EC426 Public Economics

“Corruption and the composition of government expenditure: A brief review of the literature and an empirical study for four EU countries”
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*References*
1. Introduction

The purpose of this essay is to briefly review the literature in order to discuss what the latter suggests about the relationship between corruption and the composition of government expenditure and to investigate empirically this relation for the case of four European Union countries: Spain, Portugal, Greece and Italy.

Section 2 gives a definition for corruption and discusses why it should start attracting more attention by policy makers and development practitioners.

Section 3 provides the theoretical framework within which one can identify which market structures are susceptible to corruption, by surveying the international literature. As we shall see, although there has not been too much work done towards this direction, one thing is apparent: corruption is a governance problem and a result of weak state management. As such, it exists where government officials have monopoly power over a good or service and limited or no accountability. Building on these suggestions, this section will conclude by proposing which types of public expenditures seem to provide more lucrative opportunities for corrupt behavior.

Section 4 briefly mentions the empirical findings by Mauro (1998), which provides the only empirical study on this subject that I am aware of.

Section 5 discusses first the methodological problems that arise when one tries to investigate empirically the relationship between corruption and the various components of government expenditure. It then provides the first cross-section time series evidence that corruption does indeed affect the composition of public expenditure. More specifically, corruption is found to increase government spending
on defense and reduce the allocation of resources to education, health and social security and welfare.

Section 6 concludes the essay.

2. Definition of Corruption. Does corruption affect economic activities?

Although, there is no agreement in the literature on how to define the phenomenon of corruption, I use a definition provided by Rose-Ackerman (1975, 1978), Becker and Stigler (1974), Klitgaard (1988, 1991)\(^1\) and Shleifer and Vishny (1993), who describe corruption as the misuse of public office for private gain. More specifically, government corruption is defined as “…the sale by government officials of government property for personal gain”. This “sale” can take various forms such as collecting bribes for issuing permits or licenses or even for prohibiting the entry in specific sectors to competitors. In almost all of these cases, the competitors are charged not only the official price of the good but also the extra payment, paid to the government official.

Until now, the literature still debates as to whether corruption does in fact decrease efficiency or not. Thus, researchers are mainly divided into two opposing schools: those who believe that the corruption mechanism may be efficiency enhancing and those who insist on the damaging implications of it.

The first school builds on the work of Leff (1964) and Huntington (1968) and concludes that corruption may increase economic growth, mainly for two reasons.

\(^1\) Klitgaard (1998) defines corruption as C=M+D-A-S, where C is corruption, M is monopoly power, D is discretion, A is accountability and S are public sector salaries.
The first one, which is due to Lui (1985), suggests that in an equilibrium queuing model of a non-cooperative game, bribes can minimize the waiting cost and therefore speed up the process of investment and thus increase economic growth. The second one is based on the “second best” principle and states that in an economy with existing policy distortions, additional distortion in the form of corruption may in fact induce welfare.

The other strand opposes this efficiency enhancing analysis and argues that corruption can be detrimental to economic growth for three reasons. First, the view that this mechanism can speed up the processes between private investors and public administrators is not true when corruption is pervasive. More specifically, corrupt officials can cause significant delays in order to attract more bribes. Second, the equilibrium queuing model proposed by Lui is based on restrictive assumptions and as it is argued in Andvig (1991) there are other strategic ways to reduce waiting costs. Finally, as Rahman, Kisunko and Kapoor (forthcoming in the World Bank Report: Corruption in Bangladesh: Costs and Cures) state, the fact that it is possible for efficiency to be induced because corrupt officials will grant the bid in an auction to the lowest cost firm – since it is this firm who can afford the highest bribe – creates some skepticism when one considers the nature of corruption and that perverse client-patron relations may dominate business transactions. In other words, government officials could channel bids to friends or relatives and not to the lowest cost firm.

Although, much of this literature is not based entirely on economic theory, the conclusions suggest that corruption must have an impact on efficiency, growth and welfare. Mauro (1995) uses data for 70 countries for the period 1980 – 83 and finds that bureaucratic efficiency actually causes high investment and growth and that corruption is negatively associated with them. Further, the estimates prove to be
quite robust when controlling for additional determinants of investment and economic growth. Tanzi and Davoodi (1997) find that corruption increases public investment at the expense of private investment. Wei (1997a) estimates empirically the relationship between corruption and foreign direct investment and concludes that the former reduces the latter. Finally, Gupta, Davoodi and Alonso-Terme (1998) carry out an empirical study and find that corruption tends to increase inequality and poverty due to lower economic growth.

3. Corruption and Government Expenditure - Theory

The literature on the association between corruption and the allocation of public resources is very limited and in many cases it diverges far from pure economic analysis. The aim of this section is to establish that government regulation does indeed provide incentives for corruption and to identify its implications for resource allocation.

In her very influential work, A. Krueger (1974) argued that it is the existence of rents which motivates individuals to rent seeking activities. Krueger builds up a model in which the government imposes quantity restrictions to the amount of a certain good imported. She assumes that there is a distributional sector, which is responsible for purchasing the domestic good, trade it with the foreign one and then redistribute the latter to individuals. The quantity restriction imposed on imports gives rise to rents since the wages of those employed in the distributional sector have risen relatively to those in the domestic good production. The latter provides incentives for people to engage in a rent seeking activity in order to become employed in the distributional sector e.g. obtain a license for imports. Krueger then compares the outcome of the
free entry with that of the quantity restriction and finds that in principle, there is a substantial welfare loss in the second case.

The latter provides a very good benchmark, when one considers different and multiple kinds of government intervention. If certain economic activities are heavily regulated by government then these activities will in general exhibit rents which in turn lead people to compete for them. And it is this competition which may result in public officials receiving large bribes for granting licenses, permits etc. to the competitors.

The conclusions drawn from the above brief analysis – although the purpose of Krueger’s paper was not in fact related to corruption study – are nevertheless unambiguous. Corruption must be higher in markets where the degree of regulation is high and thus the degree of competition is smaller, as these markets provide incentives for bribery. In their empirical paper, Ades and di Tella (1994) find that exogenous increases in product market competition reduce corruption in the bureaucracy.

One thing to be noted here is the persistent nature of corruption. As argued, it is government regulation, which creates rents and which in turn, give rise to corrupt activities. The latter however provides more incentives for government intervention and regulation and thus more corruption.

A. Shleifer and R. Vishny (1993) use the standard principal-agent environment in order to investigate the consequences of corruption for resource allocation. They build their model by initially assuming that there is one homogenous government-produced good and that the official enjoys monopolistic power over it. Further they
relax these assumptions by introducing complementary public goods or services and competition among government officials.

Under the largest set of assumptions, there is one public good with price $p$ set by the government and a demand schedule $D(p)$ from private agents. Corruption is incorporated into the model by assuming that the official has the power to refuse providing the good if he does not collect a bribe. Thus the public service is either provided (under bribery) to the private agent or it is not provided at all\(^2\). Within this set up there are two separate cases under which corruption can be investigated.

The first one is when there is no risk of detection and/or punishment of the corrupt action. Within this framework the public official can either turn over to the government the official price of the good and keep the bribe he has collected from the private agent or withhold everything from the government by hiding his sales. Assuming that the official cannot price discriminate, he equates marginal cost to marginal revenue in order to maximize his profits. In the first case the marginal cost to the official of providing the good is simply its price $p$ while in the second case the marginal cost is equal to zero.

When the official does not hide his sales he collects bribe $b_1$ and the private agent pays a price of $p' = p + b_1$. However, when the official does not turn over to the government the good’s price, he is charging the private agent with a price $p''$, which is equal to bribe $b_2 < p'$.

\(^2\) De Soto (1989) argues that many government regulations simply exist in order to provide that kind of power to government employers and/or politicians.
Introducing penalties to the model does not alter the situation significantly although it
does change the level of corruption. If the detection probability or the penalty itself is
an increasing function of the bribe then the government official will charge a lower
bribe and increase the quantity he supplies to private agents. If on the other hand the
number of buyers increases the penalty then the official may increase the bribe and
decrease output.

One important conclusion can be drawn from the case when the official hides his
sales. Since $p' > p'' = b_2$ - under the assumption of monopolistic official and normal
good – then it will certainly be optimal for the private agent to pay only for the bribe $b_2$
instead of getting charged for $p' = p + b_1$. The latter of course is true when there are
no penalties for the buyers or when the expected punishment is such that it is still
profitable for the private agent to pay only $b_2$. The above argument suggests that we
should expect corruption to be larger in cases where the public sector has the
monopolistic power of providing a good or service and the corresponding accounting
system is rather poor. An accounting system that ensures the reporting of all sales
and/or purchases of public goods is essential for reducing corruption.

However, the situation changes when one assumes that there is competition among
public officials for the supply of one government-produced good. In this case where
there is free entry, bribes attract more and more public officials and the increasing
competition drives bribes to zero. The whole scenario is perfectly consistent with the
theoretical framework introduced by Krueger as we saw. Other similar studies such
as Becker and Stigler (1974) and Rose-Ackerman (1995) coincide with this
theoretical framework and conclude that reforms, which induce competitiveness help,
induce corruption incentives.
The above analysis, although intuitively correct, it has its own limitations. For one thing, it takes the principal-agent model as given. In this way it does not leave any room for investigating how alternative structures of the government affect this model and the regulation responses. Further, the discretion over the supply of the good that officials are assumed to have, may be necessarily in order to incorporate corruption to the model, but in fact there is no theory of how and why this discretion comes about. In addition and since corruption is deeply connected with information, this setup ignores to examine what the consequences may be within different information frameworks. In extreme cases where incentives and better information are complements, increased competition may in fact provide higher probabilities for corruption activities (i.e. increased competition can make corruption less costly). In any case, the latter does not alter the conclusion that corruption is a governance problem and as such it must be treated.

I now turn to the consequences of corruption for resource allocation. Unfortunately much less work has been done within this domain and basically there is no economic model upon which one can be based. The key idea however is that corrupt politicians and/or government officials will try to channel public funds to those expenditures that provide more lucrative opportunities for bribery. A. Shleifer and R. Vishny (1993) argue that corrupt officials will chose to spend money on goods whose true value is difficult to be identified by agents. Although problems due to information do arise again and this argument has not been examined under neither a static nor a dynamic framework, it is reasonable to assume that it is quite appealing. Thus expenditures on military and high technology goods are possible candidates for providing such lucrative opportunities. Hines (1995) suggests that international trade in military aircraft tends to be especially susceptible to corruption.
On the other hand, expenditures on education do not seem to provide any opportunities at all. For example, it would be difficult for a government official to collect bribes for appointing unqualified persons to teaching positions. The same may hold more or less for expenditures on health although one can argue that sophisticated hospital equipment could give rise to opportunities for bribery. On the other hand, the implications for spendings on social security and welfare are more ambiguous. For one thing the value of these services is certainly not difficult to be monitored but there are numerous cases in Greece where officials receive bribes for granting e.g. disability pensions to perfectly healthy individuals. Recently, it was revealed that the Greek national insurance system was “paying” pensions for a large number of years to 16,000 already dead people. From another perspective however, one wonders of how high the incentives for corruption are in this area considering that the target groups are in many cases low-income people (for example unemployed individuals).

Concluding, we have seen that government regulation does provide incentives for corrupt activities (although the literature must work more towards the foundations of the principal-agent model). These incentives are likely to influence the decisions of corrupt politicians and/or government officials so as to spend money on those activities that provide more opportunities for bribery. Thus and for the reasons explained one should expect corruption to increase expenditures on defense and reduce education and probably health spending. We will see what the empirical results revealed for these three categories as well as for expenditures on social security and welfare.
4. The literature and the empirical findings

Mauro (1998) provides the only empirical related work that I am aware of. He estimates a cross-section regression for about 100 countries\(^3\) worldwide, using the same perception corruption index that I use in this essay. The regressions are based on the average values of the period 1970-85 as a percentage of GDP. Initially, he divides government expenditure into four major categories: education, defense, transfer payments and social insurance and welfare payments. His estimates reveal a negative relation between each component of public spending and the corruption index. However, when he controls for the per capita GDP of 1980, only the coefficient in the education regression turns out to be statistically significant at the conventional level with a considerable magnitude of 0.0034. This result proves to be quite robust when adding additional explanatory variables to the model. Further, the direction and magnitude of association remains almost intact when the author splits the sample to developing and developed countries in order to account for potential differences among them. But even by doing so, he does not control for country specific effects, an issue that will be discussed in detail in the next section.

All in all, Mauro’s findings suggest that education stands as a particularly unattractive target for rent-seekers. On the other hand, no component of public expenditure was found to provide opportunities for corrupt activities. The next section discusses some problems with the cross-section estimation techniques and uses another econometric method to reveal the relationship – if any – between corruption and the composition of government expenditure.

\(^3\) The number of the observations varies from 75 in some cases, to 106 according to the availability of the data for each country.
5. Estimations

5.1 The data

The perception corruption index used in this essay is the same used in Mauro (1998) and comes from the Political Risk Services, Inc. (IRIS), a private company, which publishes the International Country Risk Guide (ICRG). ICRG uses a three-dimensional evaluation system (political, financial and economic risks) by assigning point ratings to these three sub-indicators up to a certain maximum\(^4\). These indices were collected by the IRIS center in the University of Michigan and they refer to a cross-section of about 130 countries for the period 1982-1995.

Although, there exist various organizations\(^5\) that produce quantifiable measures, it is essential to understand that all of these data sets (including the ICRG index) do have their limitations. The latter is due to the fact that these indices are heavily biased towards the foreign investors’ perception of the various economies. Further one may worry about the choice of the specific index. As it is discussed in Rahman, Kisunko and Kapoor, despite the different sources of data, the correlation between the indices is quite high. Therefore, the results can be considered robust as far as the choice of alternative indices is concerned.

Coming back to the data set used in this essay, it has to be indicated that the lower the score of the ICRG index is, the more probable is that “high government officials will demand special payments”. All indices take values between 0 (most corrupt) and 6 (less corrupt). Thus, when we move on to the estimation results, one should keep in mind that negative values of the corruption coefficient estimator, denote a positive

\(^4\) The set of data are described in more detail by Political Risk Services as well as in Keefer and Knack (1993).

\(^5\) Other perception indices from different organizations include the Business International Index (BI), the Transparency International Index (TI) and the World Economic Forum index (GCR)
relationship between the level of corruption and the respective dependent variable. As mentioned before, it is important to realize that this data are totally subjective. However the later makes it highly unlikely that they constitute a source of endogeneity bias. I will come back to this issue as well as the problems of causality and model specification in the next section.

Table 1 summarizes the descriptive statistics for the 4 EU countries (Spain, Portugal, Greece and Italy) based on the corruption index for the corresponding period.

<table>
<thead>
<tr>
<th>Country</th>
<th>Mean Corruption Index</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>4.85</td>
<td>0.96</td>
</tr>
<tr>
<td>Portugal</td>
<td>4.42</td>
<td>0.78</td>
</tr>
<tr>
<td>Greece</td>
<td>4.35</td>
<td>0.84</td>
</tr>
<tr>
<td>Italy</td>
<td>3.67</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Table 1

The components of government expenditures were divided in four major categories: expenditures on defense, education, health and social security and welfare. Unfortunately, although there are other types of public expenditure as well, such as general public services, transport and communications and economic services – which may in fact provide sources for many lucrative opportunities for corrupt behavior – only these four sub-categories were commonly available for the four countries. The data for the components of government expenditure are from the OECD National Accounts. Since not all data on government spending were available for all countries for the period 1982-1995, the regressions estimated were based on an unbalanced sample of 40 observations.

\[6\] For example, if the index decreases (more corruption), then the dependent variable increases.

\[7\] In order to obtain a common (balanced) sample would result in a very significant loss of 16 observations. Although unbalanced samples make the algebra fairly cumbersome, most modern econometric computer packages fully automate the calculation in order to obtain the
The data for GDP, population, unemployment and total direct and indirect tax revenues – their purpose will become apparent in the next section - were also collected from the OECD National Accounts statistics. Finally, the data on total enrolment in pre-primary, primary and secondary education (which refer to ages between 5 and 21) were taken from the UNESCO Institute for statistics.

5.2 The Methodology and the problems

Three major problems arise when one tries to estimate the relationship between corruption and the composition of government expenditure:

i. Causality problems
ii. Model specification problems and
iii. Data problems

The causality issue refers to the direction of association between corruption and the composition of public expenditure. In other words, one has to worry as to whether corruption alters the composition of public expenditure or it is the composition of expenditures, which causes corruption. This problem may introduce endogeneity bias to the estimators, which can only be solved with the use of instrumental variables. Unfortunately, this requires special econometric software, which was not available to the author by the time this essay was conducted.
The problems of model specification are obvious. Since there is not a specific economic theory available for the determinants of each and every component of government expenditure, we can only experiment by using alternative variables to our econometric model. The latter creates the problem of misspecification, which in turn, again addresses the issues of biased and inconsistent estimators.

As far as data problems are concerned, as discussed in the previous section the fact that the corruption indices depend on the personal views and opinions of the foreign investors who filled in the corresponding questionnaires, suggests that this index has its certain limitations. Therefore, once again problems of biasness and inconsistency arise if we assume that these data may incorporate measurement errors. Another data related problem is the choice of correct instruments. As it was mentioned earlier, IV estimations were not performed, since the appropriate software was not available to the author. But even if one tried to test such regressions would immediately be confronted with the problem of the choice of the right instruments. In a model with several exogenous variables, one would have to discover instruments, which should be significantly correlated with the regressors including the corruption index and not correlated with the omitted variables included in the error term. Instruments which are considered to be highly correlated with corruption, are the index of ethno linguistic fractionalization, data on religious affiliation, the percentage of people not speaking the official language of the country and others. The problem with these data sets is that they are not available for all countries and when available they are simply averages of certain periods. Therefore their use in a time series context is impossible.

It was discussed in the “The literature and the empirical findings” section that Mauro (1998) uses cross-section regressions based on the average value of observations of

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8 See Treisman Daniel (2000)
1970-1985 for about 100 countries worldwide, to study the relationship between corruption and the various components of government expenditure. Although this allows him to use a large sample, the use of a cross-section model does not come at no expense. Mainly, the problems associated with cross-section regressions are of two shorts: First of all, the data used do not incorporate the dynamics of time-pattern either because one uses averages for a certain period or because they refer to a single observation in time. The second problem, which I find crucial in this case of corruption study, is the fact that these models assume identical parameters for the sample countries. Mauro (1998) does not seem to control for the differences among countries and the situation becomes worse if one considers that the sample includes countries with enormous differences in their economic environment structure such as Cuba and Germany\(^9\). Thus, it is reasonable to have some uneasiness about the parametric stringency of these models.

The methodology employed in this essay, is the estimation using cross-section time series data (henceforth panel data) for the following four EU countries: Spain, Portugal, Greece and Italy. The reasons that these countries were chosen are two: First, they belong to the top of the ranking as far as corruption “performance” is concerned among all the members of the European union i.e. they are the most corrupt. Therefore, if corruption is considered to alter the composition of government expenditure, this effect would manifest itself mostly in these countries. Second, data were not available for some other countries and for a significant number of years.

The advantage of the use of panel data over the simple cross-section estimation is that it allows one to specify a “fixed effect” that permits the constant term to vary

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\(^9\) Although it is true that Mauro runs also separate regressions for developed and developing countries. However, this does not mean that he controls for country specific effects.
across countries by including country-specific “intercept dummy variables”\textsuperscript{10}. In that way, it was possible to eliminate the problem mentioned earlier. However it must be stressed that $F$-tests were conducted for all regressions, in order to test the hypothesis that the effects are equal in the four countries. In all cases this hypothesis was strongly rejected even at the 1\% level.

However, the use of “fixed effects” raises its own questions. It is certainly appropriate when one is quite confident that the differences can be entirely captured by parametric shifts of the regression function. If this is not the case then the use of randomly distributed effects could be more correct. Mundlak (1978) suggests that we should always treat the individual effects as random. Although this may seem rather logical it creates certain drawbacks, especially when one worries about the specification of the model used. The random effects estimation assumes that the individual effects are uncorrelated with the rest of the regressors used. Therefore, this increases the problem of inconsistent estimators due to omitted variables. Thus it was considered more appropriate that the pooled least squares procedure should be used within a fixed effects model.

5.3 Regression Results

This section analyzes empirically the relationship between corruption and the composition of public expenditure. The empirical findings are based on the pool least squares procedure for four European Union countries (Spain, Portugal, Greece and Italy) for the period 1982-1995.

\textsuperscript{10} See Hsiao (1986) for further discussion on the benefits of panel data.
Table 2 summarizes the results for the simplest model one can use. As the endogenous variable I use each component of public expenditure (as a ratio of GDP\textsuperscript{11}), which is regressed on a constant and the corruption index.


Model 1: \( \text{Dependent Variable}_{it} = c_i + \beta \times \text{Corruption}_{it} \) (\( i \) refers to country)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Pooled Data</th>
<th>(- R^2)</th>
<th>Corruption Index</th>
<th>Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on Defense (% of GDP)</td>
<td>40</td>
<td>0.95</td>
<td>-0.0028** ((-4.036))</td>
<td>0.0297</td>
</tr>
<tr>
<td>Expenditure on Education (% of GDP)</td>
<td>40</td>
<td>0.92</td>
<td>0.0027** ((3.380))</td>
<td>0.0171</td>
</tr>
<tr>
<td>Expenditure on Health (% of GDP)</td>
<td>40</td>
<td>0.90</td>
<td>0.0020** ((3.065))</td>
<td>0.0283</td>
</tr>
<tr>
<td>Expenditure on Social Security and Welfare (% of GDP)</td>
<td>40</td>
<td>0.98</td>
<td>0.0004** ((2.454))</td>
<td>0.0147</td>
</tr>
<tr>
<td>Total Consumption Expenditure (% of GDP)</td>
<td>40</td>
<td>0.38</td>
<td>0.0064** ((2.925))</td>
<td>0.1265</td>
</tr>
</tbody>
</table>

t-statistic in parentheses.

**Statistically significant at 1%. *Statistically significant at 5%.

**Table 2**

The one thing that has to be indicated about the results is the exceptionally high value of the adjusted R-squared. Although it is certainly irrational to conclude that the corruption index can be considered as the sole determinant of each component of public expenditure, this finding can be attributed to the fact that the fixed effect, manages to explain a large proportion of the endogenous variable (due to its low variation). This result reveals the importance of the criticism made earlier. In fact, it

\textsuperscript{11} In this case I follow Mauro (1996) who states that if bribes are levied just as easily on all income, then each component of public spending as a percentage of GDP should be unrelated to corruption.
enhances the argument that country specific characteristics may be an important
determinant of the endogenous variable. When this is indeed the case, their inclusion
to the estimation procedure is undoubtedly necessary. In addition, this high value of
the adjusted R-squared should not be considered as a restriction for better
specification. Remember that it is not a theoretical model that we are trying to specify
here, but the significance and the impact of corruption on the composition of public
expenditure.

As far as the relation of corruption and each type of government spending is
concerned, the results are stunning. All estimates are statistically significant even at
the 1% level and their magnitude is considerable. First of all, the sign of the
coefficient seems to be in accordance with what I have discussed thus far (remember
that a negative sign of a coefficient reveals a positive relation between the level of
corruption and the endogenous variable and vice versa). Corruption is found to be
positively related to military spending and to reduce expenditures on education,
health and social security and welfare. To see the impact of this relationship note the
following: a one-standard-deviation improvement on the corruption index of Greece
for example, would increase public spending on education by 0.22 % of GDP and
increase public spending on health by 0.17 % of GDP. As far as spendings on social
security and welfare are concerned, the sign of the coefficient reveals that this type of
government expenditure does not seem to provide many lucrative opportunities for
corrupt officials. In addition, its magnitude is small compared to the rest of the
estimation results. Finally, corruption is found to reduce total consumption
expenditure by a considerable size. However, this finding must be used in
combination with the other estimations because it is the different types of public
spending that we are interested in and not government expenditure as a whole.
To control better for the magnitude and the sign of the corruption coefficient, I follow Easterly and Rebelo (1993) and add the per capita GDP as one more determinant of public expenditure. Table 3 summarizes the results of the five regressions.

Again all estimates concerning the corruption index are found to be statistically significant even at the 1%. The only difference now is that the impact of corruption to public expenditure on health is increased by 30% compared to the previous case. These results imply that even when controlling for the per capita GDP, corruption is again strongly associated with the various components of public expenditure (it is true however that this supplementary variable does not seem to contribute in explaining the behavior of spending on education and social security and welfare. Therefore, results within these areas cannot be considered as better specified).

As an additional determinant of government spending (at least for some categories), I use the total direct and indirect tax revenues, again as a percentage of GDP. The results of the corresponding regressions are presented in Table 4.

Model 2: \( \text{Dependent Variable}_i = c_i + \beta \times \text{Corruption}_i + \gamma \times \text{PercapitaGDP}_i \) (i refers to country)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Pooled Data</th>
<th>( R^2 )</th>
<th>Per capita GDP(^{12} )</th>
<th>Corruption Index</th>
<th>Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on Defense (% of GDP)</td>
<td>40</td>
<td>0.96</td>
<td>0.0375** (2.619)</td>
<td>-0.0033** (-4.915)</td>
<td>0.0312 0.0363 0.0613 -0.0059</td>
</tr>
<tr>
<td>Expenditure on Education (% of GDP)</td>
<td>40</td>
<td>0.92</td>
<td>0.0017 (0.095)</td>
<td>0.0027** (3.175)</td>
<td>0.0171 0.0328 0.0124 0.0351</td>
</tr>
<tr>
<td>Expenditure on Health (% of GDP)</td>
<td>40</td>
<td>0.93</td>
<td>-0.0525** (-4.555)</td>
<td>0.0026** (4.943)</td>
<td>0.0260 0.0143 0.0071 0.0764</td>
</tr>
<tr>
<td>Expenditure on Social Security and Welfare (% of GDP)</td>
<td>40</td>
<td>0.98</td>
<td>-0.0032 (-0.796)</td>
<td>0.0004** (2.567)</td>
<td>0.0145 0.0043 0.0004 0.0086</td>
</tr>
<tr>
<td>Total Consumption Expenditure (% of GDP)</td>
<td>40</td>
<td>0.41</td>
<td>-0.0820* (-1.728)</td>
<td>0.0075** (3.367)</td>
<td>0.1230 0.1233 0.1318 0.2238</td>
</tr>
</tbody>
</table>

\( t \)-statistic in parentheses.

**Statistically significant at 1%. *Statistically significant at 5%.

Table 3

\(^{12} \text{Corr(PGDP, COR)} = -0.5.\)

Model 3:  Dependent Variable $y_i = c_i + \beta \times Corruption_i + \gamma \times PercapitaGDP_i + \delta \times Total\ D.\ &\ Ind.\ Tax\ Rev.\ \%GDP_i$  
(i refers to country)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Pooled Data</th>
<th>$-R^2$</th>
<th>Per capita GDP</th>
<th>Total direct and indirect tax revenues ($%$ of GDP) $^{13}$</th>
<th>Corruption Index</th>
<th>Spain</th>
<th>Portugal</th>
<th>Greece</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on Defense ($%$ of GDP)</td>
<td>40</td>
<td>0.96</td>
<td>0.0294*</td>
<td>-0.0205</td>
<td>-0.0031**</td>
<td>-0.0031 (-4.317)</td>
<td>0.0348</td>
<td>0.0400</td>
<td>0.0636</td>
</tr>
<tr>
<td>Expenditure on Education ($%$ of GDP)</td>
<td>40</td>
<td>0.92</td>
<td>0.0328 (1.504)</td>
<td>0.0792*</td>
<td>0.0020*</td>
<td>0.0020 (2.344)</td>
<td>0.0032</td>
<td>0.0184</td>
<td>0.0009</td>
</tr>
<tr>
<td>Expenditure on Health ($%$ of GDP)</td>
<td>40</td>
<td>0.95</td>
<td>-0.0263* (2.064)</td>
<td>0.0669**</td>
<td>0.0020** (4.107)</td>
<td>0.0143</td>
<td>0.0021</td>
<td>-0.0021</td>
<td>0.0363</td>
</tr>
<tr>
<td>Expenditure on Social Security and Welfare ($%$ of GDP)</td>
<td>40</td>
<td>0.98</td>
<td>-0.0015 (-0.301)</td>
<td>0.0042</td>
<td>0.0005* (2.412)</td>
<td>0.0138</td>
<td>0.0035</td>
<td>-0.0001</td>
<td>0.0061</td>
</tr>
<tr>
<td>Total Consumption Expenditure ($%$ of GDP)</td>
<td>40</td>
<td>0.55</td>
<td>0.0265 (0.506)</td>
<td>0.2769** (3.399)</td>
<td>0.0050** (2.418)</td>
<td>0.0744</td>
<td>0.0728</td>
<td>0.0915</td>
<td>0.0576</td>
</tr>
</tbody>
</table>

$t$-statistic in parentheses.

**Statistically significant at 1%. *Statistically significant at 5%.

Table 4

$^{13} corr(TAXREV, COR) \approx -0.27$
As seen from Table 4, the corruption coefficient proves to be strongly robust to the various estimations performed. Controlling for additional explanatory variables does not alter neither the significance nor the sign and the magnitude of the estimates. This is mostly observed in the case of health expenditures where both coefficients of the new variables are statistically different from zero. The above may be due to the fact that a large proportion of this category of spending is committed to doctors’ and nurses’ salaries. Apparently this does not leave much room for bribe opportunities. On the other hand the impact on government expenditure on education falls by about 26% compared to the previous regression, but still remains in quite substantial level.

However, it is tempting to wonder whether there would be any change if one controlled for additional variables that are considered to be determinants of each individual category of public expenditure. Once again the problem of lack of a corresponding economic theory and data availability do arise, making thus necessary to impose some ad hoc assumptions. I perform such regressions for the cases of expenditures on education and social security and welfare. As far as the first category is concerned I control for the number of pupils enrolled to pre-primary, primary and secondary education as a percentage of total population, which appears to be an obvious determinant of education expenditure. For the case of social security and welfare spendings, I use as an additional explanatory variable the unemployment rate, since these transfers include unemployment benefits. Table 5 summarizes the results.

Model 4: Education Exp.\(_{it}\) = \(c_i + \beta \times \text{Corruption}_{it} + \gamma \times \text{Per capita GDP}_{it} + \delta \times \text{Total D. & Ind. Tax Rev.} \% \text{GDP}_{it} + \phi \times \text{Pupils enrolled}_{it}\) (i refers to country)

Social Sec. & Welfare Exp.\(_{it}\) = \(c_i + \beta \times \text{Corruption}_{it} + \gamma \times \text{Per capita GDP}_{it} + \delta \times \text{Total D. & Ind. Tax Rev.} \% \text{GDP}_{it} + \phi \times \text{Unemployment rate}_{it}\) (i refers to country)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Pooled Data</th>
<th>(R^2)</th>
<th>Per capita GDP</th>
<th>Total direct and indirect tax revenues (% of GDP)</th>
<th>Pupils enrolled (% of total population)(^{14})</th>
<th>Unemployment rate(^{15})</th>
<th>Corruption index</th>
<th>Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on Education (% of GDP)</td>
<td>40</td>
<td>0.95</td>
<td>0.0101</td>
<td>0.1394**</td>
<td>0.2389**</td>
<td>0.0026**</td>
<td>-0.0589</td>
<td>Spain</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.539)</td>
<td>(4.392)</td>
<td>(4.047)</td>
<td></td>
<td></td>
<td>Portugal</td>
</tr>
<tr>
<td>Expenditure on Social Security and Welfare (% of GDP)</td>
<td>40</td>
<td>0.98</td>
<td>-0.0026</td>
<td>0.0027</td>
<td>-0.0106*</td>
<td>0.0004**</td>
<td>0.0161</td>
<td>Greece</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(-0.518)</td>
<td>(0.349)</td>
<td>(-1.724)</td>
<td></td>
<td></td>
<td>Italy</td>
</tr>
</tbody>
</table>

**Statistically significant at 1%. *Statistically significant at 5%.

**Table 5

\(^{14}\) \(\text{corr(PUPILS, COR)} \approx 0.01\). The fact that the percentage of pupils enrolled and corruption are not significantly correlated does not mean that adding the former to the model does not help at all in specifying better the contribution of corruption. This is due to the fact that the magnitude of \(\phi\) (0.2389) is quite considerable.

\(^{15}\) \(\text{Corr(UN, COR)} \approx 0.2\)
Once again, when controlling for determinants of specific types of government expenditure, the significance as well as the sign and the magnitude of the corruption coefficient does not seem to alter. Note however that in the case of social security and welfare, the unemployment rate is marginally significant at the conventional level. Thus and since the rest of the variables used are insignificant, the results may be considered tentative. The greater impact appears to be on education expenditure. More specifically in this better specified model it is anticipated that a one-standard-deviation improvement to the corruption index would: increase expenditure on education by 0.25 % of GDP in Spain, 0.2 % of GDP in Portugal, 0.22 % of GDP in Greece and 0.12 % of GDP in Italy. To give another example, if Greece would have managed to achieve a corruption rating of 6, then it would increase its expenditures on education by 0.5 % of GDP. This is quite considerable given the fact that the educational system in this country suffers each year for the last 20 years by teacher strikes (which are mainly motivated due to low educational spending).

5.4 Some considerations

As it has been argued in a previous section, the investigation of the qualitative and quantitative impacts of corruption to the various components of public expenditure suffers from certain problems. Apart from the subjective corruption index used, the major problem is the lack of an economic theory that pins down the determinants of each government spending. This creates endogeneity and omitted variables problems, which tend to produce biased and inconsistent estimates. Therefore all results cannot be considered as flawless. However, the regressions revealed one important conclusion. The corruption coefficient proved to be quite robust to a
number of changes in specification\textsuperscript{16} and its size and sign did not seem to change significantly. Therefore and given the difficulties already explained, some confidence can rely on the estimation results.

As far as the impact of corruption on social security and welfare expenditures is concerned, it is true that one might have expected a positive relationship to arise. However, it has already been argued that the picture is less clear-cut within this domain. At least for the case of Greece, there have been many incidents of fraud on disability pensions and unemployment benefits. On the other hand, the bribes involved in these cases are relatively small, mainly because the target group consists of low-income people. Therefore and compared to military spending, this category of public expenditure does not seem to provide large lucrative opportunities for corrupt officials.

6. Concluding remarks

Our brief review of the literature revealed the important role of the degree of market competition as far as corruption incentives are concerned. Although the standard principal-agent model does raise some questions, the conventional approach suggests that corruption is a result of government intervention and weak state management. This can have large implications for the composition of government expenditure when one considers that corrupt government officials may try to channel public funds to those spendings that provide more lucrative opportunities.

\textsuperscript{16} I also experimented adding log(GDP), square of log(GDP) and the inflation rate as additional regressors but I did not find any notable changes.
Using this scenario, this essay investigated the relationship between four major categories of government expenditure and corruption based on the method of pooled least squares for Spain, Portugal, Greece and Italy during the period 1982-1995. The results proved to be more robust and worrying than in Mauro. I found that expenditures on defence may be positively related to the level of corruption. This can be attributed to the fact that this type of spending is the most difficult one to be monitored by people as it involves transactions in high technology products. Further, corruption was found to reduce expenditures on education, health and social security and welfare. Its greater impact was nevertheless on health and education, probably because in general their provision is not associated with sophisticated equipment provided by international (or domestic) monopolies and oligopolies. The implications for the latter can be better understood when one considers that the international literature has gathered robust evidence that government spending on education is an important determinant of economic growth.

Although in some cases the additional variables employed, were not statistically significant (as it was for example the case of expenditures on defence with respect to tax revenues), the results were quite robust in general and suggest that improvements to the monitoring and accounting system should strongly be considered by governments. Overhauling the system of incentives as well as increasing the share of those spendings that stand as particularly unattractive to corruption should be considered as measures of immediate response and utmost importance.
References


