CESifo WORKING PAPERS

10956
2024

February 2024

The Impact of Government Size on Corruption: A Meta-Regression Analysis

Graziella Bonanno, Lucia Errico, Nadia Fiorino, Roberto Ricciuti

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: https://www.cesifo.org/en/wp

CESifo *Working Paper No. 10956*

The Impact of Government Size on Corruption: A Meta-Regression Analysis

Abstract

We perform a Meta-Regression Analysis (MRA) of the literature on government size and corruption, examining 450 empirical estimates retrieved from 44 primary papers published from 1998 to 2022. We find considerable heterogeneity in the results, mainly depending on whether the paper is published or not, accounts for endogeneity and uses panel or cross-sectional data. Moreover, the type of indicator used to measure corruption has a significant impact on the sign of the relationship with government size. Finally, adding variables defined at the country level as regressors, per capita GDP does not lead to significant results, whereas we find a positive relationship between the countries' corruption index and the effect size.

JEL-Codes: H110, H500, D730, C830.

Keywords: corruption, survey, government size, public expenditure, meta-analysis.

Graziella Bonanno
University of Salerno / Italy
gbonanno@unisa.it

Lucia Errico
University of Calabria / Italy
lucia.errico@unical.it

Nadia Fiorino
University of L'Aquila / Italy
nadia.fiorino@univaq.it

Roberto Ricciuti
University of Verona / Italy
roberto.ricciuti@univr.it

1. Introduction

In 2018, the UN Secretary-General António Guterres, citing estimates by the World Economic Forum, said the global cost of corruption is at least $2.6 trillion, or 5 percent of global GDP. Moreover, every year businesses and individuals pay more than $1 trillion in bribes.[1] Although the credibility of corruption statistics has been put into question (Wathne and Stephenson, 2021), there is a consensus that the cost of corruption is greater than the sum of money lost: according to Mauro (2021), distortions in spending priorities caused by corruption undermine the ability of the state to promote sustainable and inclusive growth and divert public resources away from education, healthcare, and infrastructure, the types of investments that typically improve economic performance and living standards.

A large body of literature, from the 1990s when data became more widely available, has investigated the causes and consequences of corruption, defined as the exploitation of a public office for personal benefit (Mauro, 1995; Rose-Ackerman 2007, 1999). As a result, several surveys have reviewed the achievements and the missing points in the literature (e.g., Rose-Ackerman, 1999; Tanzi, 1998; Jain, 2001; Aidt, 2003; Lambsdorff, 2006; and Treisman, 2007). In particular, the causes of corruption have received a great deal of attention. These factors fall into several groups such as economic variables (economic development, government size, openness to international trade, state intervention in the economy, the endowment of natural resources), socio-cultural variables (legal system, colonial heritage, religion, ethnolinguistic fragmentation, education) and political variables (basic political rights, uninterrupted democracy, freedom of information, the spread of mass media, federalism, the electoral system, political instability).

Of these, government size - the degree of participation by governments in the economy - has been considered a potential breeding ground for corruption. From an analytic perspective, a relevant point in the literature that analyzes the link between corruption and government size concerns the definition and, as strictly linked to the latter, the measurement of government size. The term ‘government size’ refers to public intervention in the form of spending decisions and employment (bureaucracy). The first hinges on public budgets and therefore the size of public expenditure. The second concerns the number of bureaucrats and/or the related expense, such as wages and salaries (see Niskanen, 1971).[2] Empirical models on the relationship between government size and corruption have produced mixed results, reflecting different viewpoints on the role of large governments. Most of the literature

[1] https://press.un.org/en/2018/sc13493.doc.htm

[2] Niskanen (1971) defines government bureaucrats as agents seeking to maximize the size of their budgets and points out that they have no incentive to be efficient.

considers that while a certain degree of government intervention is instrumental in remedying market failures, excessive intervention (an increase in government size) provides more opportunities for political rent-seeking (more resources can be stolen from the public budget), leading politicians and monopolist bureaucrats to become more corrupt, inhibiting market competition and generating government failures (e.g., Rose-Ackerman, 1978, 1999). Hence, a larger government may increase the risk of predatory behaviour by government agents. This view directly connects to the "crime and punishment" model (Becker, 1968) which suggests that big governments increase the expected benefits (payoffs) of illegal activities and, as a result, incentivize illegal activities, including corruption. This is especially the case in spending areas characterized by low competition, high technological content (such as defense spending) and/or where spending is discretionary and therefore less transparent (Gupta, et al., 2002; Glaeser and Shleifer, 2003; Adsera et al., 2003). Nevertheless, different explanations and controversial results for the linkage under investigation are rather common (e.g., Alesina and Angeletos, 2005; Méon and Sekkat, 2005; Kotera et al., 2012; Billger and Goel, 2009). For example, some prominent studies suggest that an increase in government size should reduce corruption since a larger government can enshrine a system of checks and balances (i.e., with improved oversight) and strengthen voice and accountability. This view is based on the evidence that long-established economically-developed liberal democracies generally have larger governments and are less corrupt than developing countries, since large governments are better able to provide public goods, such as education and services, which in turn boost human capital and the quality of life (Berry and Lowery, 1987), encouraging entrepreneurship and efficient capital markets (e.g., Audretsch et al., 2015), and providing citizens with more tools to monitor corrupt activities (e.g., Lipset, 1960; La Porta et al., 1999; Billger and Goel, 2009). In light of these empirical results, it is unclear whether large governments enhance corruption. This makes it difficult for researchers and policy-makers to draw unambiguous conclusions about the effect of the former on the latter variable, which in turn has significant consequences in terms of the policy design of anti-corruption measures.

This paper aims to provide the first meta-regression analysis (henceforth MRA) of the government size/corruption nexus, filling the evidence gap in the literature. Specifically we (i) provide a statistical synthesis of the existing research on government size as a driver of corruption; (ii) assess the competing claims about the impact of government size on corruption; (iii) explore the sensitivity of the reported empirical results; and (iv) investigate and correct the evidence base for publication and misspecification biases. To this end, we select 44 articles (for 450 observations/estimations) that use quantitative methods to evaluate the impact of government size on corruption. Our sample mirrors the diversity in the literature. As indicated above, most of the existing literature points to a positive effect of government size on corruption; however, we found articles that suggest the opposite and others that rule out any link between the two. A closer look at these divergent findings shows that they depend on the sample of countries analyzed, on the measures adopted for corruption as well as government size, on estimation methods, data structure and the model specifications used by scholars.

Within this framework, meta-analysis provides an objective and verifiable means to synthesize the evidence and to explain why the results systematically differ in and between the various studies (Cooper et al., 2019; Hedges and Olkin, 1985). Meta-analysis embodies a rigorous approach combining heterogeneous outcomes in a single estimation. It also ensures objectivity and the replicability of the results, following a peer-reviewed and pre-published systematic protocol specifying the search, inclusion/exclusion and data extraction criteria.

By applying MRA to a wide set of observations, we address several relevant issues. The first concerns whether the sample size, measures, estimation methods, data structure and specification of the models used in the primary papers influence the estimated impact of government size on corruption. Since all of these factors refine the focus of the problem, they can create heterogeneity in the reported estimates, making it very difficult for traditional narrative reviews to draw robust and valid inferences. Moreover, taking into account the country to which the primary paper refers, the MRA includes per capita GDP and corruption defined at the country level. These country variables are meant to capture how the context in which the countries operate affects the heterogeneity in the government size/corruption nexus. By contributing to the debate on methodological issues, we indirectly add to the wide methodological discussion concerning the various proxies for corruption, particularly the divergence between perceived - Transparency International or World Bank - and experience-based measures of corruption -the International Crime Victims Survey - (see, e.g., Kurtz and Schrank, 2007; Treisman, 2007; Svensson, 2005; Gutman et al., 2020). Our paper also indirectly sheds light on the policy implications raised by the analyses of the government size/corruption nexus. Indeed, the positive or negative sign of government size in relation to corruption helps to answer the question of whether larger government intervention can remedy market failures and promote economic development without increasing corruption.

The paper is organized as follows. Section 2 introduces Meta-Analysis techniques, traces the history of its use and analyzes the steps involved. Section 3 describes the primary literature. In section 4 the empirical strategy is illustrated, and section 5 presents the empirical results. Section 6 concludes.

2. Meta-Regression Analysis

2.1 Some history

Since the contributions of Glass (1978) and Stanley and Jarrell (1989), meta-analyses have become increasingly popular. Several new techniques have emerged in recent years, and a sort of gold standard procedure has been codified (Havránek et al., 2020; Irsova et al., 2023). More than 1,100 MRA papers in Economics from 1980 to 2020 were published, with exponential growth in the 2000s.

However, the statistical ideas behind meta-analysis predate these contributions. For example, Fisher (1944) noted that “When a number of quite independent tests of significance have been made, it sometimes happens that although few or none can be claimed individually as significant, yet the aggregate gives an impression that the probabilities are on the whole lower than would often have been obtained by chance”. This observation was the source of the idea of aggregating probability values. Cochran (1953) discussed a method of averaging means across independent studies and laid down much of the statistical foundation on which modern meta-analysis is built (e.g., inverse variance weighting and homogeneity testing).

Among the seminal contributions establishing meta-regression analysis (henceforth MRA), Glass (1978) statistically aggregated the findings of 375 psychotherapy outcome studies and called his method “meta-analysis”. Stanley and Jarrell (1989) wrote a seminal paper for Meta-Regression Analyses, defining meta-regression analysis as the regression analysis of regression analyses aiming to objectify the review process by providing a framework for replication and offering a sensitivity analysis for model specification.

2.2 A Brief Description of Meta-Regression Analysis

The traditional systematic reviews, which provide a qualitative analysis of a stream of literature, offer a useful summary of a topic and tend to focus on statistical significance testing to decide whether there is an effect. However, two shortcomings arise: significance testing is not well suited to this task because it depends significantly on sample size; in addition, the comparability of studies can be problematic because it may not be easy to establish what the same studies are.

In this paper, we propose MRA to analyze the literature on government size as a determinant of corruption. MRA offers several advantages compared to a qualitative survey. A meta-regression analysis is a statistical method that uncovers more about a phenomenon studied in a large set of empirical works. By investigating the relationship between the dependent variable (i.e., the efficiency scores of primary studies) and some features of each paper, MRA provides a systematic synthesis of a substantial number of studies and quantifies the role that specific aspects of original papers play in explaining the heterogeneity of the results (Glass, 1976; Glass et al., 1981; Stanley and Jarrell, 1989; Stanley, 2001).

Specifically, it evaluates the relationship between the dependent variable (that is the main result of the analyzed studies) and numerous features in every paper. The dependent variable is the “effect size” of the original papers. In other words, by modelling all the relevant differences between studies of a given subject, MRA fosters an understanding of the role of each varying factor in determining the heterogeneity of outcomes. Briefly, it resolves the difficulty of comparing the results of empirical works. As in any other survey, the selection of the studies to be meta-reviewed is an important phase of the research. This selection is driven by a set of criteria to be satisfied and tends to cover all the literature without restrictions based on the reviewer’s judgments. This ensures that meta-studies suffer less than qualitative reviews from potential bias when reviewing the literature on a specific topic.

3. Dataset collection

To carry out a reliable MRA, we collect the primary papers from numerous archives: Google Scholar, Scopus, Mendeley, ABI Inform, and references from qualitative reviews (Gusenbauer and Haddaway, 2020). In addition, cross-paper searches were carried out. Some journal archives are available from the library system of the University of Calabria (including via *Proxy* service).

Figure 1 sets out the PRISMA[3] chart (Havránek et al., 2020), illustrating details of the different steps followed to collect the primary papers.

Specifically, we ran the paper search using different criteria. First, we used the words “corruption” and “government size” or “public spending” to search for the title of the paper, abstract, and keywords. 9980 results were obtained in Google Scholar, while in the scientific databases, the number was significantly lower: 69 in Scopus, 274 in Mendley, and 1164 in ABI Inform (the latter including theses).

Secondly, the search was refined by looking for “estimation” and “empirical analysis” in the titles, abstracts, and keywords. The main journals in the field were consulted manually, and papers were further selected with a focus on the impact of government size on corruption. References from the qualitative survey of Dimant and Tosato (2018) were subsequently scanned. Before filtering this sample of papers, we verified that they (a) conducted empirical analyses and (b) were published in

[3] PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

English in a journal or as a discussion paper. This process resulted in the selection of 84 papers and was concluded on 28 February 2023.

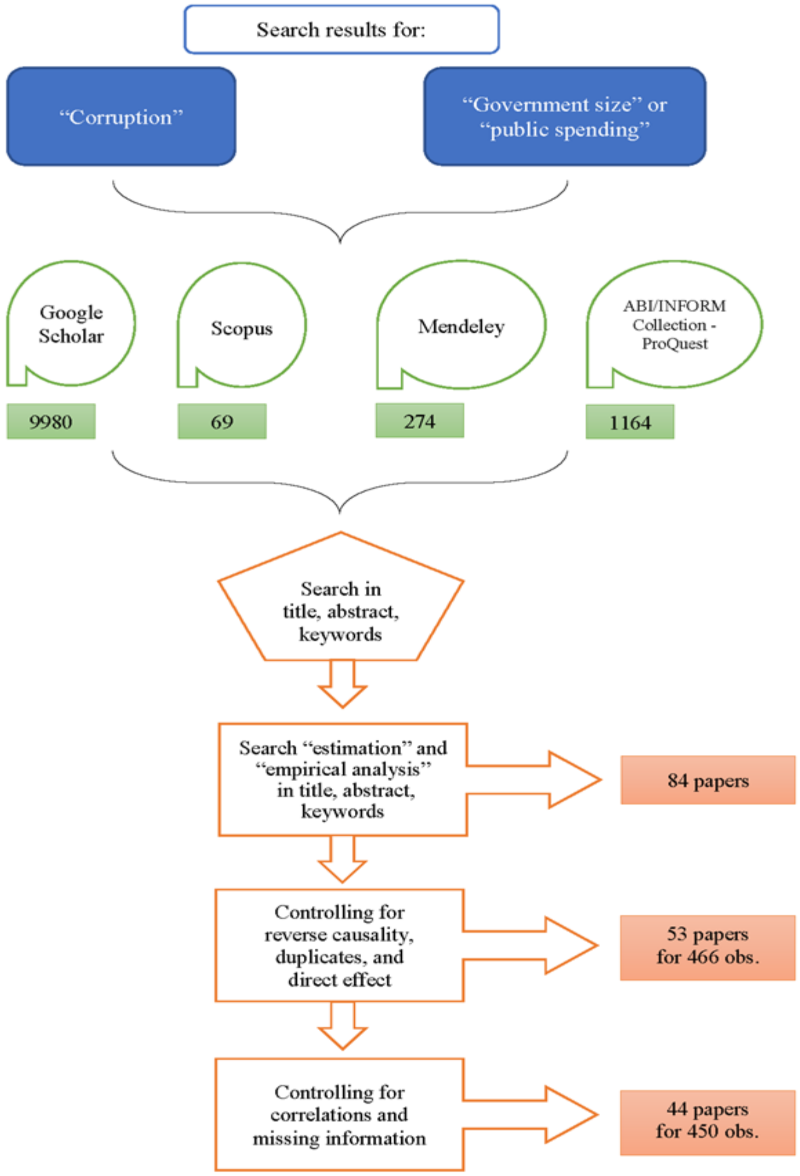

Figure 1. The PRISMA of Corruption-Government size literature

Then, we checked the papers to see if they (a) focused on the direct impact of government size on corruption; (b) did not investigate the reverse relationship between them; and (c) did not appear twice in the sample. As a result, 31 contributions were withdrawn, resulting in a sample of 53 papers and 466 observations.

Finally, 9 papers (and 16 observations) were removed because they did not provide the essential data required for conducting the meta-analysis (the estimated outcome and its standard error). Hence, the search yielded a sample of 44 papers (including 5 working papers) published from 1998 to 2022 with 450 observations (Figure 1).[4] In the Appendix, Table A1 sets out the primary papers collected.

4. Empirical Strategy

4.1 The partial correlation index, variables and estimation technique

Since different studies use different units of measurement, their estimates are not directly comparable. To summarize and compare the results from various studies, it is necessary to compute standardized effect sizes. We therefore compute the partial correlation coefficients (PCCs), which measure the association between corruption and government size whereas other explanatory variables are held constant. PCCs are comparable because they are independent of the metrics by which the independent and dependent variables are measured.

The partial correlation index (PCC) is defined as follows (see Ugur, 2014; Valickova et al., 2015; and Doucouliagos et al., 2022, among others):

$$PCC_{ij} = \frac{t_{ij}}{\sqrt{t_{ij}^2 + df_{ij}}} \qquad (1)$$

where i indicates the single estimation in the j-th primary paper, t is the test statistic for the significance of β, and df is the degrees of freedom for estimating β.

The standard error for the PCC is:

$$SE_{ij} = \frac{PCC_{ij}}{t_{ij}} \qquad (2)$$

To run our MRA on the impact of government size on corruption, we use the following model:

$$PCC_{ij} = \beta_0 + \beta_1 SEr_{ij} + \sum_k \beta_k X_{kij} + \varepsilon_{ij} + u_i \qquad (3)$$

where $\varepsilon_{ij} \sim N(0, \sigma_{ij}^2)$ is the within-study disturbance and $u_i \sim N(0, \tau^2)$ is the deviation due to the residual non-observable heterogeneity (between-study variance). The parameter τ^2 is a measure of between-study variability and is estimated as in Harbord and Higgins (2008). The group of variables X_{kij} comprises the explanatory variables summarizing various model characteristics in each study.

We adopt a two-step procedure as proposed by Gallet and Doucouliagos (2014) and applied in Aiello and Bonanno (2018; 2019). A Random Effect Maximum Likelihood (REML) regression is run in the

[4] Additional details on the dataset construction process are available upon request.

first step, and, in the second step, a WLS regression in which the weights include SEr_{ij} to correct the default heteroskedasticity and the value of τ^2 retrieved from the first step. This ensures that the estimates are robust to clustering at the study level.

4.2 Assessing heterogeneity in the literature on the corruption/government size nexus

An MRA can be run where there is heterogeneity in the literature. The sources of the heterogeneity must be included in the regressions as explicative variables. Figures 2-6 and Table 1 show details of the sources of heterogeneity in the study of government size and corruption.

The first source of heterogeneity/variable is the type of contribution (published/not published). Therefore, we estimate the Kernel density of the two types of paper. Fig. 2 shows a strong difference in the density estimates for the two types. The result is confirmed when testing for differences in means, as shown in Table 1 (5% significance level).

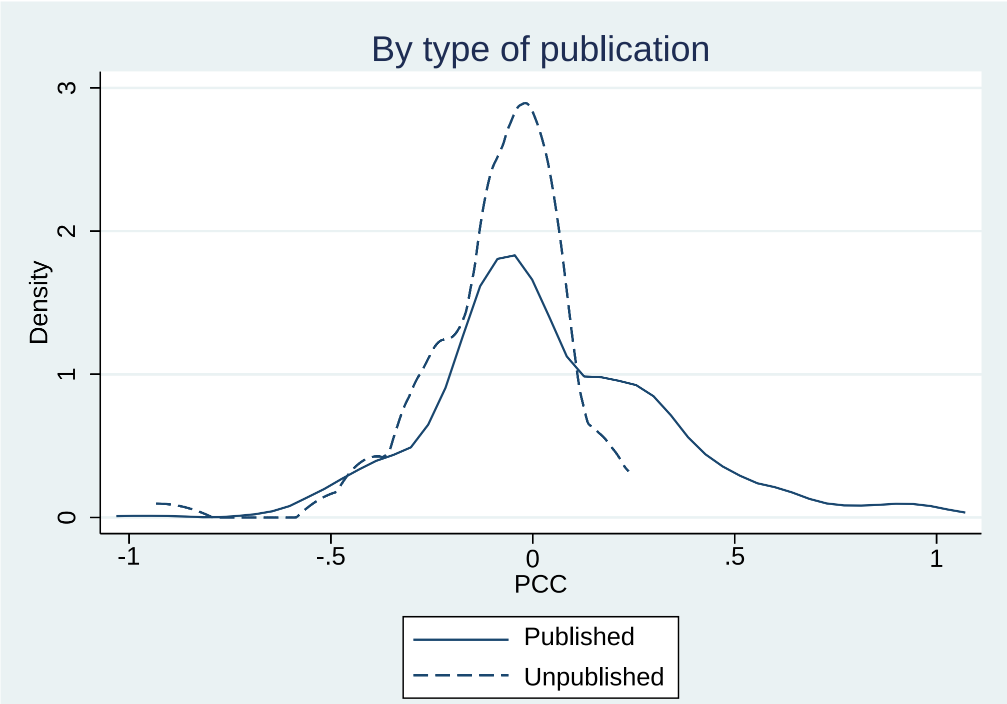

Figure 2 – Kernel density estimates for heterogeneity by type of contribution

A second source of heterogeneity could be the data type employed in the studies, either panel or cross-section data. Figure 3 shows that Kernel density estimates for the two types of data tend to differ substantially. Testing for differences in means confirms the results (5% significance level; see Table 1).

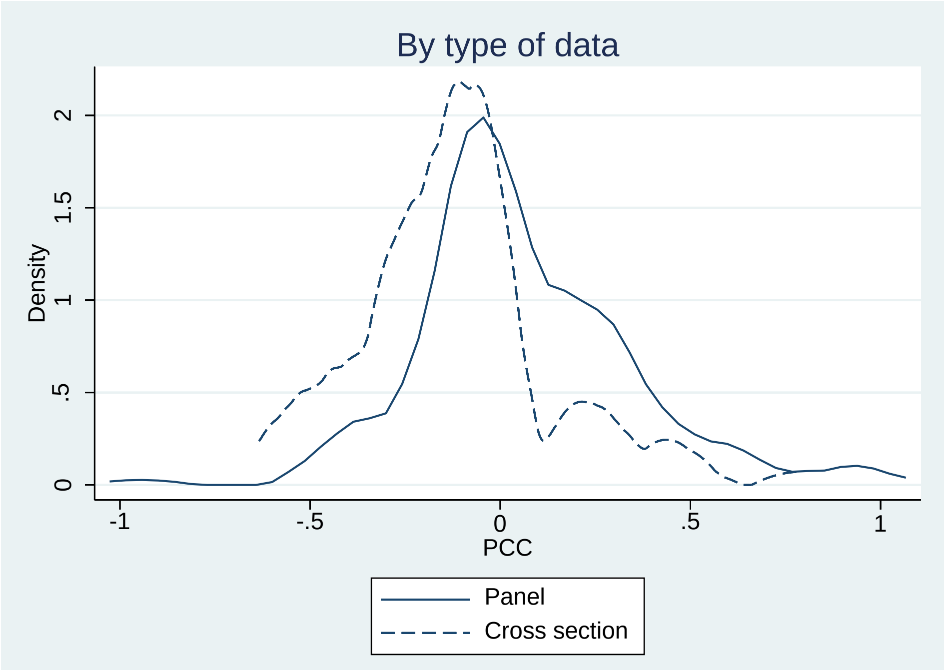

Figure 3 - Kernel density estimates for heterogeneity by data type

A third possible source of heterogeneity lies in the techniques used in the studies and whether or not they check for endogeneity among the variables of interest. Figure 4 shows the Kernel density estimates for these two types, and the results point toward the existence of differences between them. The difference in means test rejects the null hypothesis at the 10% significance level (Table 1).

In the primary papers included there is strong heterogeneity (variability) in both the proxies used to measure corruption and government size, as shown in Figures 5 and 6.[5] In this case, too, the tests for the presence of differences in means provide strong and significant results, as shown in Table 1.

[5] Several measures of corruption are used. For instance, the Corruption Perception Index (CPI) is compiled from various sources, including TI (Transparency International), GCR-WEF (The Global Competitiveness Report - World Economic Forum), EUBusSurvey (Eurobarometer Businesses' Attitudes towards Corruption), WGI (Worldwide Governance Indicators), Enterprise Surveys from the World Bank, Corruption Index from ICRG (International Country Risk Guide), and World Bank data. Other proxies involve tracking individuals charged with corruption and documented cases of corruption. Additionally, corruption measures encompass indicators like Corruption Experience, corruption risks, and the legal processes initiated, investigated, and adjudicated. When examining government size, the most commonly used measure is Government's final consumption expenditures as a percentage of the GDP. However, other measures, such as Government's investment expenditures as a share of the GDP and the number of public workers, are also utilized.

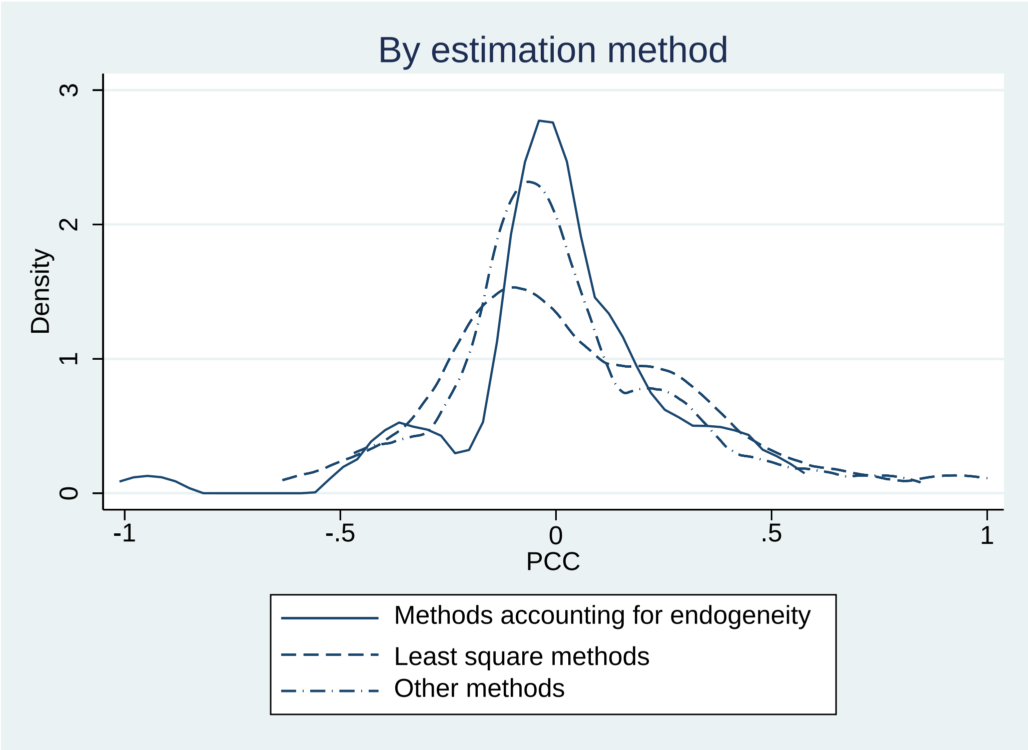

Figure 4 - Kernel density estimates for heterogeneity by estimation method

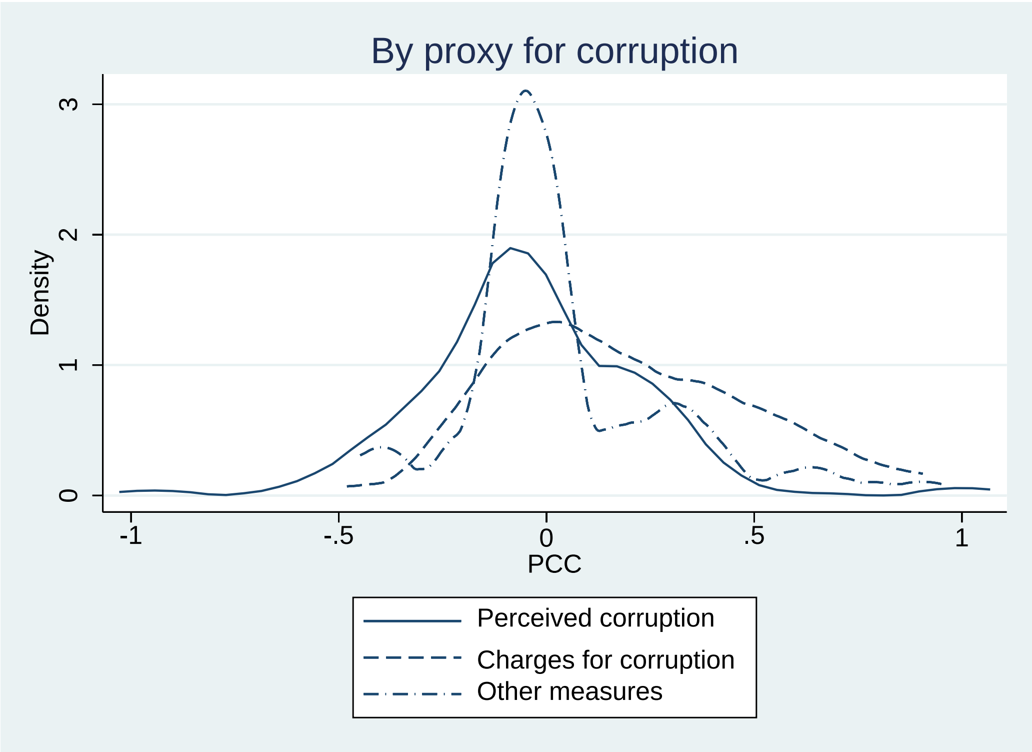

Figure 5 - Kernel density estimates for heterogeneity by proxy for corruption

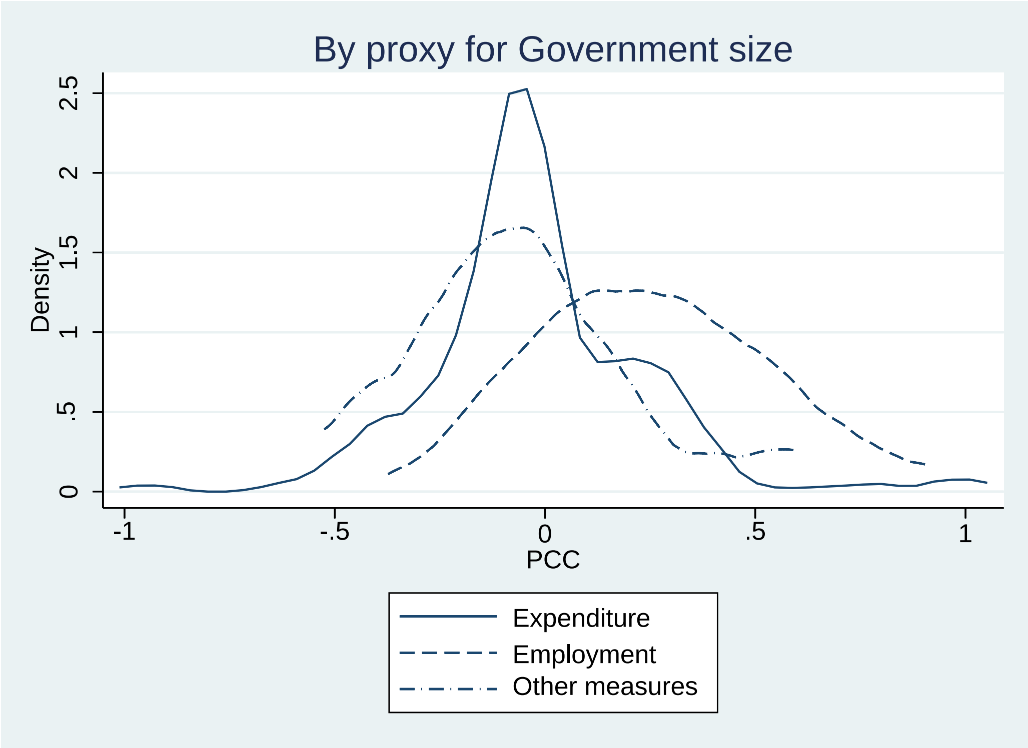

Figure 6 - Kernel density estimates for heterogeneity by proxy for government size

Table 1 shows the heterogeneity in our sample and Table 2 sets out the descriptive statistics of all variables included in our regressions.[6]

In detail, we employ a dummy variable equal to 1 for estimations retrieved from peer-reviewed papers, and 0 for estimations retrieved from working papers (*Published*). *Panel* is equal to 1 if the primary papers refer to estimations on panel data and 0 for cross-sectional data. Regarding the estimation method, we include two binary variables that capture the estimations obtained through the least square technique and methods accounting for the endogeneity (*OLS* and *Endogeneity*, respectively). The control group comprises all estimations obtained from the other types of methods used in the primary papers.

After checking all the factors considered study design variables, we use a set of regressors capturing specific characteristics of the literature. In particular, we include *Perceived corruption* (i.e., data that do not measure corruption itself but only opinions about its prevalence) and *Charges for corruption*

[6] Table A2 in the Appendix gives the correlation matrix, Table SM1 and Figure SM1 of Supplemental Material report the results of the detailed investigation about the heterogeneity of the sample. We use the Stata commands “meta forestplot” and “meta summarize” to show both graphically and analytically the presence of strong heterogeneity in our sample.

to investigate the role of the type of proxy for corruption used in the primary papers; other proxies for corruption (*Other measures*) are the control group.

Our focus is solely on the direct effects of government size on corruption. Primary studies draw upon 44 main sources of corruption data, which consist of scores based on perceived levels of corruption as well as on one objective measure of corruption. The scores have different scales, ranging from 0 to 6 for ICRG data; from −2.5 to +2.5 for World Governance Indicators data; from 0 to 12 for TI data; and different ranges in *Other corruption data sources*.[7] Except for Transparency International data, the higher the score, the less corruption. To ensure consistency, most of the original studies transform the corruption indices so a higher score indicates increased corruption. Regarding the objective measure of corruption, *Charges for Corruption* is the most commonly used indicator in our sample.

Similarly, *Govsize employment* and *Govsize expenditure* are used to check for the different types of measures of government size. In this case, we use the two variables alternatively since they are strongly correlated. Finally, we use some controlling variables, namely, two variables that are defined at the country level (degree of corruption and per capita GDP in thousands of US dollars).[8] This allows us to take into account the specific effects of each country included in the samples of primary papers (Aiello and Bonanno, 2018; 2019).

Expectations about the results when introducing per capita GDP are mixed. On the one hand, in high-income countries, the availability of increased financial resources may increase the probability of opportunistic behavior (Ades and Di Tella 1999, Treisman 2000). On the other hand, the impact of government size on corruption may be reduced given that richer countries are generally characterized by democratic institutions, spend more resources on education and have conveying institutions that aid political accountability externally (though unfettered media) and internally (through their internal checks and balances.

The second country observable used is the Control of Corruption retrieved from the World Bank DataBank website, capturing perceptions of the extent to which public power is exercised for private gain. The index uses a scale of -2.5 to 2.5, where low values denote high corruption. MRA findings

[7] Other corruption data sources include: Business Environment Risk Intelligence at http://www.beri.com/; Dreher et al. (2007) index at http://129.3.20.41/eps/pe/papers/0406/ 0406004.pdf; Economist Intelligence Unit Country Risk Service and Democracy Index at http://www.eiu.com/public/#; and Sachs and Warner (1997) index at http://jae.oxfordjournals.org/ content/6/3/335.full.pdf}html

[8] Country variables are taken from the World Bank DataBank website on World Development Indicators (WDI) [https://databank.worldbank.org/source/world-development-indicators].

can provide evidence of whether studies on the corruption-government size nexus for countries with high corruption yield results that differ from those obtained when focusing on less corrupt countries.

The other controls include the time trend based on the year of publication, the logarithm of the sample size used in the primary estimations and the logarithm of the number of regressors used in the primary regression models (*lDimension*).

Table 1. Sources of heterogeneity in the Corruption-Government size literature

	Mean	**SD**	**Obs.**
Full sample	0.031	0.286	450
Publication status			
Unpublished	-0.092	0.188	55
Published	0.048	0.293	395
Test on the difference in means (p-value)	**0.000**		
Data type			
Cross-section	-0.116	0.256	79
Panel	0.062	0.283	371
Test on the difference in means (p-value)	**0.000**		
Estimation approach			
Endogeneity	0.002	0.251	99
Least Square	0.051	0.315	230
Other	0.017	0.252	121
Test on the difference in means (p-value)	**0.067**		
Proxy for corruption			
Perceived corruption	-0.035	0.262	260
Charges for corruption	0.188	0.302	102
Other	0.043	0.265	88
Test on the difference in means (p-value)*	**0.000**		
Proxy for Government size			
Government size - Expenditure	-0.018	0.259	325
Government size - Employment	0.253	0.283	87
Other	-0.059	0.270	38
Test on the difference in means (p-value)*	**0.000**		

Notes
Authors’ elaboration on data collected.
Means are unweighted. t-test for difference in means: the bold p-values mean that the difference is statistically significant.
* All t-tests are carried out comparing the category vs all others.

Table 2. Descriptive statistics of the variables included in the regressions

Variables	Obs	Mean	Std. Dev.	Min	Max
PCC	450	0.0309	0.2861	-0.9603	1
Ser	450	0.0904	0.0795	0.0013	0.78
Precision effect (1/SEr)	450	38.2905	76.2753	1.2821	750.44
Published	450	0.8778	0.3279	0	1
Panel	450	0.8244	0.3809	0	1
Year of publication_trend	450	17.7444	6.6032	1	26
Endogeneity	450	0.2200	0.4147	0	1
Least Square	450	0.5111	0.5004	0	1
Perceived corruption	450	0.5778	0.4945	0	1
Charges for corruption	450	0.2267	0.4191	0	1
Govsize employment	450	0.1933	0.3954	0	1
Govsize expenditure	450	0.7222	0.4484	0	1
lSize	450	5.7739	2.0271	2.7726	11.2007
lDimension	450	2.0294	0.6070	0.6931	3.7136
Countries corruption	450	0.4829	0.7615	-0.6105	2.2340
Countries GDPpc	450	19.4284	14.7374	0.6244	49.8358

Notes
Authors' elaboration on data collected.

4.3 Investigation of Publication Bias

Studies with statistically significant findings are more likely to be published and are published more quickly than studies with null results. This is the issue of publication selection bias, whereby some researchers report only statistically significant results or results that are consistent with their priors (Christensen and Miguel, 2018). The publication bias distorts meta-averages, inflating them by a factor of 2 or more (Ioannidis et al., 2017). To address this issue, we conduct the FAT-PET test (Funnel-Asymmetry Test and Precision-Effect Test) (Stanley and Doucouliagos, 2007; Stanley, 2008) by estimating the following equation:[9]

$$r_{ij} = \beta_0 + \beta_1 SEr_{ij} + e_{ij} \tag{4}$$

Corrected for heteroskedasticity this becomes (dividing by SEr_{ij}):

$$t_{ij} = \beta_1 + \beta_0\, 1/SEr_{ij} + \varepsilon_{ij} \tag{5}$$

The FAT involves the test for $\beta_1 = 0$ and the PET tests for $\beta_0 = 0$ (funnel asymmetry and precision effect tests, respectively).[10]

[9] We also employed the FAT-PET-PEESE equation (Precision-Effect Estimation with Standard Errors test), which includes the square of SEr, in order to test for the presence of a non-linear effect between the PCC and its SEr (Doucouliagos et al., 2022). Results are quite robust (see Table A3 in the Appendix).

[10] Since many primary papers provide very few estimations (see Table A1 in the Appendix), we cannot compute clustered standard errors.

Table 3. Testing the presence of publication bias: the FAT-PET regression

	(1) FAT-PET with robust SE
β_1 (Bias)	0.7751***
	(0.2051)
β_0 (Precision term)	-0.0369**
	(0.0200)
Observations	450
Prob > F	0.000
Adjusted R square	4.08%

Notes

Authors' elaboration on data collected.

The dependent variable of the models is the partial correlation coefficient (PCC). Significance levels are the same resulting from the procedure proposed by Gallet and Doucouliagos (2014).

Significance levels: *** p<0.05, ** p<0.1, * p<0.2.

Both Table 3 and the funnel plot (Figure 7) consistently show the existence of asymmetry in the distribution of the partial correlation coefficients.

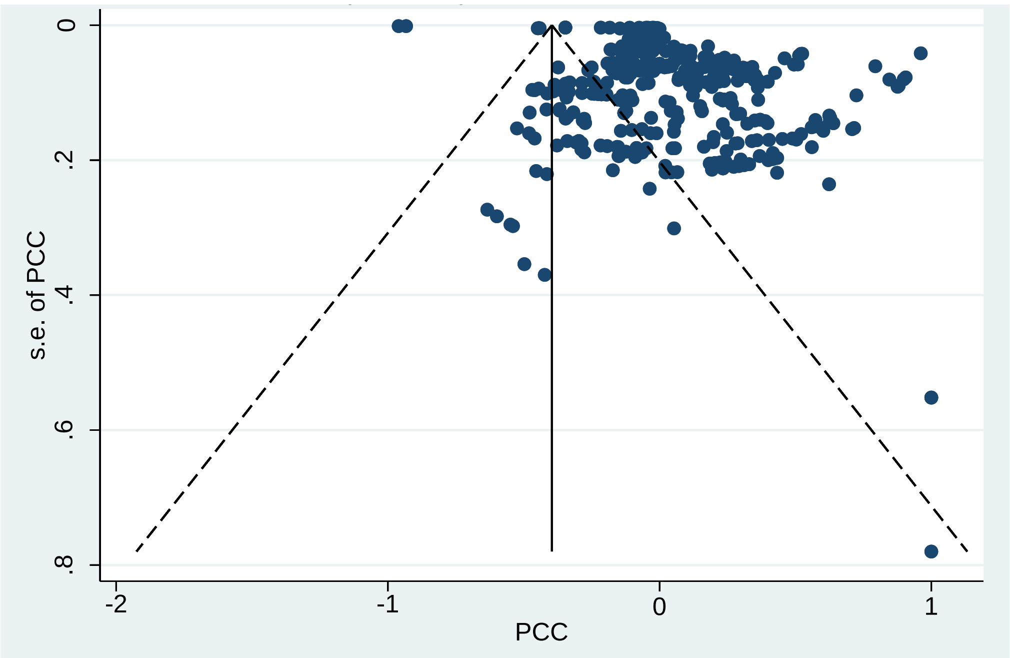

Figure 7 – Funnel plot with pseudo 95% confidence limits

5. Empirical results

The results shown in Table 4 start from the FAT-PET regression and describe the evolution of information on the funnel-asymmetry test. Column 2 shows a regression including only the dummies related to the study design used in the primary paper. Column 3 adds the variables related to the estimation method, and column 4 includes literature-specific variables. Column 5 checks for sample size and dimension, and columns 6 and 7 account for country observables.

Before discussing the results, it is worth noting that at the bottom of the table diagnostics of the models are set out guaranteeing the suitability of our estimation setting. In addition to standard F-statistics, tau2 shows the variance of effect size parameters over the population of studies and reflects the variance of the true effect sizes, which gives a measure of the amount of true heterogeneity.

As far as the study design is concerned, *Published* shows a slightly significant positive effect in columns 2-4, but it turns out not to be significant in the full models 5-7.

Interestingly, when the estimated results of the primary papers are set out on panel data, the effect of government size on corruption increases, as the estimated coefficients of *Panel* are always positive and equal to about 0.13 (except for column 4 where the coefficient is equal to about 0.1). This result is in line with an issue raised in the literature. Transparency International, provider of probably the most used perception index (CPI) warned against the use of the index over time (TI, 2011), and Treisman (2007, 220) and Andersson and Heywood (2009) have critically discussed this use. Moreover, from an econometric point of view, these indices exhibit limited variation over time, not only on a year-by-year basis but also over longer periods (Heywood and Rose, 2014). These authors call for the use of 10-year averages if one wants to analyze the evolution of corruption over time. Therefore, the positive effect of *Panel* may be more an artifice of the data than a genuine outcome. The time trend based on the year of publication is significant only in columns 4-7. Also, in this case, the estimated sign is positive.[11]

When we look at the estimation methods, both the variables employed (*Least Square* and *Endogeneity*) enable us to capture reductions in the effect size compared to other estimation techniques. The conclusion confirms that method types matter in understanding the relationship between corruption and government size.

Results are inconsistent when referring to the proxy for corruption used in the primary regressions. *Perceived corruption* has a significantly negative impact on the effect size, while *Charges for*

[11] We re-estimated the same models replacing the time trend based on the year of publication with the year of estimation. The results are quite robust and available on request from the authors.

corruption has a positive impact, although at a lower level. The latter positive effect may be related to the higher number of public officials in countries with large governments, increasing the potential for crime (Glaeser and Saks, 2006). Nevertheless, we do not find these results surprising. The literature is characterized by a long-standing debate on the measurement of corruption, a challenging issue due to the secretive nature of the phenomenon. Perception indices are the most commonly used but suffer from several limitations. Treisman cautions that the subjective indices may capture 'not observations of the frequency of corruption but inferences made by experts and survey respondents based on conventional understandings of corruption' (Treisman, 2007, p.212). In addition, perceptions have been shown not to predict the experience of corruption. Experience-based indicators, which deal with individual incidents of corruption and are included in the "Other" group in our analysis, have been proposed but are based on what respondents remember and how they assessed whether an official expected a bribe, hardly an objective measure. Gutmann et al. (2020) have shown that perceived- and experience-based indicators are not correlated and that variations in individual corruption perception cannot be explained by experience alone but are also affected by respondent and country characteristics. Finally, judicial statistics – such as *Charges for corruption* – are strongly depend on both the cultural characteristics of a country and criminal policy, and therefore are typically not suitable for cross-country comparison. All in all, our results point towards the risk of over/under-estimating the effect of government size on corruption when using different measures of corruption.

Our main Meta-Regressions include the dummy *Govsize expenditure* since more than 70% of our sample uses this proxy for government size. The variable has a significantly negative impact. In addition, we use *Govsize employment* as a robustness check (Table A4), which in turn is significantly positive.

Interesting findings are obtained when we check for a potential non-linear effect of sample size and dimension used in the primary papers. Both estimated coefficients for *lSize* and *lDimension* are negative. This confirms that with an improved fit, the estimated link between government size and corruption becomes sharper (i.e., the coefficient turns out to be more negative). Figure 8 shows the marginal effects of the dimension, while Figures 9 and 10 give the marginal effects of the sample size (for the whole sample and the first 85th percentiles, respectively).

Finally, we add per capita GPD and Corruption defined at the country level as regressors, separately because of the strong correlation between these variables. There is a significantly positive relationship between country corruption and our effect size, whereas *GDPpc* does not lead to significant results. As regards the positive coefficient associated with Corruption, high index values (i.e. low corruption in the country) lead to a higher effect size. The latter finding is interesting, although unsurprising. A stream of literature maintains that higher-income countries tend to overestimate corruption, while the opposite happens in poorer countries (Gutman et al., 2020), possibly because in rich countries the expectation for greater accountability is somehow frustrated.

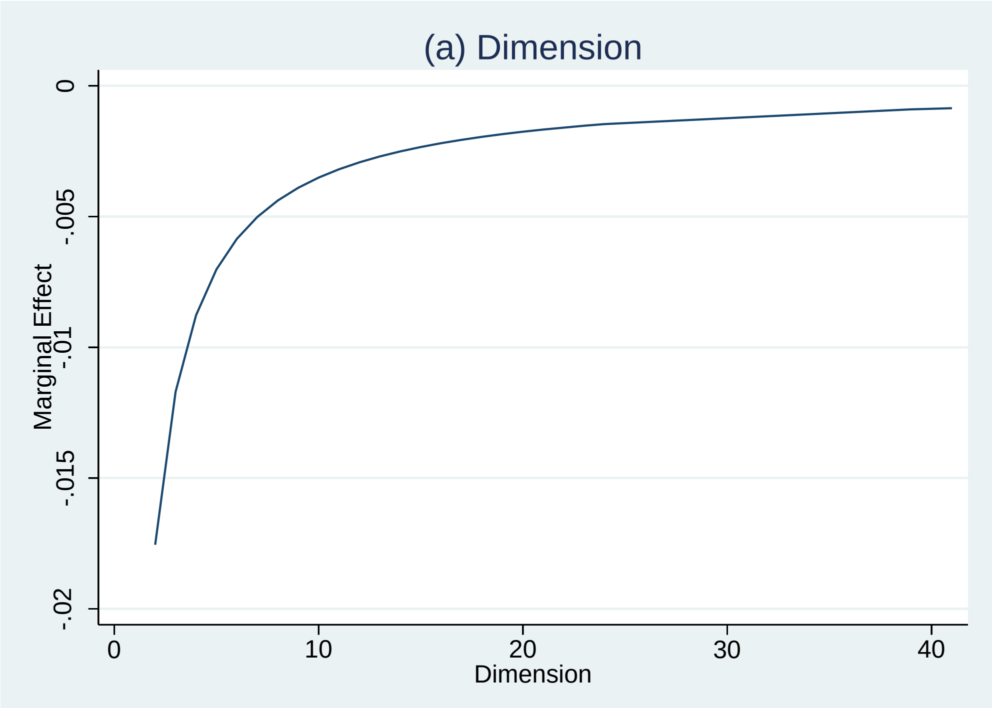

Figure 8. Marginal effects of dimension

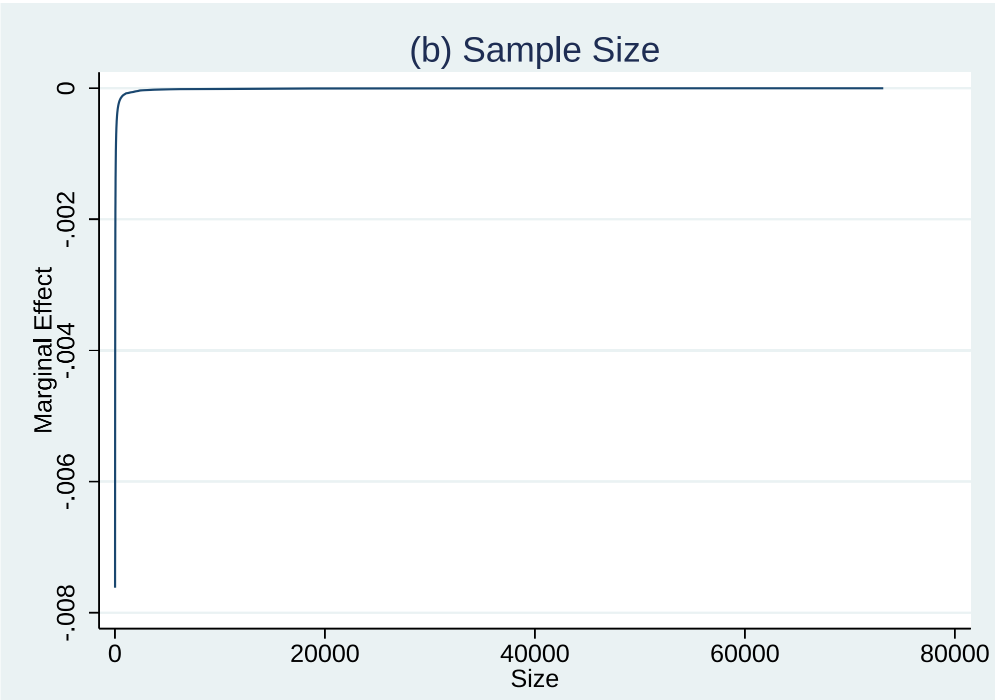

Figure 9. Marginal effects of sample size (all sample)

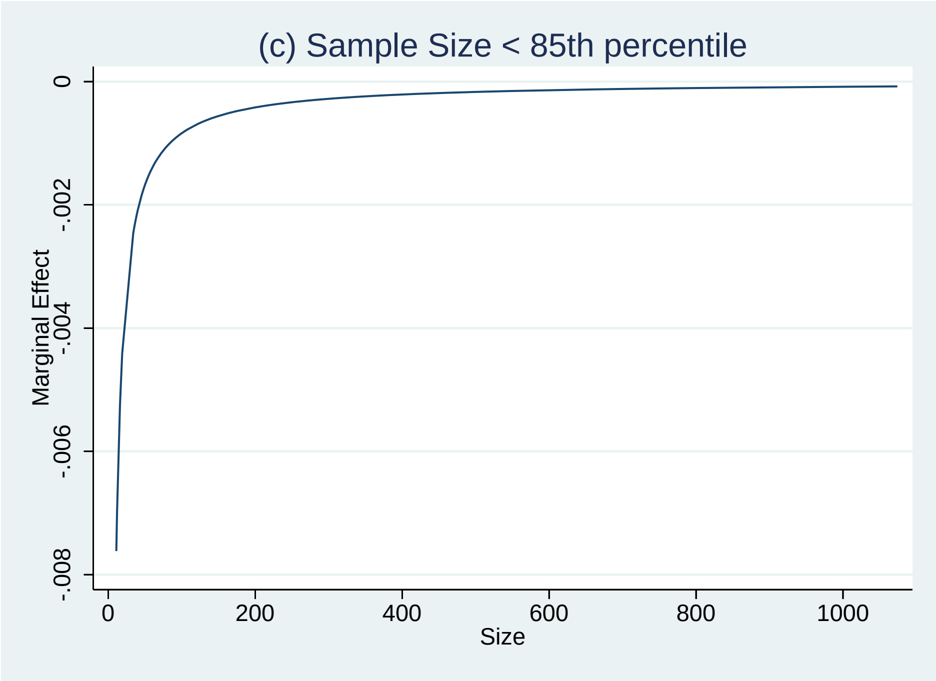

Figure 10. Marginal effects of sample size (1-85 percentiles of the distribution)

Table 4. Main Meta-Regressions on Corruption&Government Size

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FAT-PET	Study design	Estimation method	Specific variables	Size and dimension	Countries observables	
β_1 (Bias)	0.7751***	0.7430***	0.7065***	0.4541**	-1.4446***	-1.4934***	-1.4293***
	(0.2051)	(0.2355)	(0.2438)	(0.2389)	(0.3129)	(0.3144)	(0.3200)
β_0 (Precision term)	-0.0369**	-0.1904***	-0.1774***	-0.1398***	0.6267***	0.5948***	0.6318***
	(0.0200)	(0.0570)	(0.0607)	(0.0631)	(0.1027)	(0.1051)	(0.1060)
Published		0.0638**	0.0659**	0.0523*	-0.0387	-0.0342	-0.0394
		(0.0378)	(0.0379)	(0.0361)	(0.0345)	(0.0346)	(0.0348)
Panel		0.1383***	0.1396***	0.0982***	0.1310***	0.1324***	0.1311***
		(0.0349)	(0.0350)	(0.0346)	(0.0321)	(0.0321)	(0.0322)
Year of publication_trend		-0.0008	-0.0011	0.0057***	0.0110***	0.0112***	0.0109***
		(0.0022)	(0.0022)	(0.0024)	(0.0023)	(0.0023)	(0.0023)
Endogeneity			-0.0306	-0.0323	-0.0821***	-0.0873***	-0.0807***
			(0.0345)	(0.0328)	(0.0308)	(0.0310)	(0.0315)
Least Square			-0.0023	0.0044	-0.0526**	-0.0536***	-0.0521**
			(0.0299)	(0.0283)	(0.0283)	(0.0283)	(0.0284)
Perceived corruption				-0.0661***	-0.1355***	-0.1187***	-0.1390***
				(0.0318)	(0.0304)	(0.0325)	(0.0345)
Charges for corruption				0.1063***	0.06500**	0.0694**	0.0645*
				(0.0419)	(0.0392)	(0.0393)	(0.0393)
Govsize expenditure				-0.1067***	-0.1012***	-0.0997***	-0.1017***
				(0.0350)	(0.0324)	(0.0324)	(0.0326)
lSize					-0.0850***	-0.0828***	-0.0850***
					(0.0103)	(0.0104)	(0.0103)
lDimension					-0.0335*	-0.0376***	-0.0331*
					(0.0185)	(0.0192)	(0.0186)
Countries corruption index						0.0256*	
						(0.0178)	
Countries GDPpc							-2.22e-07
							(1.04e-06)
Observations	450	450	450	450	450	450	450

tau2	0.0573	0.0551	0.0552	0.0486	0.0383	0.0381	0.0385
F	14.28	9.733	6.641	11.03	17.78	16.52	16.27
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes
Authors’ elaboration on data collected.
The dependent variable of the models is the partial correlation coefficient (PCC). Significance levels are the same resulting from the procedure proposed by Gallet and Doucouliagos (2014).
Significance levels: *** p<0.05, ** p<0.1, * p<0.2.

6. Concluding remarks

Do larger governments affect corruption? The results from the empirical studies are unclear, depending on the definition, measurement and empirical methodology applied. This paper seeks to answer the question by collecting 450 observations from 44 primary studies published over the period 1998-2022 and using a meta-analysis to evaluate the impacts that government size may exert on corruption in primary studies.

Our results show enormous heterogeneity in the estimates and identify several sources for the variability. First, estimates of the impact of government size on corruption found in published papers are significantly higher than in unpublished papers. This result is not surprising, since journals tend to publish positive results. Second, when estimates are made by methods that correct for endogeneity, the impact of government size on corruption is significantly lower. Third, the choice of using panel data gives significantly higher government size impacts on corruption, but, as we argued above, this is probably the result of the low variability of the corruption data over time.

Another contribution of the paper is the use of per capita GDP and corruption defined at the country level as regressors. While the GDPpc does not lead to significant results, we find a positive relationship between country corruption and our effect size.

Finally, our MRA concludes that the results are sensitive to the measures used in the primary papers. This reinforces the issue of the reliability of data on corruption as raised after the initial publication of papers on corruption, including in leading journals. This remains an open question and our results suggest that the challenge of future research will be to refine the measures of both government size and corruption and to examine the patterns they reveal. This is not merely a scholarly issue. As UNDP (2008, 8) stated: “To put it plainly, there is little value in a measurement if it does not tell us what needs to be fixed”, therefore there is the need to develop actionable indicators that, in turn, lead to policy decisions that can reduce the levels of corruption.

Data Availability Statement

Data available in article supplementary material.

References

Adsera, A., Boix, C., Payne, M. (2003). Are you being served? Political accountability and quality of government. *The Journal of Law, Economics, and Organization*, 19(2), 445-490.

Afonso, A., de Sá Fortes Leitão Rodrigues, E. (2022). Corruption and economic growth: does the size of the government matter? *Economic Change and Restructuring*, 55(2), 543-576.

Aidt, T.S. (2003). Economic analysis of corruption: a survey. *The Economic Journal* 113(491): F632–F652.

Aiello, F., Bonanno, G. (2018). On the sources of heterogeneity in banking efficiency literature. *Journal of Economic Surveys*, 32, 194–225.

Aiello, F., Bonanno, G. (2019). Explaining Differences in Efficiency: A Meta-Study on Local Government Literature. *Journal of Economic Surveys*, 33, 999–1027.

Alesina, A. and Angeletos, G. (2005). Corruption, inequality, and fairness. *Journal of Monetary Economics*, 52(7), 1227-1244.

Ali, A. M., Isse, H. S. (2002). Determinants of economic corruption: A cross-country comparison. *Cato Journal*, 22, 449.

Amegavi, G. B. (2022). The heterogeneous effects of government size and press freedom on corruption in sub-Saharan Africa: method of moment quantile regression approach. *The International Journal of Press/Politics*, 27(2), 439-459.

Amirzadi, R., Khosrozadeh, A. (2015). The Relation Between Government Size and Corruption in Middle East Countries and North of Africa (Mena) Emphasizing on Iran. *Indian Journal of Fundamental and Applied Life Sciences*, 5, 1219-1226.

Angelopoulos, K., Philippopoulos, A. (2005). The role of government in anti-social redistributive activities. Available at SSRN 680525.

Ariva, M. S. Q. A. P. (2020). Determinants Influencing the Level of Corruption in Indonesia Local Governments. *Journal of Economics and Behavioral Studies*, 12(4(J)), 34-42.

Arvate, P. R., Curi, A. Z., Rocha, F., Miessi Sanches, F. A. (2010). Corruption and the size of government: causality tests for OECD and Latin American countries. *Applied Economics Letters*, 17(10), 1013-1017.

Aswar, K., Ermawati, J., Sumardjo, M., Nopiyanti, A. (2022). The Role of Law Enforcement on Moderating the Relationship between Government Size, Fiscal Decentralization, Audit Finding and Corruption. *Universal Journal of Accounting and Finance*, 10(1), 211-218.

Audretsch, D. B., Heger, D.,Veith, T. (2015). Infrastructure and entrepreneurship. *Small Business Economics*, 44(2), 219– 230.

Baklouti, N., & Boujelbene, Y. (2018). Moderation of the relationship between size of government and corruption by democracy. *Journal of the Knowledge Economy*, 9, 1210-1223.

Bel, G. (2022). Beyond government size: Types of government intervention and corruption. *Regulation & Governance*, 16(4), 1174-1196.

Becker, G. (1968). Crime and punishment. *Journal of Political Economy*, 76(2), 169-217.

Bergh, A., Fink, G., Öhrvall, R. (2012). Public sector size and corruption: Evidence from 290 Swedish Municipalities (No. 938). *IFN Working paper*.

Bergh, A., Fink, G., Öhrvall, R. (2017). More politicians, more corruption: evidence from Swedish municipalities. *Public Choice*, 172, 483-500.

Billger, S. and Goel, R. (2009). "Do existing corruption levels matter in controlling corruption? Cross-country quantile regression estimates". *Journal of Development Economics* 90, 299–305.

Brunetti, A., Weder, B. (2003). A free press is bad news for corruption. *Journal of Public Economics*, 87(7-8), 1801-1824.

Cochran, W. G. (1953). Matching in analytical studies. *American Journal of Public Health and the Nations Health*, 43(6_Pt_1), 684-691.

Cooper, H., Hedges, L. V., and Valentine, J. C. (2019). *The Handbook of Research Synthesis and Meta-Analysis*. New York: Russell Sage Foundation.

Corrado, G., Rossetti, F. (2018). Public corruption: A study across regions in Italy. *Journal of Policy Modeling*, 40(6), 1126-1139.

Del Monte, A., Papagni, E. (2007). The determinants of corruption in Italy: Regional panel data analysis. *European Journal of Political Economy*, 23(2), 379-396.

Dimant, E. and Tosato, G. (2018). Causes and Effects of Corruption: What Has Past Decade's Empirical Research Taught Us? A Survey. *Journal of Economic Surveys*, 32: 335-356.

Doucouliagos, C., de Haan, J., Sturm, J. E. (2022). What drives financial development? A Meta-regression analysis. *Oxford Economic Papers*, 74(3), 840-868.

Egger M, Smith G.D, Schneider M., Minder C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal* 315: 629-634.

Fiorino, N., Galli, E., Padovano, F. (2015). How long does it take for government decentralization to affect corruption? *Economics of Governance*, 16(3), 273-305.

Gallet, C. A., Doucouliagos, H. (2014). The income elasticity of air travel: A meta-analysis. *Annals of Tourism Research*, 49, 141–155.

Glaeser, E. L., Saks, R. E. (2006). Corruption in America. *Journal of Public Economics*, 90(6-7), 1053-1072.

Glass, G.V. (1976) Primary, secondary, and meta-analysis of research. *Educational Researcher*, 5: 3–8.

Glass, G.V. (1978) Standards and criteria. Journal of *Educational Measurement*, 15(4): 237-261.

Glass, G.V., McGaw, B. and Smith, M.L. (1981). *Meta-Analysis in Social Research*, Beverly Hills, CA: Sage Publications.

Goel, R. K. (2014). PACking a punch: Political Action Committees and corruption. *Applied Economics*, 46(11), 1161-1169.

Goel, R.K., Budak, J. (2006). Corruption in transition economies: Effects of government size, country size and economic reforms. *Journal of Economics and Finance*, 30(2), 240-250.

Goel, R.K, Korhonen, I. (2009). Composition of exports and cross-country corruption. BOFIT Discussion Papers No 5/2009, Bank of Finland Institute for Emerging Economies (BOFIT).

Goel, R. K., Nelson, M.A. (2007). Are corrupt acts contagious?: Evidence from the United States. *Journal of Policy Modeling*, 29(6), 839-850.

Goel, R.K, Nelson, M.A. (2010). Causes of corruption: History, geography and government. *Journal of Policy Modeling*, 32(4), 433-447.

Goel, R. K., & Nelson, M. A. (2021). Direct and indirect influences of political regimes on corruption. Social Science Quarterly, 102(4), 1569-1589.

Goel, R.K, Budak, J., Rajh, E. (2012). Factors Driving Bribe Payments: Survey Evidence from Croatia. *Transition Studies Review*, 19(1), 13-22.

Goel, R. K., Mazhar, U., & Ram, R. (2022). Dimensions of size and corruption perceptions versus corruption experiences by firms in emerging economies. *Journal of Economics and Finance*, 46(2), 374-396.

Goel, R. K., Nelson, M. A. (1998). Corruption and government size: A disaggregated analysis. *Public Choice*, 97(1), 107-120.

Goel, R. K., Mazhar, U., Ram, R. (2021). Size Matters: Corruption Perceptions versus Corruption Experiences by Firms. CESifo Working Paper No. 9221.

Gusenbauer, M., Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research synthesis methods*, 11(2), 181-217.

Gutmann, J., Padovano, F., Voigt, S. (2020). Perception vs. experience: Explaining differences in corruption measures using microdata. *European Journal of Political Economy*, 65, 101925.

Harbord, R. M., Higgins, J. P. T. (2008). Meta-regression in Stata. *The Stata Journal,* 8, 493–519.

Havránek, T., Stanley, T. D., Doucouliagos, H., Bom, P., Geyer-Klingeberg, J., Iwasaki, I., Reed, W.R., Rost, K., Van Aert, R. C. M. (2020). Reporting guidelines for meta-analysis in Economics. *Journal of Economic Surveys*, 34(3), 469-475.

Hedges, L. V. and Olkin, I. (1985). *Statistical Methods for Meta-Analysis*. Cambridge: Academic Press.

Irsova, Z., Doucouliagos, H., Havranek, T., Stanley, T. D. (2023). Meta-analysis of social science research: A practitioner's guide. *Journal of Economic Surveys*, forthcoming.

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

Khan, F.N., Majeed, M.T. (2018). Does social capital greases or sands the wheels of corruption: A panel data analysis. *FWU Journal of Social Sciences*, 12(2), 160-178.

Khodapanah, M., Dehghan Shabani, Z., Akbarzadeh, M.H., Shojaeian, M. (2022). Spatial spillover effects of corruption in Asian countries: Spatial econometric approach. *Regional Science Policy and Practice*, 14(4), 699-717.

Kiswanto, H.A., Fitriani, N. (2019). The effect of audit results and financial performance on corruption level moderated by government size. *International Journal of Economics and Business Administration*, 7(3), 250-259.

Kotera, G., Okada, K., and Samreth, S. (2010). A study on the relationship between corruption and government size: the role of democracy, MPRA Paper 25015, University Library of Munich, Germany.

Kotera, G., Okada, K., and Samreth, S. (2012). Government size, democracy, and corruption: An empirical investigation. *Economic Modelling*, 29(6), 2340-2348.

Kurtz, M. J., Schrank, A. (2007). Growth and governance: Models, measures, and mechanisms. *The Journal of Politics*, 69(2), 538-554.

Lambsdorff, J.G. (2006). Causes and consequences of corruption: what do we know from a cross-section of countries. In S. Rose-Ackerman (ed), *International Handbook on the Economics of Corruption* (pp. 3–51). Cheltenham, UK: Edward Elgar.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. (1999). The quality of government. *Journal of Law, Economics and Organization*, 15(1), 222-279.

Lash, N.A., Batavia, B. (2013). Government economic intervention and corruption. *Journal of Developing Areas*, 47(2), 1-15.

Lipset, S.M., 1959. Some Social Requisites of Democracy: Economic Development and Political Legitimacy. *The American Political Science Review*, 53 (1), 69-105.

Mauro, P. (2021). The State and Your Hard-Earned Money A Survey on Moral Perspectives in Public Finance, International Monetary Fund WP/21/287, Washington DC.

Méon, P. G. and Sekkat, K. (2005). "Does corruption grease or sand the wheels of growth?" *Public Choice*, *122*(1-2), 69-97.

Montinola, G. R., Jackman, R. W. (2002). Sources of corruption: A cross-country study. British *Journal of Political Science*, 32(1), 147-170.

Niskanen, W.A. (1971). *Bureaucracy and Representative Government.* Aldine/Atherton, Chicago.

O'Connor, S., Fischer, R. (2012). Predicting societal corruption across time: Values, wealth, or institutions? *Journal of Cross-Cultural Psychology*, 43(4), 644-659.

Paiva, M. E. R., Ribeiro, L. L., Gomes, J. W. F. (2021). Does the size of the government increase corruption? An analysis for Brazilian municipalities. *Revista de Administração Pública*, 55, 272-291.

Rose-Ackerman, S. (1999). *Corruption and Government: Causes, Consequences and Reforms*. Cambridge: Cambridge University Press.

Rose-Ackerman, S., Palifka, B. J. (2016). *Corruption and government: Causes, consequences, and reform*. Cambridge University Press.

Saha, S., Ali, M. S. B. (2017). Corruption and economic development: New evidence from the Middle Eastern and North African countries. *Economic Analysis and Policy*, 54, 83-95.

Shabbir, G., Butt, A.R. (2014). Socioeconomic Determinants of Corruption: A Cross Country Evidence and Analysis. *Forman Journal of Economic Studies*, 10, 79-104.

Stanley, T.D. (2001). Wheat from chaff: a meta-analysis as quantitative literature review. *Journal of Economic Perspectives* 15(3): 131–150.

Stanley, T. D. (2017). Limitations of PET-PEESE and other meta-analysis methods. *Social Psychological and Personality Science,* 8(5), 581-591.

Stanley, T. D., Doucouliagos, H. (2007). Identifying and correcting publication selection bias in the efficiency-wage literature: Heckman meta-regression. *Economics Series*, 11, 2007.

Stanley, T. D., Jarrell, S. B. (1989). Meta-regression analysis: a quantitative method of literature surveys. *Journal of Economic Surveys*, 3(2), 161-170.

Svensson, J. (2005). Eight questions about corruption. *Journal of Economic Perspectives*, 19(3), 19-42.

Tanzi, V. (1998). Corruption around the world: causes, consequences, scope, and cures. *International Monetary Fund Staff Papers* 45: 559–594.

Themudo, N. S. (2014). Government size, nonprofit sector strength, and corruption: a cross-national examination. *The American Review of Public Administration*, 44(3), 309-323.

Treisman, D. (2000). The causes of corruption: a cross-national study. *Journal of Public Economics*, 76(3), 399-457.

Treisman, D. (2007). What have we learned about the causes of corruption from ten years of cross-national empirical research? *Annual Review of Political Science* 10: 211–244.

Ugur, M. (2014). Corruption's direct effects on per-capita income growth: a meta-analysis. *Journal of Economic Surveys*, 28(3), 472-490.

Valickova, P., Havranek, T., Horvath, R. (2015). Financial development and economic growth: A meta-analysis. *Journal of Economic Surveys*, 29(3), 506-526.

Visković, J., Burnać, P., Herman, M. (2021). Impact of political and fiscal decentralization on the government quality in Central and Eastern European countries. *Ekonomska Misao I Praksa*, 30(1), 285-302.

Wathne, C., Stephenson, M. (2021). The credibility of corruption statistics. Bergen: U4 Anti-Corruption Resource Centre, Chr. Michelsen Institute.

Zhou, L. A., Tao, J. (2009). Government size, market-orientation and regional corruption: Evidence from the provincial level panel data. *Frontiers of Economics in China*, 4, 425-448.

Zhao, X., Xu, H.D. (2015). E-Government and Corruption: A Longitudinal Analysis of Countries, *International Journal of Public Administration*, 38(6), 410-421.

Appendix

Table A1. An overview of the papers included in our Meta-dataset.

Studies	**Number of estimates**	**Corruption data**	**Government size data**	**Sign of the estimated coefficients**	**Significant**
Adsera et al. (2003)	4	ICRG, Other	World Bank, Other	Positive**	Yes, no
Ali and Isse (2002)	1	TI	Other	Positive	Yes
Amegavi (2022)	11	ICRG	World bank	Negative	Yes
Amegavi et al. (2022)	6	Other	World bank	Positive**	Yes
Amirzadi and Khosrozadeh (2015)	3	TI	World bank	Negative**	Yes
*Angelopoulos and Philippopoulos (2005)**	2	ICRG	Other	Negative**	Yes
Ariva (2020)	1	Other	Other	Positive	Yes
Arvate et al. (2010)	4	TI	World bank	Negative**	Yes
Aswar et al. (2022)	1	Other	Other	Positive	Yes
Baklouti and Boujelbene (2018)	8	TI	World bank	Positive**	Yes
Bel (2022)	30	TI, GCR-WEF, EUBusSurvey, Other	Eurostat	Positive, negative	No, yes
*Bergh et al. (2012)**	9	Other	Other	Negative	Yes, no
Bergh et al. (2017)	8	Other	Other	Negative	Yes
Billger and Goel (2009)	12	TI	World bank	Negative	Yes
Corrado and Rossetti (2018)	4	Other	ISTAT	Positive, negative	Yes, no
Del Monte and Papagni (2007)	18	Other	Other	Positive, negative	Yes, no
Fiorino et al. (2015)	19	TI, WGI	IMF	Positive, negative**	Yes, no
Glaeser and Saks (2006)	26	Other	Other	Positive, negative	Yes, no
Goel (2014)	34	Other	Other	Positive	No, yes
Goel and Budak (2006)	4	TI	EBRD	Positive**	Yes
*Goel and Korhonen (2009)**	13	TI	World bank	Negative	Yes
Goel and Nelson (1998)	12	Other	Other	Positive, negative	Yes, no
Goel and Nelson (2007)	18	Other	Other	Negative**	Yes
Goel and Nelson (2010)	5	TI	World bank	Negative	Yes
Goel and Nelson (2021)	23	TI, ICRG	World bank	Positive, negative	Yes
Goel et al. (2012)	8	Other	Other	Negative	Yes, no
*Goel et al. (2021)**	22	Enterprise Surveys	World bank	Negative	Yes
Goel et al. (2022)	20	Enterprise Surveys	World bank	Negative	Yes
Khan and Majeed (2018)	14	ICRG	World bank	Positive**	Yes
Khodapanah et al. (2022)	6	TI	World bank	Negative, positive**	Yes
Kiswanto and Fitriani (2019)	2	Other	Other	Positive, negative	Yes
*Kotera et al. (2010)**	9	TI	Other	Positive, negative	Yes, no
Kotera et al. (2012)	22	TI, WGI	World bank	Positive, negative	Yes
Lash and Batavia (2013)	5	TI	World bank	Negative**	Yes
Montinola and Jackman (2002)	7	BI	Penn World Table	Positive**	Yes
O'Connor and Fischer (2012)	3	Other	World bank	Positive**	Yes, no
Paiva et al. (2021)	4	Other	Other	Negative	Yes
Saha and Ali (2017)	15	ICRG	Penn World Table	Positive	Yes
Shabbir and Butt (2014)	6	TI	World bank	Positive, negative	Yes
Themudo (2014)	8	TI	Frasier Institute	Negative	Yes
Treisman (2000)	6	TI	Other	Negative	Yes, no
Visković et al. (2021)	2	WGI	Penn World Table	Negative**	Yes
Zhou and Tao (2009)	10	Other	Other	Positive	Yes
Zhao and Xu (2015)	5	TI	World bank	Positive**	Yes
TOTAL *44*	450				

Authors' elaboration. * stands for Working paper. ** indicates the primary papers that consider higher values of the corruption variable as the lack of corruption. Authors' elaboration. * stands for Working paper. ** indicates the primary papers that consider higher values of the corruption variable as the lack of corruption. ICRG: International country risk guide; TI: Transparency International; GCR-WEF: The Global Competitiveness Report - World Economic Forum; EUBusSurvey: Eurobarometer Businesses' Attitudes towards Corruption; WGI: Worldwide Governance Indicators; Enterprise Surveys from the World Bank.

Table A2. Correlation matrix (obs=450)

	Published	Panel	Year of publication_trend	Endogeneity	Least Square	Perceived corruption	Charges for corruption	Govsize employment	Govsize expenditure	lSize	lDimension	Countries corruption	Countries GDPpc
Published	1												
Panel	0.2201	1											
Year of publication_trend	-0.0319	0.2965	1										
Endogeneity	0.0180	0.0336	-0.0054	1									
Least Square	0.0287	0.0044	-0.1451	-0.5430	1								
Perceived corruption	-0.0443	0.0194	0.2568	-0.0673	0.0550	1							
Charges for corruption	0.2020	0.1103	-0.3717	0.0712	0.0198	-0.4756	1						
Govsize employment	0.1827	0.0632	-0.3120	-0.0291	0.0285	-0.3620	0.4339	1					
Govsize expenditure	-0.0951	-0.0254	0.4198	0.0898	-0.1698	0.3347	-0.5175	**-0.7894**	1				
lSize	-0.3476	0.1210	0.5175	0.0701	-0.3433	-0.0361	-0.3021	-0.3009	0.3593	1			
lDimension	-0.0606	0.0345	0.1401	0.0002	0.1049	-0.2032	-0.0118	-0.1664	0.1301	0.2684	1		
Countries corruption	0.0522	-0.0588	-0.3462	0.0707	0.0903	-0.3700	0.3965	0.3718	-0.4228	-0.3568	0.0564	1	
Countries GDPpc	0.0361	-0.0152	-0.3241	0.1018	0.0702	-0.4242	0.4604	0.4324	-0.5078	-0.2797	0.0513	**0.8903**	1

Notes
Authors' elaboration on data collected.

Table A3. PET-FAT-PEESE and full models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FAT-PET-PEESE	Study design	Estimation method	Specific variables	Size and dimension	Countries observables	
SEr^2	1.7308***	1.4630***	1.3307**	0.6653	-1.3770**	-1.4184**	-1.3019**
	(0.6839)	(0.7132)	(0.7228)	(0.7117)	(0.7465)	(0.7477)	(0.7499)
β_0 (Precision term)	0.0059	-0.1280***	-0.1236***	-0.1017**	0.3299***	0.2998***	0.3672***
	(0.0142)	(0.0514)	(0.0563)	(0.0586)	(0.0768)	(0.0823)	(0.0861)
Published		0.0838***	0.0852***	0.0650**	-0.0321	-0.0287	-0.0357
		(0.0372)	(0.0372)	(0.0354)	(0.0353)	(0.0355)	(0.0355)
Panel		0.1370***	0.1379***	0.0945***	0.1268***	0.1276***	0.1271***
		(0.0351)	(0.0352)	(0.0347)	(0.0328)	(0.0328)	(0.0328)
Year of publication_trend		-0.0027*	-0.0029*	0.0047***	0.0112***	0.0113***	0.0111***
		(0.0020)	(0.0021)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Endogeneity			-0.0314	-0.0326	-0.0643***	-0.0677***	-0.0591**
			(0.0347)	(0.0329)	(0.0312)	(0.0314)	(0.0317)
Least Square			0.0088	0.0114	-0.0434*	-0.0439*	-0.0415*
			(0.0297)	(0.0281)	(0.0288)	(0.0288)	(0.0289)
Perceived corruption				-0.0617**	-0.1245***	-0.1121***	-0.1410***
				(0.0318)	(0.0309)	(0.0332)	(0.0352)
Charges for corruption				0.1104***	0.0709**	0.0742**	0.0684**
				(0.0419)	(0.0399)	(0.0400)	(0.0400)
Govsize expenditure				-0.1154***	-0.0859***	-0.0844***	-0.0891***
				(0.0348)	(0.0330)	(0.0330)	(0.0332)
lSize					-0.0577***	-0.0555***	-0.0590***
					(0.0082)	(0.0084)	(0.0083)
lDimension					-0.0326**	-0.0355**	-0.0308*
					(0.0190)	(0.0192)	(0.0191)
Countries corruption index						0.0186	
						(0.0182)	
Countries GDPpc							-1.01e-06
							1.05e-06
Observations	450	450	450	450	450	450	450

tau2	0.0589	0.0560	0.0560	0.0491	0.0406	0.0405	0.0407
F	6.405	8.213	5.752	10.67	15.53	14.33	14.31
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes

Authors’ elaboration on data collected.

The dependent variable of the models is the partial correlation coefficient (PCC). Significance levels are the same resulting from the procedure proposed by Gallet and Doucouliagos (2014).

Significance levels: *** p<0.05, ** p<0.1, * p<0.2.

Table A4. Government employment as a proxy for Government size

	(1) Specific variables	(2) Size and dimension	(3) Countries observables	(4)
β_1 (Bias)	0.3612*	-1.5086***	-1.5635***	-1.5072***
	(0.2324)	(0.3051)	(0.3067)	(0.3129)
β_0 (Precision term)	-0.2584***	0.4973***	0.4650***	0.4972***
	(0.0597)	(0.1004)	(0.1025)	(0.1032)
Published	0.0238	-0.0650**	-0.0603**	-0.0650**
	(0.0352)	(0.0337)	(0.0337)	(0.0339)
Panel	0.0899***	0.1247***	0.1261***	0.1247***
	(0.0336)	(0.0312)	(0.0312)	(0.0312)
Year of publication_trend	0.0061***	0.0112***	0.0115***	0.0112***
	(0.0023)	(0.0022)	(0.0022)	(0.0022)
Endogeneity	-0.0249	-0.0769***	-0.0825***	-0.0769***
	(0.0318)	(0.0299)	(0.0301)	(0.0305)
Least Square	0.0210	-0.0400*	-0.0412*	-0.0400*
	(0.0275)	(0.0274)	(0.0274)	(0.0275)
Perceived corruption	-0.0322	-0.1032***	-0.0853***	-0.1033***
	(0.0314)	(0.0300)	(0.0321)	(0.0342)
Charges for corruption	0.1169***	0.0752***	0.0797***	0.0752***
	(0.0405)	(0.0379)	(0.0379)	(0.0380)
Govsize employment	0.2157***	0.1996***	0.1993***	0.1996***
	(0.0366)	(0.0342)	(0.0341)	(0.0342)
lSize		-0.0847***	-0.0824***	-0.0846***
		(0.0100)	(0.0101)	(0.0100)
lDimension		-0.0250	-0.0293*	-0.0251*
		(0.0180)	(0.0182)	(0.0181)
Countries corruption index			0.0269*	
			(0.0173)	
Countries GDPpc				-6.68e-09
				(1.01e-06)
Observations	450	450	450	450
tau2	0.0459	0.0361	0.0359	0.0362
F	14.37	29.95	19.47	19.16
Prob > F	0.000	0.000	0.000	0.000

Notes

Authors' elaboration on data collected.

The dependent variable of the models is the partial correlation coefficient (PCC). Significance levels are the same resulting from the procedure proposed by Gallet and Doucouliagos (2014).

Significance levels: *** p<0.05, ** p<0.1, * p<0.2.