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Effect of the size of government spending on corruption in sub-saharan african countries

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Abstract

Previous work on the effect of the size of government spending on corruption has led to mixed results. In order to explain those ambiguous results, this paper aims to analysing the effect of the size of government spending on corruption in african countries by considering three indicators, namely government final consumption expenditure, public health expenditure and military expenditure. Using annual data on a panel of thirty nine african countries over the period 2000 - 2017, the results show that government final consumption expenditure and public health expenditure have a negative effect on the level of corruption, and that military expenditure leads to an increase in corruption. In addition, the identification of transmission channels for the effects of the size of government spending on corruption was highlighted. As robustness and to address endogeneity problems, we conduct the instrumental variables estimation and the results reveal that our main findings are robust. The study suggests intensifying the fight against corruption by strengthening the quality of institutions and improving the functioning of the judicial system.

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1. Introduction

Corruption is a phenomenon of great concern and is widely observed in both developing and developed countries. The international community, through the United Nations, has grasped of the situation to the point where they have made the fight against corruption a priority emergency. This strong commitment is materialized in the adoption of the United Nations Convention against Corruption in December 2003. Today, corruption has become a subject of study for political scientists and economists alike, mainly because of its various harmful effects on the society. Transparency International (2020) defines corruption as the abuse of public office for personal gain. In recent years, corruption has been the subject of many empirical research works specifically focused on the determinants of the phenomenon and its effects on growth. These include Mauro (1995), Ades and Di Tella, 1997, La porta et al (1999), Treisman (2000), Serra (2006), Lambsdorff (2006), Goel and Nelson (2010), Kotera et al (2012), Asongu (2012), Nuno (2014), D'Agostino et al (2016), Nurudeen et al (2019), Del Monte and Pennacchio (2020)... Though a consensus has been reached on some determinants of corruption, the effect of some other factors of it remains unclear and subject of debate. This research focuses on one of those factors, the effect of the size of government spending on corruption.

There are two main competing theses on the effect of the size of government on corruption in the economy. Regarding the first thesis, commonly referred to as the ‘’big government, bad government thesis‘’, the authors argue that an increase in the size of government creates more rent-seeking opportunities for politicians and public officials who then become more corrupt (Rose-Ackerman, 1978; 1999). This thesis finds its source in Becker's model (1968) where individuals evaluate the costs and benefits of criminal acts (corruption here) in order to make a rational choice. In other words, according to this theory, a large government generates illegal activities such as corruption. Alesina and Angeletos (2005) propose a theoretical model in which large government size increases the possibility of corruption.

In the second thesis, and contrary to the authors of the ‘’big government, bad government thesis‘’, the authors argue that a large government reduces the level of corruption because a large government has the capacity to better control public officials and create a culture of accountability. This thesis is supported by the fact that developed countries generally have large governments and are less corrupt than developing countries. La Porta et al (1999) and Billger and Goel (2009) reached this conclusion. The two opposing analyses presented above show that the results are mixed regarding the effect of government size on corruption. It is therefore essential to conduct empirical studies on specific regions or countries in order to find out which theory is the most appropriate to explain the link.

Thus, the objective of this paper appears to be to analyse the effect of the size of government spending on corruption in Sub-Saharan African countries. It is interesting to conduct such a study on Sub-Saharan African countries for several reasons. According to Transparency International's various annual rankings, Sub-Saharan African countries appear at the bottom of the ranking. Given the urgency of the situation, the African Union has committed itself to the fight against corruption through the adoption by all Member States of the Convention on Preventing and Combating Corruption in July 2003 in Maputo, Mozambique. For the 2017 ranking of transparency international for example, only six countries in Sub-Saharan Africa scored 50 or higher, which means that corruption remains a real problem in the different countries even if some countries manage to do well, such as Botswana, which scored 61, ranking first in Africa, and 34th globally. According to Transparency International's latest Corruption Perceptions Index for 2019, Sub-Saharan Africa is the region where corruption is most prevalent with a score of 32 out of 100, followed by Eastern Europe and Central Asia with a score of 35 out of 100 and the Middle East and North Africa with a score of 39 out of 100. In addition, this

region is made up of a large number of countries classified as heavily indebted poor countries and corruption appears to be an obstacle to their development.

The study specifically aims to determining the effect of three indicators used as proxy variables for the size of government spending on corruption. The aim is estimating the effect of government final consumption expenditure, military expenditure and public health expenditure on the level of corruption in Sub-Saharan African countries. Thus, using annual data on a panel of thirty-nine African countries over the period 2000 - 2017, we estimate a model using the estimation techniques of the fixed-effects model with correction for heteroscedasticity and those of instrumental variables in order to solve possible endogeneity problems.

This study contributes to the existing literature on the subject in three main ways. The first contribution lies in the fact that unlike previous studies that have approached the issue by considering only one or two indicators of the size of government spending (Kotera et al, 2010; Chen et al, 2018; Nurudeen et al, 2019...), the present study uses three indicators of the size of government spending (government final consumption expenditure, military expenditure and public health expenditure) in order to have a broad understanding of the link between corruption and the size of government spending.

The second contribution here is methodological; unlike other studies that have studied the link in terms of cause and effect (Kotera et al, 2010, d'Agostino et al, 2012...) this research work deepens the analysis by identifying the transmission channels through which indicators of the size of government spending affect corruption. Moreover, the study takes advantage of the limitations of previous studies to address the issue of endogeneity that may result from the double causality between those two variables using the instrumental variable estimation method.

Finally, the third contribution is operational and practical in the sense that by providing empirical evidence for understanding the effect of the size of government spending on corruption in African countries, this research is important in order to analyse the phenomenon of corruption and to propose specific solutions to reduce the adverse effects of the spread of corruption in the economies of countries in order to ensure more effective public action and better management of public resources in African countries.

The rest of this article is organized as follows. In Section 2, we present a review of the literature on the link between corruption and the size of government spending. Section 3 presents the methodology and data. Section 4 is devoted to the analysis of the empirical results obtained. Section 5 is all about robustness testing. Section 6 includes the conclusion and policy implications.

2. Literature review

This literature review will focus on two points. In the first point, we present the main theories explaining corruption by the size of government spending, and secondly we present the empirical analyses conducted on the issue.

2.1. Theoretical review

There is no clear economic theory explaining the links between corruption and its potential determinants. This makes it difficult to conduct any empirical study that can build consensus among researchers on the factors that affect corruption (Alt and Lassen, 2003; Goel and Nelson,

2011). However, the authors use economic theories and theories borrowed from other social science disciplines and adapt them to determine the causes of corruption.

Thus, early economic analyses of corruption showed that it was caused by the failure of markets and governments to protect individual rights. From this perspective, corruption is seen as a positive response to market failure (Huntington, 1968; Coase, 1988). However, this thesis will soon be abandoned in view of the negative effects of corruption in different countries.

Later on, some economists (Billger and Goel, 2009, Nelson and Goel, 2010) adapted Becker's (1968) theory of the determinants of criminal activity to explain the causes of corruption in the economy. Indeed, according to Becker's (1968) model, individuals who give bribes and those who receive them assess their level of usefulness through a cost-benefit analysis of their participation in criminal activities, i.e. corruption. On the one hand, examples of the benefits of engaging in corruption may be time savings, favours received from public officials or civil servants, preferential treatment to obtain public contracts, etc. (Guriev, 2004; Shleifer and Vishny, 1993). On the other hand, the costs of corruption may be the likelihood of paying penalties, being arrested or imprisoned. Thus, an individual will engage in corruption if he or she believes that the benefits outweigh the costs according to his or her analyses. Corruption, in all cases, involves conscious personal calculations and plans, and involves both those who take the initiative and those who allow themselves to be corrupted.

The authors of public choice theory, who study the optimal behaviour of public institutions, have developed explanatory models of the phenomenon of corruption. Thus Stigler (1971), in his theory of regulation, explains the phenomenon of corruption. According to this theory, companies attempt to bribe and capture regulatory officials in order to benefit from the specific treatments that would benefit them. From this point of view, companies are the main causes of corruption in the economy.
Regulatory theory postulates that regulation is implemented by governments to solve market failure. However, some agents and officials will take advantage of regulation to engage in opportunistic rent-seeking behaviour. This theory is important in explaining systemic corruption. In this rent-seeking model, weak regulation and broad competition reduce the gap between market prices and hidden prices, thereby reducing the level of corruption. This theory views corruption as the consequence of the decisions of agents through the "principal-agent" model who abuse their discretionary power.

The dominant thesis of the relationship between corruption and the size of government is that State intervention in the economy is the main cause of increased corruption. This thesis, known as the 'big government, bad government thesis', i.e., the more the State in the economy, the more corruption is supported by both theoretical and empirical analysis. In this perspective, authors will use the principle of the functioning of the market in the neoclassical model to analyse the behaviour of the state in the economy. Those authors argue that the large size of the public sector leads to a concentration of bureaucratic power and the elimination of competition in markets, allowing public officials or civil servants to take advantage of rent situations due to the public monopoly they enjoy (Klitgaard, 1988; Rose-Ackerman, 1999). Thus, from this point of view, corruption is the consequence of mismanagement by the State. The institutions that are established to regulate interactions between citizens and the state are used for the personal enrichment of corrupt officials.

On the other hand, other authors will oppose this thesis of "the more the State in the economy, the more corruption" to highlight the forces of public intervention. In this sense Elliot (1997) argues that a large government will be better equipped to fight corruption than a weak government. Indeed, the size of the government measured by the amount of public resources at

its disposal enables it to better monitor public officials, punish bad officials and ensure transparency in the management of public affairs. Moreover, good management of public resources enables it to offer decent salaries to civil servants and thus reduces their temptation to engage in corruption. In this vein, Uslaner (2008) argues that a strong government with significant resources to redistribute is more effective than a weak government in addressing social inequality. By resolving social inequality, the government thus strengthens the social contract between citizens and the State. This is a favourable condition for law enforcement, which leads to a reduction in the level of corruption.

Very recently, authors have drawn on the model of dynamic economic interaction between groups proposed by Cerqueti, Correani and Garofalo (2013) to propose solutions to combat corruption (Shi and Pan, 2018; Shi, Pan and Peng, 2017). According to Shi and Pan's (2018) theory of social tolerance, corrupt rulers will redistribute national wealth so that a large part of the population can benefit from it.

In this way, they will receive sympathy and esteem from society, which will ignore their malicious act. Those authors believe that in this case corruption can be reduced by reforms of political and economic institutions.

2.2. Empirical review

Empirical analyses show that corruption is determined by several variables, namely political, legal, socio-cultural, religious, historical, geographical and economic factors (Treisman, 2000; Dong and Torgler, 2013). Dimant and Tosato (2017) identify in the economic literature twenty-eight explanatory factors for the phenomenon of corruption and twelve consequences that corruption generates in the economy. In this analysis we focus specifically on studies that have addressed the relationship between the size of government spending and the level of corruption. Thus, by browsing the economic literature, we find that studies on the effect of the size of government spending on corruption can be classified into two categories. On the one hand, there are authors who argue that the size of government spending is a source of increased corruption, and on the other hand, there are authors who believe that the size of government spending reduces the level of corruption.

2.2.1. Size of government spending as a source of increased corruption levels

Several authors have found that the size of government spending can lead to an increase in the level of corruption in the economy. Lapalombara (1994) finds that corruption is positively correlated with the size of government. Goel and Nelson (1998), show that the sizes of the State and local governments in the USA have a positive effect on corruption. Rose-Ackerman (1999) highlights the possibility of an increase in the level of corruption as the size of government increases, as she argues that increasing the size of the State undermines the efficiency of the bureaucracy. Similarly, Treisman (2000) comes to the same conclusion. Ali and Isse (2003) examine the determinants of corruption using different estimation techniques. The authors show that the size of government has a positive effect on the level of corruption. Furthermore, the authors find that the effect of government size (approximated by government spending) on corruption is found to be mediated by external aid. Billger and Goel (2009) find that greater economic freedom and government size do not reduce the level of corruption in the most corrupt countries. Arvate et al (2010) examine the causality between government size and corruption in OECD countries and Latin American developing countries over the period 1996-2003. Using the method of Granger and Huang (1997), the authors find that government size causes

corruption in the Granger sense in both groups of countries. D'Agostino et al (2012) show that military spending contributes to increase the level of corruption in African countries because the defence sector is not open to competition, thus generating rent-seeking activities that provide a breeding ground for increased corruption. In another approach, Chen et al (2018), in a study on the determinants and consequences of corruption in thirty Chinese provinces, highlight that the size of government expenditure and public investment have a significant and positive effect on the level of corruption.

2.2.2. Size of government spending as a factor in reducing the level of corruption

Kotera, Okada and Samreth (2012) examine the effect of government size on corruption by considering the role of democracy in each country. Using panel data from eighty-two countries over the period 1995-2008, the results show that, on the one hand, an increase in the size of government can lead to a reduction in the level of corruption if the level of democracy is high in the country and, on the other hand, an increase in the size of government can lead to an increase in the level of corruption if the level of democracy is low. Precisely, theses authors show that in non-democratic or transitional countries, an increase in government size can aggravate corruption, since monitoring on the government is weak. In contrast, when a democracy is sufficiently consolidated like in USA and european Union countries, larger government size leads to a reduction in corruption, because the monitoring mechanisms function well and can restrain corruption conducted by the politicians and bureaucrats. Fisman and Gatti (2002) find that decentralisation as measured by the share of local public expenditure in total public expenditure reduces corruption. Adserà et al (2003) find a negative effect of government size on corruption. The same is true for La Porta et al, (1999) and Acemoglu and Verdier, 2000). Goel and Nelson (2010) in a research on the causes of corruption in a panel of 100 countries look at the size of government and historical and geographical factors. Using two different indices of the size of government, they highlight that government size is associated with low levels of corruption.

Those results confirm the thesis that a strong government makes it possible to better manage public resources and to offer decent salaries to civil servants, thus protecting them from acts of corruption. Baklouti and Boujelbene (2013) examine the effect of the size of government on corruption by considering the role of democracy in each country. Using annual data from 12 MENA countries between 1996 and 2011, the authors' estimates show, on the one hand, that an increase in the size of government spending can lead to a decrease in the level of corruption if democracy is high enough and, on the other hand, this increase can lead to an increase in the level of corruption if democracy is too low.

Nurudeen and Marcin (2019), researching the determinants of corruption in Nigeria using different estimation techniques, find that military spending reduces the level of corruption.

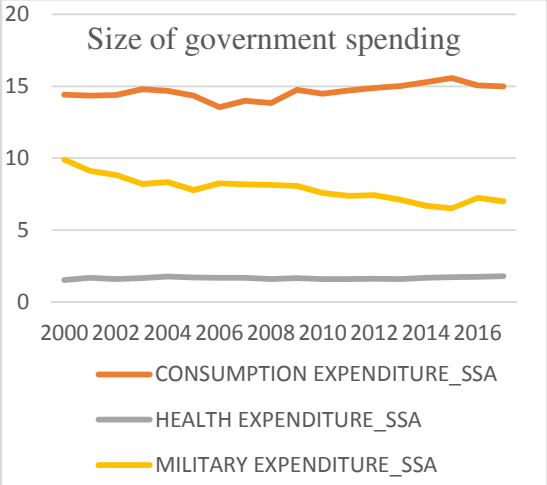
At the end of this literature review, we note that despite the multitude of studies on the relationship between the size of government spending and the level of corruption, very little research has specifically focused on Sub-Saharan African countries on this topic. The present research is therefore timely in filling this gap in order to document the economic literature with respect to African countries.

3. Methodology and Data

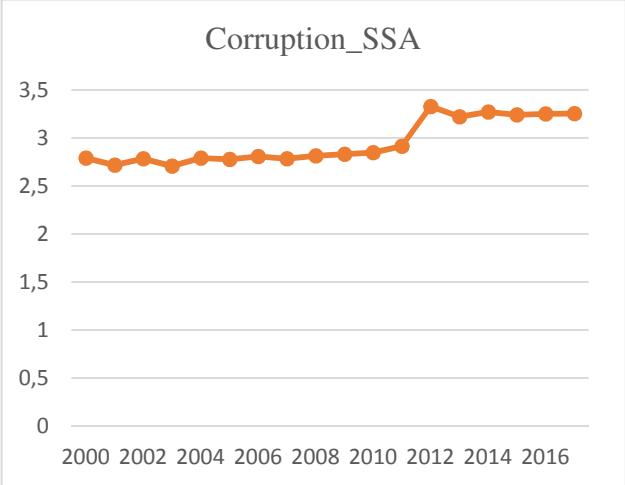
3.1. Descriptive analysis of key variables

We analyze the evolution of the indicators of the size of government spending and that of corruption in Sub-Saharan African countries through graph 1 and 2 below.

Graph 1: Size of government spending



Graph 2: corruption in SSA Countries



Source: Author's calculations based on data from WDI (2019) and Transparency International (2019)

The graph 1 shows that the indicators of the size of government spending have changed over the period. More specifically, we note that public health spending remains below 2% of GDP over the entire study period. Military spending is trending downward from 10% of total public spending in 2000 to around 6.5% in 2017. Public consumption expenditure is on the rise, rising from 14% in 2000 to around 14.5% in 2017. It should be noted that the corruption variable varies from 0 to 10. The value 0 indicates a high level of corruption and the value 10 indicates a low level of corruption. So when the curve varies from 0 to 10; this means that the level of corruption is decreasing in the country. And when the curve varies from 10 to 0 it means that the level of corruption increases in the country. The graph 2 shows that the indicator of the level of corruption has evolved from just over 2.5% to just under 3.5% over the entire period. This evolution shows that corruption is a problem in Sub-Saharan African countries because the index is still below average.

3.2. Model specification

This work, following Goel and Nelson (2010), builds on the basic theoretical model from the remarkable work of Becker (1968). In this model, individuals evaluate the costs and benefits of criminal acts (corruption here) in order to make a rational choice. Those costs and benefits are influenced by exogenous factors. These include the size of government spending, the level of development, the socio-cultural environment, the quality of institutions, etc. We take most of those variables into account in this study. Therefore, the basic empirical model can be described as follows:

Corruption = f (economic development, size of government spending, quality of institutions, cultural, historical and social factors) *(1)*

Operationally, and given the impossibility of quantifying certain factors that may cause corruption, we use the following linear model:

$$Corr_{it} = \alpha_0 + \alpha_1 Govsize_{it} + \alpha_2 Develop_{it} + \alpha_3 Instit_{it} + \alpha_4 X_{it}' + \varepsilon_{it} \quad (2)$$

With $Corr_{it}, Govsize_{it}, Develop_{it}, Instit_{it}, X'_{it}, \varepsilon_{it}$ representing respectively the corruption index, indicators of the size of government expenditure, economic development, institutional variables, vector of control variables and error term.

It should be pointed out here that, since corruption is by definition a hidden phenomenon, it is impossible to produce objective statistics to measure its levels due to the lack of available raw data. Thus, as early as 1995, Transparency International envisaged using opinion surveys and thus perceptions to try to assess levels of corruption. Thus Transparency International today publishes an index called the "Corruption Perceptions Index" (CPI). The CPI scores countries and territories by their perceived levels of public sector corruption according to experts and business people. The index takes also into account the costs of doing business in a country. It is a composite index, a poll, using data on corruption drawn from expert polls conducted by various independent bodies. It reflects views from around the world, including those of experts resident in the countries being assessed. Transparency International (2020) defines corruption as the abuse of public office for personal gain. The surveys used to compile the CPI ask questions related to the abuse of official power for personal gain (e.g. bribery of public officials, bribes in public procurement, embezzlement of public funds) or questions that probe the strength of anti-corruption policies, thereby including administrative and political corruption. We use the Corruption Perceptions Index (CPI) as a dependent variable in this study.

It should be noted that the size of government spending variable is represented by three indicators that we use as proxy variables: government final consumption expenditure as a percentage of GDP, military expenditure and public health expenditure. For Stiglitz (2018), no single aggregate can be an adequate indicator of government influence on the economy. According to Stiglitz (op.cit), general government final consumption expenditure as a percentage of GDP, military expenditure and public health expenditure can be used as indicators of size of government spending. Therefore, in addition to the standard indicator that economists use to denote the size of a country's economy, i.e. government final consumption expenditure as a percentage of GDP, other indicators should be added for further analysis. The economic development variable will be approximated by the growth rate of Gross Domestic Product. For the institutional variables, we use three World Governance Indicators, namely the rule of law, the regulatory quality and the government effectiveness. Finally, several other control variables are used, namely the inflation rate, trade openness, official development assistance and natural resources rents.

3.3. Econometric estimation methods

Before estimating our model materialized by equation (2) above it is urgent to first perform the stationarity test on the different variables of the model. Thus the test of Im, Pesaran and Shin (2003) is carried out to study the stationarity of the variables.

After studying the stationarity of the variables, the model in equation (2) is first estimated by the OLS. Thus we perform the Hausman test in order to choose the best model between the

fixed effects model and the random effects model. In a second step, and given the nature of the variables, the model could suffer from heteroscedasticity problems; we carry out the estimation by the fixed effects technique with correction of the heteroscedasticity by the White method. Finally, to verify the robustness of our results and to take into account possible endogeneity problems, we estimate the model using the fixed-effects technique with instrumental variables. This method makes it possible to solve, on the one hand, the biases linked to the variables omitted in the model and, on the other hand, the problems linked to the double causality between corruption and the size of the government spending.

3.4. Data Sources

The data on economic variables are mainly from the World Bank's World Development Indicators (2019). Data on institutional variables are from the World Bank's Worldwide Governance Indicators (2019) database and Transparency international (2019) database. The study covers the period 2000 - 2017 and takes into account thirty-nine Sub-Saharan African countries for which all the variables are available.

4. Empirical results

The stationarity tests of Im Pesaran and Shin reveal that all the variables in the model are stationary. After performing the stationarity tests, we estimated the model. The results of the different estimations are analysed in the following lines.

4.1. Direct effects of indicators of the size of government spending on corruption

The analysis of the effects of the size of government spending on corruption is based on estimates made by controlling for heteroscedasticity and the results are reported in Table 1 below.

The results summarized in table 1 show that the three indicators of the size of government spending (government final consumption expenditure as a percentage of GDP, government health expenditure as a percentage of GDP and military expenditure as a percentage of total government spending have a significant effect on the level of corruption in African countries. As for the control variables of the model, it appears that the rate of economic growth positively affects corruption while trade openness, official development assistance, the quality of regulation and law enforcement and the quality of justice negatively affect the level of corruption. The results reveal that two indicators of the size of government spending, namely government final consumption expenditure as a percentage of GDP and public health expenditure as a percentage of GDP, have a significant negative effect on the level of corruption. This result shows that the execution of those two types of expenditure does not contribute to the increase in corruption. This result can be understood by the fact that in several African countries' consumption expenditures and health expenditures are financed by technical and financial partners, who are today very rigorous in their compliance with the procedures for disbursement of funds and also monitor the management of the different resources made available to African countries. It is almost impossible for public officials to use those resources for other purposes. Thus, improving the functioning of institutions (good governance) has beneficial effects in terms of reducing the level of corruption in African countries. This result confirms those of Goel and Nelson (2010), La Porta et al (1999) and Acemoglu and Verdier (2000).

The third indicator of the size of government spending, military expenditures is found to have a positive effect on the level of corruption. Military expenditures fuel corruption in African countries, according to the results of our estimates. Military expenditures are often carried out in great secrecy for security reasons. This suggests that some public officials engaged in this task may take advantage of this privilege to engage in corrupt acts. Furthermore, military expenditures are often very high, which may whet the appetite of some public officials of questionable morals to engage in rent-seeking. Such behaviour has the effect of increasing corruption. This finding corroborates that of D'Agostino et al (2012; 2016).

Table 1: Direct effect of the size of government spending on corruption

	1.1	1.2	1.3
Consumption expenditure	-0.009 (1.79)*		
Growth	0.071 (1.90)*	0.013 (2.20)**	0.011 (1.70)*
Rule of law	-0.488 (2.57)**	-0.056 (2.00)**	
Regulatory quality	-0.862 (3.60)***	-0.160 (4.37)***	-0.166 (5.38)***
Inflation	0.052 (0.97)		0.009 (1.15)
Natural resources rents	-0.035 (0.74)		
Trade	-0.087 (0.88)	-0.023 (1.90)*	
Aid	-0.131 (4.36)***	-0.020 (4.77)***	-0.020 (5.18)***
Health expenditure		-0.030 (2.80)***	
Military expenditure			0.031 (3.88)***
Constant	10.923 (15.10)***	2.589 (24.38)***	2.362 (25.67)***
R^2	0.87	0.88	0.88
N	700	700	700

Note The estimation method is AREG With sample heteroscedasticity correction. t-statistics in parentheses. *** ; ** and * denote significance at 1%, 5% and 10% confidence levels respectively.

The direct, though significant, effect of indicators of the size of government spending does not provide information on the mechanisms by which government intervention affects the level of corruption. Based on the hypothesis that this relationship may not necessarily be linear, we therefore explore channels through which the effects of increasing the size of government spending on corruption can be transmitted, and we deepen the analysis in terms of a threshold effect.

4.2. Channels of transmission of the effect of the size of government spending on corruption

The results of estimating the indirect effect of indicators of the size of government spending on corruption are reported in table 2 below. The results show that the coefficient of the interaction variables between government final consumption expenditure as a percentage of GDP, government health expenditure as a percentage of GDP and the governance variables rule of

law, regulatory quality and government effectiveness are negative and significant, thus showing that the effect of these two types of expenditure on corruption passes through three main channels, namely the effectiveness of public regulation, the rule of law with a better functioning of justice and the effectiveness of governance. According to our estimates, when governance institutions function effectively, the size of government spending significantly reduces the level of corruption in African countries.

On the other hand, the results reveal that the coefficients of the interaction variables between military expenditure and governance variables rule of law, regulatory quality and government effectiveness are all positive and significant. This allows us to argue that the increase in the level of corruption through military expenditure is explained by poor quality of regulation, inefficiency of public governance during the execution of these types of expenditure. This result confirms the thesis that defence activities are shrouded in secrecy and constitute a breeding ground for rent-seeking activities. This can increase the level of corruption in African countries. Moreover, this result seems very interesting especially in the current context where several African countries are fighting against terrorism. This obliges states to increase their military spending for border defence. Governance in this sector therefore needs to be strengthened to prevent some officials from engaging in rent-seeking activities due to the lack of competition and secrecy surrounding defence contracting.

Table 2: Transmission channels of the effect of the size of government spending on corruption

	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Consumption expenditure×government effectiveness	-0.017 (3.00)***						
Consumption expenditure	-0.031 (4.45)***	-0.034 (2.99)***	-0.023 (2.44)**				
Growth	0.004 (1.40)	0.004 (1.36)	0.003 (1.01)	0.002 (0.73)	0.002 (0.55)	0.001 (0.47)	0.003 (1.01)
Trade	-0.151 (1.61)	-0.154 (1.73)*	-0.163 (1.88)*				
Aid	-0.173 (6.15)***	-0.135 (4.82)***	-0.164 (6.11)***	-0.131 (4.68)***	-0.126 (4.52)***	-0.128 (4.60)***	-0.143 (5.16)***
Consumption expenditure× rule of law		-0.017 (2.00)**					
Rule of law		-0.329 (2.44)**		-0.291 (2.92)***	-0.528 (4.63)***	-0.228 (2.38)**	-0.257 (2.73)***
Consumption expenditure×regulatory quality			-0.012 (1.89)*				
Inflation			-0.001 (2.17)**	-0.001 (1.83)*	-0.001 (1.69)*	-0.001 (1.46)	-0.001 (1.68)*
Regulatory quality			-0.591 (4.39)***	-0.707 (6.96)***	-0.637 (6.47)***	-0.928 (7.65)***	-0.479 (4.23)***
Military expenditure× government effectiveness				0.020 (2.90)***			
Military expenditure				0.029 (2.93)***	0.045 (4.22)***	0.046 (4.51)***	

Natural resources rents				-0.004 (1.40)	-0.003 (1.27)	-0.003 (1.16)	-0.004 (1.68)*
Trade				-0.000 (0.13)	-0.000 (0.01)	-0.000 (0.04)	-0.000 (0.38)
Military expenditure× rule of law					0.035 (4.59)***		
Military expenditure× regulatory quality						0.037 (4.11)***	
Health expenditure× regulatory quality							-0.100 (2.17)**
Health expenditure							-0.143 (3.36)***
Constant	11.389 (18.35)***	10.472 (16.56)***	10.848 (17.73)***	8.993 (15.47)***	8.728 (14.83)***	8.774 (14.98)***	9.661 (17.18)***
R^2	0.86	0.87	0.87	0.88	0.88	0.88	0.88
N	700	700	700	700	700	700	700

Note The estimation method is AREG With sample heteroscedasticity correction. t-statistics in parentheses. *** ; ** and * denote significance at 1%, 5% and 10% confidence levels respectively.

Can the different results interpreted above be considered robust? To find out, we have carried out robustness tests.

5. Robustness check

The robustness test addresses a possible endogeneity problem that could be due to three reasons: reverse causation between corruption and the size of the government spending; omitted variables and measurement errors. Before estimating our model by instrumental variables method, we run the endogeneity test of Hausman on our three key variables that measure the size of the government spending. The results show that endogeneity concerns only the military expenditure equation. So we use an instrumental variables estimation method to solve the problem. An instrument is a variable correlated with the variable assumed to be endogenous but not correlated with the residual of the model. We use as an instruments the lagged value of the military expenditure and the population growth rate. According to Kotera, Okada and Samreth (2012), population can be used as an instrument of the size of the government spending. Theses authors argue that population may increase the size of government spending because population raising requires various public goods and services such as education, health and security. We then use population growth rate as an instrument and we conduct a further analysis to check the validity of the instruments. The sargan Hansen test of validity of the instrument shows that the instruments are valid.

The result of the estimation by instrumental variables is below.

Table 3 : Result of Estimation by instrumental variables method

	Dependent Variable: Corruption
Military expenditure	0.283 (3.53)***
Growth	0.005 (1.60)
Rule of law	-0.185 (1.76)*
Regulatory quality	-0.644 (6.18)***
Natural resources rents	-0.004 (1.64)
Aid	-0.125 (4.48)***
constant	8.516 (14.21)***
N	661

Note : The estimation method is Fixed-effects (within) IV regression. t-statistics in parentheses. *** ; ** and * denote significance at the 1% 5% and 10% levels respectively.

The results show that the effects of the indicator of the size of government spending namely military expenditure is broadly identical to those found previously. Our estimate shows that military expenditure has a positive effect on corruption in Sub-Saharan African countries.

6. Conclusion and policy implications

Corruption has become a major concern in recent years in various countries with the adoption by international institutions such as the UN, the IMF and the African Union of several conventions to reduce the phenomenon if not eradicate it. Thus, African countries, through the African Union, adopted the Convention on Preventing and Combating Corruption in July 2003 in Maputo, Mozambique. The fight against corruption is often complex because of many institutional, cultural and geographical factors that are very subtle and difficult to quantify. This article contributes to the understanding of the causes of corruption by shedding new light on the role of the size of government spending approximated by three indicators in explaining the phenomenon in African countries. Previous studies have found mixed results on the relationship between corruption and the size of government spending. Thus, in order to understand and explain this ambiguous result, this paper aims to analyse the effect of the size of government spending on corruption by taking into account three key indicators, namely government final consumption expenditure as a percentage of GDP, government health expenditure and military expenditure. Using panel data from thirty-nine Sub-Saharan African countries over the period 2000 - 2017, the results of the estimates showed that government final consumption expenditure and public health expenditure reduce the level of corruption when governance is effective, i.e. when there is effective law enforcement, justice and regulation. Military spending, on the other hand, contributes to fuelling corruption. Through their secrecy, military spending creates rents, which increases the level of corruption in the African countries included in our study.

Elsewhere, it has been established through our analyses that the channels through which the size of government spending affects corruption are mainly the effectiveness of regulation, law enforcement and a better functioning judicial system.

The results and lessons provided by this reflection pave the way for proposals for actions to be implemented in African countries in terms of economic policy. Firstly, it is essential to improve governance and transparency in the management of public affairs, particularly in the defence sector. It is mainly necessary to strengthen democratic accountability, respect for the law, the quality of justice and the effectiveness of public governance in the various countries. Secondly, the fight against corruption must be intensified in all African countries. Finally, the public authorities must use the additional resources obtained from the fight against corruption to improve their performance in terms of the provision of social public goods and services in order to ensure better well-being for the populations.

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APPENDIX

Table 4: List of 39 countries of the sample

Angola, Benin, Botswana, Burkina Faso, Burundi, Cap Vert, Cameroun, Centre Afrique, Tchad, RDC, Congo, Cote d'Ivoire, Eswatini ,Ethiopia, Gabon, Gambie, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Mali, Mauritania, Maurice, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Soudan, Tanzania, Togo, Ouganda, Zambia, Zimbabwe

Source : The author