $\frac{ph(\hat{q}_0 - q)}{1-p} > w$, and bureaucrats would deviate and choose to become corrupt. This scenario implies that neither total corruption, $\mu = 1$, nor complete honesty, $\mu = 0$, would be an equilibrium situation. However, we can establish the existence of an equilibrium in the following manner. Assume a level of corruption $\mu = \mu^* \in (0,1)$ such

that $\frac{ph[\hat{q}(\mu^*)-q]}{1-p}=w$; thus, the level of corruption is such that the pay-off obtained by choosing to be corrupt equates the pay-off obtained by not being corrupt, which implies that each bureaucrat will be indifferent and randomize the choice. At the aggregate level, the fraction of corrupt bureaucrats will be μ^*, and $\frac{ph[\hat{q}(\mu^*)-q]}{1-p}=w$ such that no bureaucrat is incentivized to deviate. The results from proposition 1 are represented in Fig. 1.

For low levels of bureaucrats' wage (opportunity cost), $w<w_A^L$, all bureaucrats are corrupt and the amount of active corruption in the economy is at its maximum, $\mu=1$. When this occurs, the level of bribe per bureaucrat is determined by eq. (0), $\hat{b}=b^*=\hat{q}_1-q$ .However, for high enough levels of bureaucrats' wage, $w>w_A^H$, there is no active corruption, $\mu=0$, and no bribing, $b=0$. For intermediate values of wage, $w_A^L<w<w_A^H$, aggregate corruption is a decreasing monotonic function of wage. Indeed, $\forall w\in(w_A^L,w_A^H)$, the fraction of corrupted bureaucrats is determined by $\frac{ph[\hat{q}(\mu^*)-q]}{1-p}=w$. Since $\hat{q}'(\mu)<0$, the latter simply requires that, as w increases, μ decreases. Clearly, the rate of change in μ depends on the shape of the $\hat{q}(\mu)$ function. In fig. 1, we depict μ as determined by assuming both a linear (bold section) and a concave $\hat{q}(\mu)$ (dotted section)[5]. The concave line implies aggregate decreasing returns to corruption. If one believes that wages act as a proxy for per capita income, this implies that richer economies should display lower levels of active corruption and that as countries become richer, the level of corruption decreases at a constant (bold section) or decreasing rate (dotted section).

In the interval $w_A^L<w<w_A^H$, the level of bribe per bureaucrat, $b=b^*=\hat{q}(\mu)-q$, increases monotonically, and it jumps discontinuously to $b=0$, when $w=w_A^H$. The intuition for this result is as follows. The rent that each bureaucrat can extract from bribery depends on the aggregate level of corruption. Equilibrium entails that each bureaucrat is indifferent between active corruption and honesty for a given wage, $\frac{ph[\hat{q}(\mu^*)-q]}{1-p}=w$. Of course, the higher the wage, the higher the expected cost of being detected. Hence, the higher the wage the higher the bribe should be, $b=b^*=\hat{q}(\mu)-q$, to keep bureaucrats indifferent. Since the total amount of corruption is $b\mu$, the model predicts that corruption measured by the size of bribe per bureaucrat is monotonically increasing in the interval $w_A^L<w<w_A^H$,: fewer bureaucrats ask for a bribe, although the size of the bribe is larger and larger.

2.2 A contract with Passive Corruption

The government assigns z_2 bureaucrats the task of procuring public good G_2. The production of G_2 requires specialized technologies and only a limited number $m<n$ firms can supply this good. These assumptions attempt to capture the notion that the contract to procure good G_2 entails a shift in the bargaining power from bureaucrats to firms. The firm may ask the bureaucrat to be granted some benefit in exchange for a bribe.

[5] The concave line implies aggregate decreasing returns to corruption as w increases. Since the concavity of the $q(.)$ function does not alter the interpretation of the results, henceforth we will simply assume linearity.

The market price of good G_2 is Q. In supplying G_2 to the government through bribery, firms can obtain $\hat{Q} > Q$. However, we assume that the bribing activity involves some lobbying costs. The lobbying cost is an increasing and convex function of the fraction of the firms actively lobbying[6]. We assume that these costs directly reduce firms rent extraction: $\hat{Q} = \hat{Q}(\alpha)$ and $\hat{Q}'(\alpha) < 0$, where $\alpha \in [0,1]$ is the fraction of firms lobbying. Each firm can contact one bureaucrat, and the expected profit of a firm is

$$u_F = \begin{cases} Q & if\ b = 0 \\ \hat{Q} - b & if\ b > 0 \end{cases} \tag{0}$$

By virtue of their required specialization, we assume that bureaucrats in charge of procuring goods G_2 obtain a higher wage, $w_2 = \rho w$, where $\rho > 1$. A corrupt bureaucrat (passive corruption) will obtain the bribe b along with a wage. The corrupt bureaucrat will not be detected with probability p, and the bureaucrat is detected with probability $1\text{-}p$. In the latter case, a corrupt bureaucrat will have confiscated both the bribe and the wage.
Hence, the expected utility of a bureaucrat is

$$u_B = \begin{cases} \rho w & if\ b = 0 \\ p(\rho w + b) & if\ b > 0 \end{cases} \tag{0}$$

The bureaucrat is willing to accept a bribe if $p(\rho w + b) \geq \rho w$ and hence if

$$b \geq (1-p)\rho w. \tag{0}$$

The latter implicitly determines the minimum bribe a bureaucrats is willing to accept,

$$b = (1-p)\rho w. \tag{0}$$

Since the firm has all the bargaining power, it will extract all the surplus, and the bribe will be set to the minimum. Hence, $b = (1-p)w$ is also the optimal level of the bribe.

The equilibrium value of passive corruption

Each firm decides to engage in lobbying and bribing only if the expected profit is sufficiently high. In other words, a firm will bribe only if

$$\hat{Q}(\alpha) - (1-p)\rho w \geq Q \tag{0}$$

The latter clearly states that whether it is optimal to bribe depends on the number of firms engaged in lobbying and bribing, among other things.

[6] Participation in public tenders typically requires firms to meet specific requirements to be shortlisted. These costs refer to the time and the resources involved in the activity with the specific aim of entering onto such shortlists. Hence, these lobbying costs do not strictly coincide with the bribe but are costs connected with building the right political and social connections.

Let us define $\hat{Q}_0 = \hat{Q}(1)$ as the minimum value of extra pricing (minimum rent extraction) corresponding to the highest lobbying costs (all firm are lobbying). In addition, let us define $\hat{Q}_0 = \hat{Q}(0) > \hat{Q}(\alpha) \forall \alpha \in [0,1]$ as the maximum value of extra pricing, which is the level of lobbying cost when there are no firms engaged in lobbying. Given eq. (0), the equilibrium level of passive corruption is summarized by the following proposition:

Proposition 2:

Passive corruption is at its maximum, $\alpha = 1$, i.e., all bureaucrats are corrupt and no one has the incentive to deviate, when $\frac{\hat{Q}_1 - Q}{\rho(1-p)} = w_P^L \geq w$.

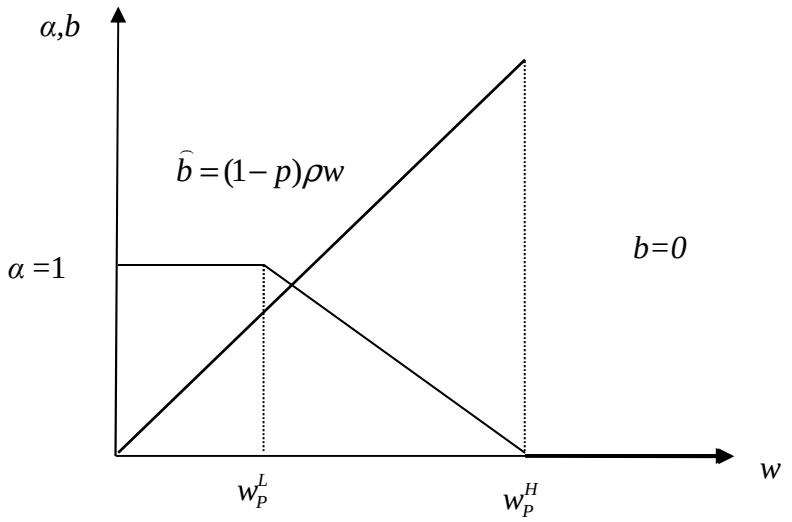
Passive corruption is at its minimum, $\alpha = 0$, i.e., all bureaucrats are not corrupt and no one has the incentive to deviate, when $\frac{\hat{Q}_0 - Q}{\rho(1-p)} = w_P^H \leq w$.

Corruption is at an intermediate equilibrium level, $\alpha = \alpha^* \in [0,1]$, when $\frac{\hat{Q}(\alpha^*) - Q}{\rho(1-p)} = w$ if $w_P^L < w < w_P^H$.

The proof of Proposition 2 follows similar arguments as the proof of Proposition 1. Let us start by assuming that all firms choose to bribe bureaucrats, i.e., $\alpha = 1$. As a consequence, lobbying costs are at their maximum, $\hat{Q}(1) = \hat{Q}_1$. At this level of lobbying cost, $\frac{\hat{Q}_1 - Q}{\rho(1-p)} \geq w$, no firm has reason to deviate. Hence, bribing is a consistent optimal choice for all firms, and $\alpha = 1$ is an equilibrium. Conversely, let us assume that passive corruption is zero and no firm is bribing, i.e., $\alpha = 0$, which entails that lobbying costs are at their minimum, $\hat{Q}(0) = \hat{Q}_0$. In this case, if the wage is high enough and $\frac{\hat{Q}_0 - Q}{\rho(1-p)} < w$, no firm has reason to deviate, which suggests that $\alpha = 0$ is also an equilibrium. Finally, let us assume that the wage rate is such that $\frac{\hat{Q}_1 - Q}{\rho(1-p)} < w < \frac{\hat{Q}_0 - Q}{\rho(1-p)}$. Then, if all firms choose to bribe and $\alpha = 1$, the condition that bribing is optimal would be violated, $\frac{\hat{Q}_1 - Q}{\rho(1-p)} < w$. As a result, firms would find it optimal to deviate and choose not to bribe. For similar reasons, if all firms choose not to bribe and $\alpha = 0$, then eq. (0) would hold, $\frac{\hat{Q}_0 - Q}{\rho(1-p)} > w$, which implies that firms deviate and choose to bribe bureaucrats. Hence, neither $\alpha = 1$ nor the absence of passive corruption, $\alpha = 0$, are an equilibrium. However, an equilibrium does exist for the level of corruption, $\alpha = \alpha^* \in [0,1]$, such that $\frac{\hat{Q}(\alpha^*) - Q}{\rho(1-p)} = w$. In fact, when this occurs the lobbying costs are such that the pay-off obtained by choosing to bribe is equal to the pay-off from not bribing, which implies that each firm will randomize the choice and that α^* will be such that (0) holds with equality and that no firm has reason to deviate. The results in proposition 2 are represented in Fig. 2.

For low wage levels, $w < w_P^L$, the bribe as determined by eq. (0) is so low that whatever is the cost of lobbying, all firms find it optimal to bribe, $\alpha = 1$. Passive corruption measured by the number of firms choosing to bribe is at its maximum, and the bribe size is increasing in the wage rate, $\hat{b} = (1-p)w$. The extra profit that each firm can obtain by bribing, $\hat{Q}_1 - Q$, is constant and low but remains high enough to render bribing optimal, $\hat{Q}_1 - Q \geq \rho w(1-p)$. Once the wage rate crosses the threshold level $w > w_P^L$, the level of bribe required to induce bureaucrats into corruption increases to the extent that some of the firms, $1-\alpha^*$, will begin to find it optimal not to bribe. The extra profit each firm can obtain by bribing, $\hat{Q}(\alpha^*) - Q$, is increasing with the wage rate as more and more firms chose not to bribe, $\hat{Q}(\alpha^*) - Q = \rho w(1-p)$. For a high enough wage, $w > w_P^H$, the bribing cost is high enough that no firm will attempt to bribe the bureaucrat. In this case, passive corruption in the economy is zero, $\alpha = 0$, and the bribe is thus $b = 0$. The extra profit each firm can obtain by bribing, $\hat{Q}_0 - Q$, is constant and maximum, but the wage rate remains so high that it is not optimal to induce the bureaucrat into corrupt behavior, $\hat{Q}_0 - Q < \rho w(1-p)$.

Fig. 2 - The equilibrium value of passive corruption



2.3 The equilibrium level of Corruption

The provision of public goods G_1 and G_2 involves the emergence of active and passive corruption, respectively. An external observer who does not distinguish between the two will observe an aggregate level of corruption in the economy that is, in fact, the result of the combination of the two types of corruption. How these types of corruption combine and how large "aggregate" corruption is depends on the threshold levels of w and, hence, on all the relevant parameters entering eq. (0) and (0). Hence, the interrelationship between w_A^L, w_A^H, w_P^L, w_P^H ultimately determines the corruption mixture in the economy. To obtain a manageable model that predicts the effects of the relevant variables on the two different forms of corruption, we assume an explicit linear function for $\hat{q} = \hat{q}(\mu)$ and $\hat{Q} = \hat{Q}(\alpha)$. Moreover, as the latter represent the overprice on G_1 and G_2, we assume that

$$\hat{q}(\mu) = (\beta - \mu)\gamma q, \tag{0}$$

and

$$\hat{Q}(\alpha) = (\beta - \alpha)\gamma Q \tag{0}$$

where $\beta > 1$ and $\gamma > 1$. The parameter γ provides a measure of the rent extraction: all other things equal, a higher level of γ implies that either the bureaucrat or the firm can obtain a larger payoff. This typically occurs when the volume of government expenditure increases, for example. Moreover, to increase the degree of comparability between the contracts involving active corruption and passive corruption, we take the market price of good G_2 to be a proportion of the price of G_1, i.e., $Q = \varphi q$ with $\varphi > 1$. Since the production good G_2 entails a higher level of specialization, it is reasonable to assume that this good has a higher market price than good G_1, whose price is now the numeraire. Substituting eq. (0) and (0) in eq. (0) and (0) yields an explicit expression for μ and α:

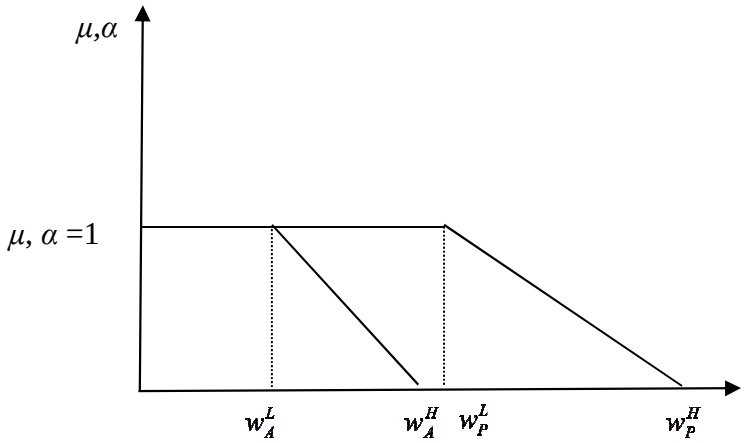
$$\begin{gathered} \mu = 1 \ \forall w < \frac{ph[(\beta-1)\gamma - 1]q}{1-p} := w_A^L; \ \mu = 0 \ \forall w > \frac{ph(\beta\gamma - 1)q}{1-p} := w_A^H \\ \mu = \beta - \frac{1}{\gamma}\left[1 + \frac{w}{phq}(1-p)\right] \ \forall w_A^L \le w \le w_A^H \end{gathered} \tag{0}$$

and

$$\begin{gathered} \alpha = 1 \ \forall w < \frac{[(\beta-1)\gamma - 1]\varphi q}{(1-p)\rho} := w_P^L; \ \mu = 0 \ \forall w > \frac{(\beta\gamma - 1)\varphi q}{(1-p)\rho} := w_P^H \\ \alpha = \beta - \frac{1}{\gamma}\left[1 + \frac{w}{\varphi q}\rho(1-p)\right] \ \forall w_A^L \le w \le w_A^H \end{gathered} \tag{0}$$

It is straightforward to verify that a sufficiently high price for good G_2, i.e., $\varphi / \rho > ph$, will ensure that $w_A^L < w_P^L$ and $w_A^H < w_P^H$. In this case, the level of active (μ) and passive (α) corruption will be determined by a two-step linear function as depicted in Fig. 3. For each level of the bureaucrat's wage, total corruption in the economy is determined by $\mu z_1 + \alpha n$ (total number of corrupt bureaucrats applying active corruption and total number of corrupt firms engaged in passive corruption). For low enough w, $w < w_A^L$, corruption is at its maximum, and a change in w does not affect corruption. If $w_A^L < w < w_P^L$, a further increase in w influences active but not passive corruption. Only when w is sufficiently high, $w_P^L < w < w_A^H$, will an increase in w reduce both active and passive corruption. Intuitively, both active and passive corruption disappear only when w is very high, $w_P^H < w$. Recalling that w is a measure of the bureaucrat's opportunity cost and thus reflects GDP per capita and labour market conditions, the model predicts that both active and passive corruption depend negatively on average income but only within a threshold level. More interestingly, it is simple to prove that all things equal, an increase in the rent extraction, γ, will marginally increase more active than passive corruption, i.e., $\partial\mu / \partial\gamma > \partial\alpha / \partial\gamma$.

Fig. 3 – Active and passive corruption



3. The Evidence

3.1 Estimation strategy and methodology

We now reassess the evidence regarding the determinants of corruption. The main objective is to show that the factors identified in the literature as the main determinants of corruption do not fully describe the dynamics of the phenomenon and may influence corruption differently than predicted. This claim rests on the notion that corruption is not a homogeneous variable but is instead a multifaceted phenomenon in which some major features depend on the allocation of bargaining power in the bribery contract. Considering that the contract undergirding corruption may essentially consist of two forms, we distinguish between active and passive corruption and test whether these two types of corruption have different determinants. Following this theory, we expect that an increase in the degree of rent seeking (γ in the theoretical model) marginally affects active corruption more than passive corruption. A first measure of the degree of rent seeking is measured using the categories of government expenditures and their volume because an increase in government expenditure alone signals an increase in the volume of resources that might be diverted toward corruption. Mauro (1998) identified that corruption had differential effects on government spending, depending on which component and which category was considered. Therefore, we focus on the volume of government expenditure and on government expenditure categories to verify the relevance of distinguishing between active and passive corruption. We distinguish the *components of government expenditure* (healthcare, education, defense and welfare) from the *categories of government expenditure* (current and capital).

We also expect that the effects of rent seeking on active corruption should be greater for those components of government expenditure that presumably involve more bargaining power for the bureaucrats, such as welfare expenditures that do not involve the supply of specialized goods. The opposite should occur for expenditures in healthcare or defense – sectors characterized by a prevalence of goods with high-technology content. Again, the premise is that fewer firms can supply these types of goods because producing them requires more specialization and knowledge. This concept further implies that

bureaucrats who must purchase these goods have fewer suppliers and less bargaining power. Conversely, it might also be presumed that bureaucrats in charge of procuring more standardized goods – whose supply can come from multiple firms – have more bargaining power. This implies that the process of procuring these goods can foster active corruption more than passive corruption.

The empirical strategy is as follows. We employ two different econometric specifications in which we regress active and passive corruption in turn, along a set of other control variables, on government expenditure and local government debt. We note that the Italian judicial system explicitly differentiates between *concussione* (active corruption) and *corruzione* (passive corruption). More specifically, we specify an *Autoregressive Distributed Lag* (ADL) model of the following type

$$Y_{jt} = \beta_0 + \sum_{i=1}^{n} \beta_i Y_{jt-1} + \sum_{i=1}^{m} d_i X_{jt-1} + f_i + u_{jt}, \qquad (0)$$

where j and t refer, respectively to the twenty Italian regions 1991-2010 timeframe[7]; f_i are region-specific unobserved effects; u_{jt} is the error term; and the dependent variable $\boldsymbol{Y_{ij}}$ is given, alternatively, by active, passive corruption and total corruption (an aggregate of the two).

This specification is well suited to describe processes of variables whose actual values strongly depend on their own past values (Del Monte and Papagni 2007). We employ an ADL (1,1) because, in our case, the one-period lag for the dependent variable best describes the persistence of corruption through time. We also employ a one-year lag for the independent variables because the data refer to crimes that have typically been reported to the judicial authority a year after they have occurred.

No large systematic differences among Italian regions regarding the relationship between reported corruption offenses and those that actually occurred should be expected. Indeed, we find that judicial data on reported corruption crimes and the index of perceived corruption (10-CPI) display similar trends (see figure 4 in Appendix).

$\boldsymbol{X}$ is a vector of explanatory variables, which includes measures of government expenditures (first specification) and local government debt (second specification), and a constant set of control variables that the literature typically identifies as the determinants of corruption. Following the literature, other control variables include some measures of social capital, economic development, political competition, educational level and the degree of Mafia infiltration into the public sector. We also include in all regressions a calendar year dummy to take into account time-specific effects, such as the Italian anti-corruption campaign known as *Mani Pulite* (Clean Hands), which was conducted in the early 90s. In fact, this judicial campaign might have directly influenced corruption as well as the propensity to report crimes.

To capture the effects of *social norms* on corruption we include the percentage of *Absenteeism* in national elections and the percentage of *Volunteering* among the regressors. To control for the level of economic development, we use a measure of *Economic backwardness* given by the share of agriculture in the total GDP. As an alternative measure, we also use *real per capita GDP (2005=100)*.

We also include in the regressions an index of *Political competition*. Political competition, in fact, is considered a major determinant of corruption. We measure political competition through a *normalized Herfindahl-Hirshman Index* (HHI*) that considers both the number of

[7]The second specification only is based on data from 1998 to 2010.

parties and the percentage of votes obtained by each at a regional level, i.e., in the elections for the Senate[8]. Following the literature, we include among the regressors a measure for education.

Furthermore, we control for the presence of criminal organizations in the public system by considering the *number of city council dismissals due to Mafia infiltration*[9]. In fact, the amount of contact between Mafia organizations and governments, both at the central and local levels, may affect the nature of corruption. The presence of Mafia and criminal organizations can distort the determinants of active and passive corruption. However, it is notable that where the Mafia is strong, the incidence of active bribery might, in fact, be lower because the bureaucrat cannot dictate the "rules of the game".

In the second specification, we include among the regressors another proxy for the amount of rent seeking and for the allocation of bargaining power: *local government debt*. The notion here is that, all things equal, the larger the local government debt, the lower the public administration's reliability will be in terms of payments and – concurrently – the lower that bureaucrats' bargaining power will be. Hence, greater local government debt, which spurs corruption, should be associated with a larger impact on passive corruption.

To control for possible endogeneity and to take care of heteroskedasticity and autocorrelation problems, we employ dynamic panel estimation. More specifically, we use a system-generalized method of moments (GMM) estimator, an approach developed by Blundell and Bond (1998) and outlined in Arellano and Bover (1995). We test the validity of the instruments by applying two specification tests. First, we use the Hansen (1982) J-test of over-identifying restrictions to examine exogeneity in the instruments. The second test is the Arellano and Bond (1991) test for serial correlation of the disturbances up to the second order.

3.2 Data description

We use a panel of twenty Italian regions over the 1991-2010 period. The judicial data on corruption-related offenses are provided by the Italian National Institute of Statistics (Istat) and have been widely used in many empirical studies (Del Monte and Papagni 2007; Acconcia and Cantabene 2008; Fiorino and Galli 2010; Alfano, Baraldi, and Cantabene 2012). The Italian judicial system provides distinct data for *Concussione* (active corruption) (article 317 of the Italian Penal Code) and *Corruzione* (passive corruption) (an aggregate of articles 318-320 of the Italian Penal Code)[10]. In our estimates, we employ the total number of crimes reported in a given year for *Concussione* and *Corruzione* offenses per 100,000 inhabitants. This study is the first to use these data. In fact, until now, empirical studies on Italian corruption have focused on an aggregate index of public misuse that includes other crimes against the public administration, in addition to those crimes designated as *Concussione* and *Corruzione*.

Data on government spending are provided by the Department of the General Accounting of the State of the Ministry of Economics and Finance and are measured as a percentage of regional GDP. In fact, measuring government spending per capita may cause some distortions due to differences in population density. Indeed, the minimum

[8] More details on the methodology for calculating the normalized index will be provided hereinafter.

[9] The main criminal organizations recognized as "Mafia" in Italy are: *Camorra*, *'Ndrangheta*, *Sacra Corona Unita* and *Mafia*.

[10] These different types of crimes are well suited to our assumptions. In fact, the legal provisions in article 317 clearly state that the bureaucrat is punished because he is forcing or inducing somebody to pay a bribe. Conversely, the language of articles 318-320 posits that the bureaucrat is punished only for receiving a bribe.

infrastructure provisions (roads, hospitals, schools, etc.) necessary in a region with low population density leads to overestimations in the amount of public spending per capita. We also employ local public debt (estimated using data provided by the Bank of Italy) as a percentage of regional GDP. The database, the Historical Archive of Elections (Ministry of the Interior - Department for Internal and Territorial Affairs) – the Senate of the Republic regional supply data for parliamentary polls, is employed to calculate absenteeism and political competition among Italian political parties. Political competition is calculated by the normalized Herfindahl-Hirschman Index (HHI *). In formal terms:

$$HHI^{*} = \frac{HHI - \frac{1}{n}}{1 - \frac{1}{n}} \tag{0}$$

where $HHI = \sum_{i=1}^{n} v_i^2$ is the Herfindahl-Hirshman index with v representing the share of votes, expressed as a percentage, that each political party has obtained out of the total valid number votes, and n is the number of political parties in a given poll. This normalized index varies between 0 (perfect political competition with n parties of equal size) and 1 (total absence of political competition). Table 1 in the Appendix contains the summary statistics for all the variables.

3.3 The estimation results

By following the literature on the issue, we first test the strength of the relationship between total corruption and the variables that are generally and theoretically predicted to be its main determinants. The results are presented in table 2 in the Appendix. Apart from being strongly autocorrelated, no other variable appears to influence total corruption (columns 1 and 2). Total government expenditure, in fact, exhibits no significant coefficients. Similarly, the categories of current and capital government expenditure do not significantly affect total corruption. The results do not change substantially if we keep all the regressors and divide the dependent variable, i.e., total corruption, into active corruption and passive corruption (columns 3 to 6 in table 2 of the Appendix). Neither total government expenditure nor the current and investment categories appear to significantly affect either active or passive corruption. In the first instance, these results may be interpreted as revealing the absence of the effects of government expenditure on corruption. However, as argued above, the absence of interrelationship might hide more complex interconnections between the inner categories of government expenditure and the different forms of corruption. Indeed, conflicting effects on active and passive corruption might cancel one another to yield a null or relatively small effect on total corruption. To verify this hypothesis, we run similar regressions on measures of active and passive corruption by including among the regressors the components of government expenditure: education, welfare, defense and healthcare. We also distinguish and include current and capital expenditure for each component of government expenditure.

To better understand our empirical analysis, we emphasize that the share of passive corruption in total corruption is not negligible. Fig. 5 in the Appendix reports the yearly average size of active and passive corruption in Italy over the 1991-2010 period. The diagram shows that there is not much difference in the sizes of active and passive corruption over the entire period. If active was greater than passive corruption in the 90s, in the next decade passive corruption grew at a higher rate (see Fig. 5 in Appendix) to

overcome active corruption. In addition, the regional distribution of active and passive corruption does not show large differences in the relative share of these in total corruption (see Fig 6 in the Appendix). Apart from Molise and Basilicata, in which the share of active corruption in total corruption is reasonably higher, the size of active corruption is almost equal to the size of passive corruption in all other regions. This description of the data should imply that the "size effect" plays a negligible role in our estimations.

Table 3 in the Appendix contains the result for education spending. The estimation shows that total expenditure in education positively and significantly affects total corruption (column 1), but this effect can be explained almost entirely by the positive impact on active corruption because expenditure in education has no significant effects on passive corruption (column 5 and 6). Moreover, it is notable that these effects derive from the current part of government expenditure in education rather than from the share of investment spending.

These results are consistent with our notion that an increase in government spending involving goods with relatively low technology content and goods or services whose supply is not restricted to a few specialized firms would have a greater effect on active corruption than on passive corruption. It is useful to recall that this scenario results because the contract involving the procurement of these types of goods entails a larger allocation of bargaining power in the hands of bureaucrats and hence yields contracts involving more active corruption.

Similar arguments can also apply to the procurement of goods and services in the welfare sector. Indeed, the regressions of total government welfare expenditure on corruption show that this measure has a positive significant effect on total corruption, which again derives mainly from a significant and positive effect on active corruption (Table 4 columns 1 and 3). These results resemble the previous results for the estimates including education. Nonetheless, current expenditure in welfare leads to an increase in both active corruption (column 6) and passive corruption (column 8). However, the effect of current welfare expenditure on active corruption is much larger: the coefficient estimates for active corruption (column 4) are almost double those for passive corruption (column 6). Investments in welfare have a positive but not significant effect on both active (column 4) and passive corruption (column 6), but the effect on active corruption is double the effect on passive corruption.

Similar arguments, but with opposite conclusions, would suggest that increased government expenditure in healthcare and defense would have less of an effect on active corruption. These goods and services, in fact, should reflect a higher technological content and fewer supplying firms. The results of the estimation only in part confirm this prediction.

Table 5 shows the results of the estimations including government expenditure on healthcare. In fact, this type of expenditure has a positive and significant effect only on active corruption (columns 3 and 4). However, the estimated coefficient is smallest between education expenditure and welfare expenditure. In this respect, it is notable that the size of the coefficient on government expenditure appears to decrease with the presumable technological content of goods and services: the coefficient on welfare expenditure is higher than that on education, which in turn has a higher coefficient than expenditure on healthcare. However, most notably, investment in healthcare negatively and significantly affects total corruption (column 2). which is presumably also why the total effect of healthcare expenditure on total corruption is not significant.

Surprisingly, government expenditure for defense does not display any effect on corruption – or on either active or passive corruption (Table 6 in the Appendix). These

results can be explained by the fact that government expenditure for defense is mainly determined at the national level, whereas our estimations involve regional data.

We finally test the effect of local government debt on corruption. The notion is that a higher level of local government debt, all else equal, should indicate that bureaucrats have less bargaining power. This implies that a higher level of debt – although spurring overall corruption by increasing the volume of rent seeking – should affect relatively more passive corruption. Indeed, the results confirm these arguments (Table 6 in the Appendix).

4. Conclusions

Corruption is a complex and multifaceted phenomenon. This study reexamines the inner nature of corruption and studies the emergence of the bribery contract between a public official and a private agent seeking an illicit favor. The paper focuses on the notion that corruption is ultimately identifiable as either active or passive and that the emergence of one or the other depends on the allocation of bargaining power. Furthermore, this study shows that active and passive corruption undergo asymmetric variations (instead of being influenced homogenously by changes in external factors), implying that what the literature has posited as the main determinant of corruption affects active and passive corruption differently and may have uncertain effects on total corruption.

This study has also implications for policy makers. Understanding the spheres of government intervention in terms of whether active or passive corruption prevails can help the policy maker to plan and implement more effective anti-corruption policies.

The empirical analysis confirms that the magnitude and the signs of the effects of factors influencing corruption differ for active and passive corruption. Active corruption appears to be more reasonably related to government expenditures on goods and services in sectors such as welfare and education because these sectors involve the exchange of goods in more competitive markets, which is not a good news for at least two reasons.

First, active corruption (*concussione)* may negatively affect firms' productivity more than passive corruption, as it acts as a tax on profit, whereas *corruzione* acts as extortion. In Italy, the problems related to active corruption are particularly severe due to the large population of small and medium-sized firms, which might also provide a novel explanation for the unusually high level of corruption in Italy, one of the richest countries plagued by a high level of corruption. According to the latest estimates of *Corte dei Conti* (Court of Auditors), corruption in Italy annually accounts for the equivalent of a hidden tax of 60 billion euro. In addition to these estimates, the Court highlights that corruptive practices likely represent the main reason for the infrastructural gap between Italy and other countries that spend the same resources on infrastructure.

Second, a distortion in these functional components of government expenditures may have long-run effects. For instance, public spending in education affects human capital accumulation and ultimately economic growth. Similarly, by distorting public expenditure in welfare and healthcare, corruption may threaten socio-economic stability and reduce growth potential.

References

Acconcia, Antonio, and Claudia Cantabene. 2008. "A Big Push To Deter Corruption: Evidence from Italy." *Giornale Degli Economisti* 67 (1): 75–102.

Acemoglu, Daron, and Thierry Verdier. 2000. "The Choice between Market Failures and Corruption." *American Economic Review* 90 (1): 194–211.

Alfano, M.R., Laura Baraldi, and Claudia Cantabene. 2012. "Political Competition, Electoral System and Corruption: The Italian Case." *MPRA Paper 41480, University Library of Munich, Germany.*, no. 41480.

Arellano, Manuel, and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *The Review of Economic Studies* 58 (2): 277–97.

Arellano, Manuel, and Olympia Bover. 1995. "Another Look at the Instrumental Variable Estimation of Error-Components Models." *Journal of Econometrics* 68 (1): 29–51.

Bardhan, Pranab, and Tsung-Tao Yang. 2004. "Political Competition in Economic Perspective." *Department of Economics, UCB*.

Blackburn, Keith, Niloy Bose, and M. Emranul Haque. 2006. "The Incidence and Persistence of Corruption in Economic Development." *Journal of Economic Dynamics and Control* 30 (12): 2447–67.

Blundell, Richard, and Stephen Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87 (1). Elsevier: 115–43.

Del Monte, Alfredo, and Erasmo Papagni. 2007. "The Determinants of Corruption in Italy: Regional Panel Data Analysis." *European Journal of Political Economy* 23 (2): 379–96.

Fiorino, Nadia, and Emma Galli. 2010. "An Analysis of the Determinants of Corruption: Evidence from the Italian Regions." *POLIS Working Papers*. Institute of Public Policy and Public Choice-POLIS.

Glaeser, E. L., R. La-Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth* 9: 271–303.

Hansen, Lars Peter. 1982. "Large Sample Properties of Generalized Method of Moments Estimators." *Econometrica* 50 (4): 1029–54.

Haque, Nadeem Ul, and Ratna Sahay. 1996. "Do Government Wage Cuts Close Budget Deficits? Costs of Corruption." *Staff Papers-International Monetary Fund*. JSTOR.

Mauro, Paolo. 1998. "Corruption and the Composition of Government Expenditure." *Journal of Public Economics* 69 (2): 263–79.

Paldam, Martin. 2002. "The Cross-Country Pattern of Corruption: Economics, Culture and the Seesaw Dynamics." *European Journal of Political Economy* 18 (2): 215–40.

Persson, Torsten, Guido Tabellini, and Francesco Trebbi. 2003. "Electoral Rules and Corruption." *Journal of the European Economic Association* 1 (4). Wiley Online Library: 958–89.

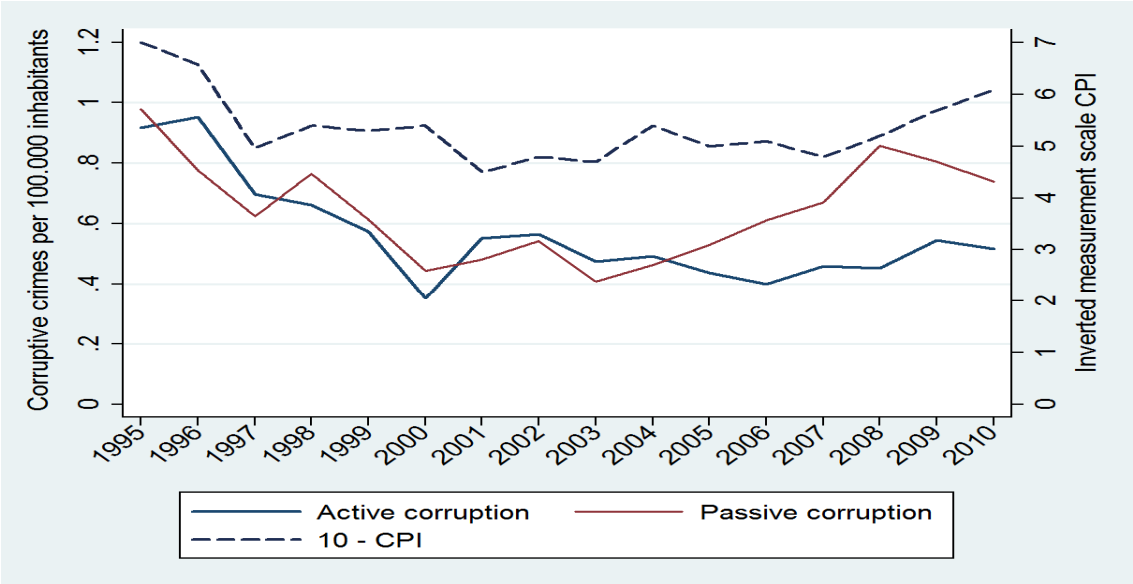
Putnam, Robert D, Robert Leonardi, and Raffaella Y Nanetti. 1994. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton university press.

Tanzi, Vito. 1998. "Corruption Around the World: Causes, Consequences, Scope, and Cures." *International Monetary Fund* 45 (4): 559–94.

Van Rijckeghem, Caroline, and Beatrice Weder. 2001. "Bureaucratic Corruption and the Rate of Temptation: Do Wages in the Civil Service Affect Corruption, and by How Much?" *Journal of Development Economics* 65 (2): 307–31.

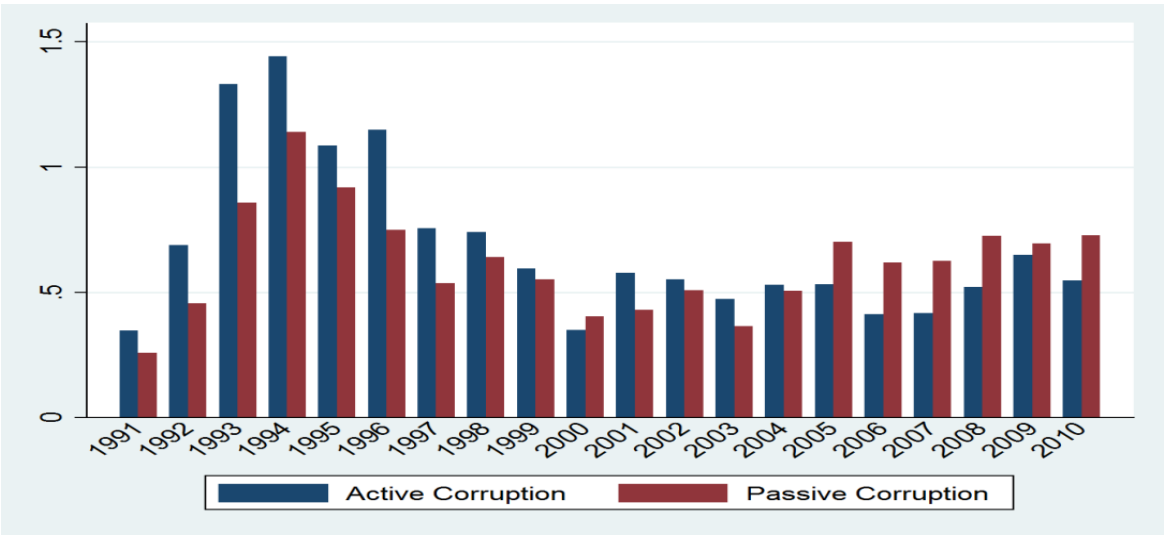
Appendix

Fig. 4 - *Corruptive crimes reported and Corruption Perception Index (CPI) in Italy*



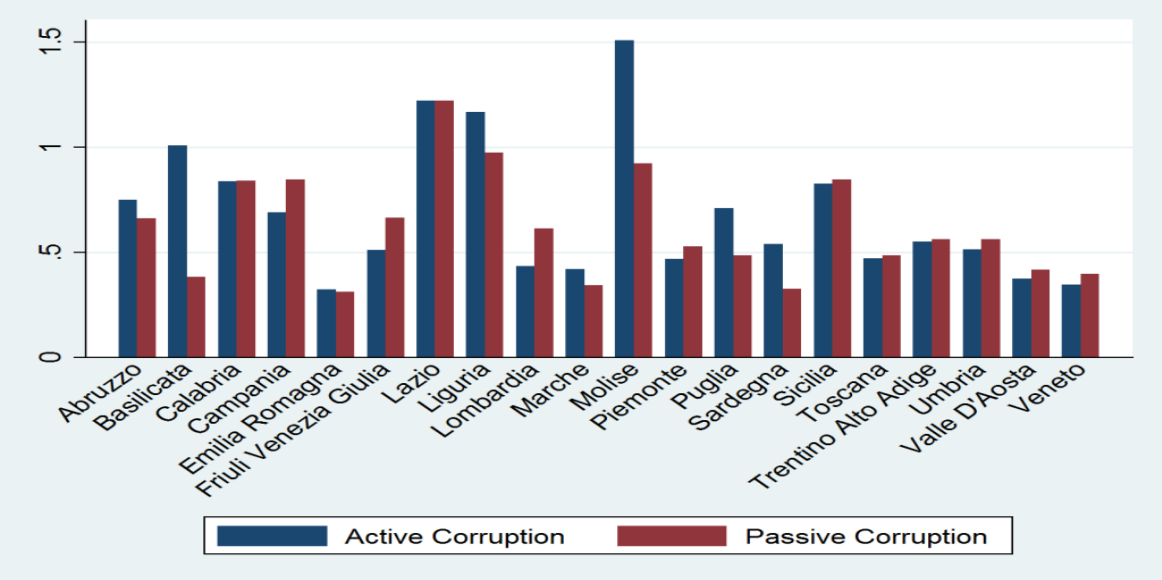
Source: elaboration of authors on ISTAT data related to corruptive crimes reported per 100,000 inhabitants(Annals of Judicial Statistics) andTransparency International data (CPI).

Fig. 5 - *Active corruption and Passive corruption in Italy (average by year)*



Source: elaboration of authors using ISTAT data related to corruptive crimes reported per 100,000 inhabitants (Annals of Judicial Statistics)

Fig. 6 - *Active corruption and Passive corruption in Italian regions (average by region)*



Source: elaboration of authors using ISTAT data related to corruptive crimes reported per 100,000 inhabitants (Annals of Judicial Statistics)

Table 1 - Summary statistics

Variables	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total corruption	400	1.032482	0.9560453	0	10.92194
Active corruption	400	0.684948	0.622134	0	6.773549
Passive corruption	400	0.621155	0.4850033	0	3.432828
Dissolution to Mafia	400	0.013304	0.0434378	0	0.398136
Political Competition HHI*	400	0.19798	0.0727353	0.058821	0.340736
Schooling	400	87.29775	9.805189	59.6	105.2
Absenteeism	400	18.189	6.378088	4.45	33.75
Volunteering	300	11.16216	4.780097	4.421409	27.69608
Economic backwardness	400	3.069875	1.492689	0.8670278	7.932573
General gov. exp.	400	24.01383	11.64738	8.086295	85.73438
General Current gov. exp.	400	20.86287	7.78945	7.93309	46.77987
General Public investment	400	3.150954	6.902737	0.0852289	54.6902
Total exp. education	400	3.307042	1.622646	0.0437193	7.823878
Current exp. education	400	3.240321	1.594652	0.0082536	7.613431
Publ. inv. education	400	0.066722	0.0617483	0	0.404266
Total exp. welfare	400	0.713131	0.5184901	0.0672177	2.978394
Current exp. welfare	400	0.695332	0.5186659	0.0672177	2.978173
Publ. inv. welfare	400	0.017799	0.0584832	0	0.602543
Total exp. healthcare	400	2.176538	2.227373	0.0106879	10.15349
Current exp. healthcare	400	2.043315	2.232736	0.0084727	10.04838
Publ. inv. healthcare	400	0.133224	0.240036	0	3.700281
Total exp. Defence	400	0.972717	0.7483697	0.0032889	5.01551
Current exp. Defence	400	0.93164	0.7321049	0.0032889	5.015363
Publ. inv. Defence	400	0.041077	0.1905757	0	3.482287
Debt GDP ratio	260	5.949748	3.381057	1.15143	18.51932

Table 2 - Corruption and general government expenditure

DEPENDENT VARIABLES	TOTAL CORRUPTION		ACTIVE CORRUPTION		PASSIVE CORRUPTION	
	(1)	(2)	(3)	(4)	(5)	(6)
Total Corruption (t-1)	0.520***	0.516***				
	(0.0391)	(0.0329)				
Active corruption (t-1)			0.351***	0.359***		
			(0.0865)	(0.0941)		
Passive corruption (t-1)					0.349***	0.339***
					(0.121)	(0.125)
Dissolution to Mafia (t-1)	4.232	1.712	5.607**	3.348**	7.103*	4.538*
	(5.174)	(3.283)	(2.426)	(1.670)	(4.164)	(2.624)
Political competition (t-1)	-0.231	-0.387	0.177	0.000276	0.612	0.477
	(0.523)	(0.357)	(0.419)	(0.322)	(0.689)	(0.623)
Schooling (t-1)	0.0109	0.0142	0.00895	0.0102	0.00606	0.00746
	(0.00914)	(0.0118)	(0.00967)	(0.00766)	(0.00884)	(0.00893)
Absenteeism (t-1)	-0.0533	-0.0274	-0.0630**	-0.0339	-0.0599	-0.0384
	(0.0357)	(0.0179)	(0.0311)	(0.0217)	(0.0365)	(0.0248)
Econ. backwardness (t-1)	0.125	0.0548	0.172*	0.101	0.0605	0.0117
	(0.0767)	(0.101)	(0.0894)	(0.0909)	(0.0547)	(0.0670)
Total general gov. exp. (t-1)	0.000819		-0.00813		-0.00364	
	(0.0102)		(0.0134)		(0.0102)	
Current general gov. exp. (t-1)		0.0286		0.0133		0.0156
		(0.0400)		(0.0238)		(0.0271)
General publ. Inv. (t-1)		-0.000860		-0.000541		-0.000718
		(0.0139)		(0.0107)		(0.00979)
Observations	380	380	380	380	380	380
Number of groups	20	20	20	20	20	20
Number of instruments	17	20	17	20	17	20
Sargan-test (*p*-value)	0.002	0.002	0.003	0.000	0.153	0.021
Hansen *J*-test (*p*-value)	0.341	0.138	0.103	0.160	0.122	0.180
AR(1) test (*p*-value)	0.032	0.046	0.023	0.026	0.011	0.016
AR(2) test (*p*-value)	0.848	0.908	0.283	0.278	0.818	0.764
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3

Notes: All regressions contain calendar year dummies (results not reported); the time span is 1991-2010. All regressions based on Blundell and Bond System-GMM estimator. In all regressions: constant term not reported; significant coefficients are indicated by *** (1% level), ** (5% level) and * (10% level); robust standard errors in parentheses.

Table 3 - Corruption and government expenditure in education

DEPENDENT VARIABLES	TOTAL CORRUPTION		ACTIVE CORRUPTION		PASSIVE CORRUPTION	
	(1)	(2)	(3)	(4)	(5)	(6)
Total Corruption (t-1)	0.469***	0.491***				
	(0.0296)	(0.0491)				
Active corruption (t-1)			0.213***	0.200***		
			(0.0536)	(0.0599)		
Passive corruption (t-1)					0.384***	0.377**
					(0.137)	(0.147)
Dissolution to Mafia (t-1)	-4.303	-0.786	-3.759	-4.392	-0.284	-2.536
	(4.795)	(4.431)	(3.644)	(4.076)	(3.704)	(5.039)
Political competition (t-1)	-0.852	-1.283	-0.500	-0.600	0.0609	-0.0764
	(0.583)	(0.859)	(0.492)	(0.447)	(0.395)	(0.522)
Schooling (t-1)	-0.00961	-0.00770	-0.0113	-0.0136	-0.00784	-0.0115
	(0.0115)	(0.0124)	(0.0117)	(0.0127)	(0.0107)	(0.0124)
Absenteeism (t-1)	-0.0286	0.00501	-0.0329*	-0.0268	-0.0126	-0.00317
	(0.0269)	(0.0580)	(0.0185)	(0.0280)	(0.0180)	(0.0250)
Econ. backwardness (t-1)	-0.160	-0.216	-0.138	-0.179	-0.0731	-0.119
	(0.132)	(0.142)	(0.129)	(0.133)	(0.111)	(0.106)
Total exp. education (t-1)	0.390**		0.420**		0.101	
	(0.185)		(0.165)		(0.143)	
Current exp. education (t-1)		0.271		0.461**		0.150
		(0.248)		(0.197)		(0.194)
Publ. inv. education (t-1)		3.591		0.658		0.474
		(3.882)		(1.944)		(1.649)
Observations	380	380	380	380	380	380
Number of groups	20	20	20	20	20	20
Number of instruments	17	20	17	20	17	20
Sargan-test (*p*-value)	0.067	0.183	0.007	0.014	0.337	0.060
Hansen *J*-test (*p*-value)	0.502	0.457	0.352	0.262	0.247	0.202
AR(1) test (*p*-value)	0.055	0.059	0.031	0.028	0.017	0.018
AR(2) test (*p*-value)	0.837	0.762	0.263	0.218	0.835	0.804
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3

Notes: All regressions contain calendar year dummies (results not reported); the time span is 1991-2010. All regressions based on Blundell and Bond System-GMM estimator. In all regressions: constant term not reported; significant coefficients are indicated by *** (1% level), ** (5% level) and * (10% level); robust standard errors in parentheses.

Table 4 - Corruption and government expenditure in welfare

DEPENDENT VARIABLES	TOTAL CORRUPTION		ACTIVE CORRUPTION		PASSIVE CORRUPTION	
	(1)	(2)	(3)	(4)	(5)	(6)
Total Corruption (t-1)	0.539***	0.546***				
	(0.0332)	(0.0401)				
Active corruption (t-1)			0.335***	0.357***		
			(0.0930)	(0.108)		
Passive corruption (t-1)					0.380***	0.337***
					(0.111)	(0.114)
Dissolution to Mafia (t-1)	0.662	-4.555	4.388	-5.033	4.265**	2.682
	(7.916)	(7.053)	(3.079)	(6.569)	(2.079)	(2.698)
Political competition (t-1)	-0.408	-0.394	0.152	0.329	0.503	0.680
	(0.763)	(0.722)	(0.442)	(0.489)	(0.600)	(0.561)
Schooling (t-1)	0.0106	-0.00558	0.0130	-0.0166	0.00503	-0.00669
	(0.0125)	(0.0207)	(0.00915)	(0.0226)	(0.00624)	(0.00775)
Absenteeism (t-1)	-0.0266	-0.00984	-0.0474	-0.0259	-0.0437*	-0.0387**
	(0.0495)	(0.0466)	(0.0300)	(0.0280)	(0.0230)	(0.0187)
Econ. backwardness (t-1)	-0.0891	-0.173	0.0173	-0.137	-0.00916	-0.111
	(0.0935)	(0.144)	(0.0799)	(0.123)	(0.0515)	(0.0754)
Total exp. welfare (t-1)	0.964**		0.679***		0.284	
	(0.380)		(0.261)		(0.230)	
Current exp. welfare (t-1)		1.031**		0.852***		0.454*
		(0.416)		(0.246)		(0.243)
Publ. inv. welfare (t-1)		6.641		12.18		6.114
		(6.582)		(7.758)		(4.182)
Observations	380	380	380	380	380	380
Number of groups	20	20	20	20	20	20
Number of instruments	17	20	17	20	17	20
Sargan-test (*p*-value)	0.267	0.379	0.004	0.225	0.146	0.414
Hansen *J*-test (*p*-value)	0.435	0.470	0.575	0.613	0.196	0.576
AR(1) test (*p*-value)	0.037	0.040	0.019	0.057	0.012	0.012
AR(2) test (*p*-value)	0.703	0.540	0.323	0.115	0.922	0.743
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3

Notes: All regressions contain calendar year dummies (results not reported); the time span is 1991-2010. All regressions based on Blundell and Bond System-GMM estimator. In all regressions: constant term not reported; significant coefficients are indicated by *** (1% level), ** (5% level) and * (10% level); robust standard errors in parentheses.

Table 5 - Corruption and government expenditure in healthcare

DEPENDENT VARIABLES	TOTAL CORRUPTION		ACTIVE CORRUPTION		PASSIVE CORRUPTION	
	(1)	(2)	(3)	(4)	(5)	(6)
Total Corruption (t-1)	0.532***	0.721***				
	(0.0380)	(0.157)				
Active corruption (t-1)			0.404***	0.406***		
			(0.0943)	(0.0990)		
Passive corruption (t-1)					0.395***	0.425***
					(0.0771)	(0.0704)
Dissolution to Mafia (t-1)	1.542	8.701**	3.810*	1.585	2.307	-0.497
	(6.963)	(3.557)	(2.294)	(1.516)	(2.021)	(1.909)
Political competition (t-1)	-0.659	0.111	-0.514	-0.669*	0.117	-0.165
	(0.521)	(0.601)	(0.521)	(0.381)	(0.560)	(0.433)
Schooling (t-1)	0.00490	0.0294	0.00870	0.00546	0.000790	-0.00427
	(0.0106)	(0.0187)	(0.00635)	(0.00705)	(0.00594)	(0.00521)
Absenteeism (t-1)	-0.0200	-0.0668*	-0.0143	0.000951	-0.0227	-0.000517
	(0.0380)	(0.0387)	(0.0299)	(0.0220)	(0.0247)	(0.0192)
Econ. backwardness (t-1)	0.0607	0.110	-0.00482	-0.0187	-0.00787	-0.0427
	(0.0683)	(0.113)	(0.0632)	(0.0584)	(0.0527)	(0.0552)
Total exp. helathcare (t-1)	0.0123		0.116**		0.0329	
	(0.0830)		(0.0568)		(0.0731)	
Current exp. helathcare (t-1)		0.0331		0.106*		0.0379
		(0.0772)		(0.0558)		(0.0777)
Publ. inv. helathcare (t-1)		-1.384**		-0.000243		0.0848
		(0.698)		(0.194)		(0.218)
Observations	380	380	380	380	380	380
Number of groups	20	20	20	20	20	20
Number of instruments	17	20	17	20	17	20
Sargan-test (*p*-value)	0.002	0.154	0.000	0.000	0.003	0.002
Hansen *J*-test (*p*-value)	0.182	0.204	0.145	0.116	0.119	0.181
AR(1) test (*p*-value)	0.038	0.028	0.028	0.031	0.024	0.032
AR(2) test (*p*-value)	0.791	0.578	0.367	0.291	0.989	0.806
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3

Notes: All regressions contain calendar year dummies (results not reported); the time span is 1991-2010. All regressions based on Blundell and Bond System-GMM estimator. In all regressions: constant term not reported; significant coefficients are indicated by *** (1% level), ** (5% level) and * (10% level); robust standard errors in parentheses.

Table 6 - Corruption and government expenditure in defence

DEPENDENT VARIABLES	TOTAL CORRUPTION		ACTIVE CORRUPTION		PASSIVE CORRUPTION	
	(1)	(2)	(3)	(4)	(5)	(6)
Total Corruption (t-1)	0.596***	0.528***				
	(0.0784)	(0.0646)				
Active corruption (t-1)			0.453***	0.386***		
			(0.126)	(0.121)		
Passive corruption (t-1)					0.427***	0.355***
					(0.0668)	(0.0995)
Dissolution to Mafia (t-1)	-5.558	-1.048	-3.460	-2.271	1.637	2.856
	(8.391)	(6.574)	(3.170)	(3.131)	(1.789)	(2.395)
Political competition (t-1)	-0.662	-0.350	-0.160	-0.219	0.161	0.271
	(0.591)	(0.565)	(0.343)	(0.351)	(0.581)	(0.645)
Schooling (t-1)	-0.00476	0.00298	-0.00174	-0.000676	-0.00273	-0.000522
	(0.0132)	(0.0106)	(0.00756)	(0.00637)	(0.00342)	(0.00401)
Absenteeism (t-1)	-0.00310	-0.0228	-0.0186	-0.0148	-0.0174	-0.0227
	(0.0532)	(0.0390)	(0.0276)	(0.0242)	(0.0202)	(0.0245)
Econ. backwardness (t-1)	0.0749	0.0781	0.116	0.105*	0.00580	-0.00312
	(0.0816)	(0.0783)	(0.0737)	(0.0593)	(0.0472)	(0.0466)
Current exp. defence (t-1)		0.0649		0.0756		0.0802
		(0.169)		(0.187)		(0.114)
Publ. inv. defence (t-1)		-3.623***		-1.430**		-1.849***
		(0.907)		(0.673)		(0.711)
Total exp. defence (t-1)	0.0281		-0.0674		0.112	
	(0.170)		(0.273)		(0.111)	
Observations	380	380	380	380	380	380
Number of groups	20	20	20	20	20	20
Number of instruments	17	20	17	20	17	20
Sargan-test (*p*-value)	0.028	0.290	0.073	0.036	0.032	0.352
Hansen *J*-test (*p*-value)	0.148	0.275	0.225	0.571	0.805	0.205
AR(1) test (*p*-value)	0.038	0.088	0.024	0.043	0.083	0.151
AR(2) test (*p*-value)	0.745	0.965	0.151	0.201	0.155	0.502
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3

Notes: All regressions contain calendar year dummies (results not reported); the time span is 1991-2010. All regressions based on Blundell and Bond System-GMM estimator. In all regressions: constant term not reported; significant coefficients are indicated by *** (1% level), ** (5% level) and * (10% level); robust standard errors in parentheses.

Table 7 - Corruption and local public debt

DEPENDENT VARIABLES	TOTAL CORRUPTION		ACTIVE CORRUPTION		PASSIVE CORRUPTION	
	(1)	(2)	(3)	(4)	(5)	(6)
Total corruption (t-1)	0.404***	0.379***				
	(0.128)	(0.0371)				
Active corruption (t-1)			0.242***	0.132**		
			(0.0542)	(0.0634)		
Passive corruption (t-1)					0.331***	0.465***
					(0.0933)	(0.136)
Dissolution to Mafia (t-1)	4.422	-1.528	1.016	-0.672	0.904	-1.268
	(8.886)	(2.934)	(1.719)	(0.991)	(3.500)	(3.362)
Political competition (t-1)	-2.956	0.589	0.0241	0.780**	-0.358	0.525
	(3.071)	(1.016)	(0.416)	(0.334)	(0.515)	(0.330)
Schooling (t-1)	0.0198	-0.00231	0.00164	-0.00193	-0.00132	-0.00921
	(0.0344)	(0.0128)	(0.00407)	(0.00794)	(0.00804)	(0.00614)
Absenteeism (t-1)	0.182		0.0310		0.0350	
	(0.144)		(0.0193)		(0.0246)	
Volunteering (t-1)		-0.00731		-0.0113		0.00743
		(0.0482)		(0.0227)		(0.0260)
Econ. backwardness (t-1)	-0.532	0.118	-0.0103	0.104*	-0.0875	0.0654
	(0.590)	(0.134)	(0.0828)	(0.0591)	(0.0994)	(0.0664)
Debt GDP ratio (t-1)	-0.101	0.0769	0.0261	0.0482***	0.0272	0.0773***
	(0.180)	(0.0798)	(0.0295)	(0.0157)	(0.0238)	(0.0247)
Observations	240	220	240	220	240	220
Number of groups	20	20	20	20	20	20
Number of instruments	16	16	16	16	16	16
Sargan-test (p-value)	0.063	0.068	0.001	0.008	0.001	0.049
Hansen J-test (p-value)	0.403	0.522	0.150	0.258	0.336	0.764
AR(1) test (p-value)	0.226	0.276	0.047	0.108	0.003	0.003
AR(2) test (p-value)	0.316	0.352	0.562	0.468	0.035	0.039
No. of lags of endogenous variables used as instruments	2_3	2_3	2_3	2_3	2_3	2_3

Notes: All regressions contain calendar year dummies (results not reported); the time span is 1998-2010. All regressions based on Blundell and Bond System-GMM estimator. In all regressions: constant term not reported; significant coefficients are indicated by *** (1% level), ** (5% level) and * (10% level); robust standard errors in parentheses.