

COULD WAGNER’S LAW EXPLAIN OVER-INDEBTEDNESS IN AFRICA?

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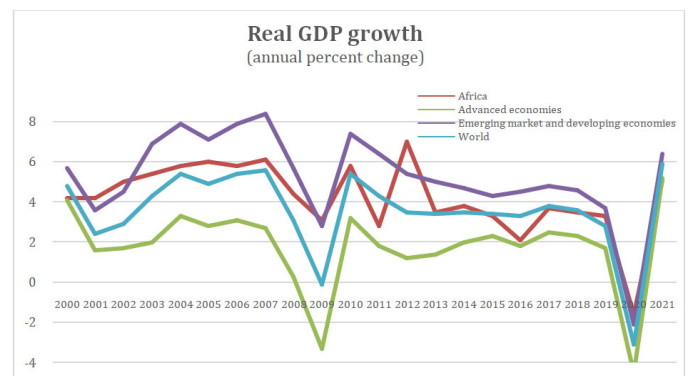
Abstract

This study deals with Wagner’s law for 52 countries in Africa. We consider 6 panels and individual countries. Panels are based on 5 Regional Economic Communities (REC) and the full sample. Panel unit-root, panel cointegration and panel ARDL analysis reveal Wagner’s elasticity evidence for full sample and 2 RECs and evidence for error correction. Wagner’s law holds for the most successful RECs and for 98% of individual countries. Pro-cyclical behavior of public spending, the long-term economic growth and embezzlement increase over-indebtedness risk in Africa. Raising the scores of the government quality indices is part of debt sustainability in Africa.

Keywords: Wagner’s law, Regional Economic Communities, Over-indebtedness, Government spending, Pro-cyclicality behavior.

INTRODUCTION

One of the oldest economic hypotheses is Wagner’s law on government expenditure. Wagner (1883) stated that there is long-run relationship between growth and public spending. The main idea behind this relationship is that the growth in public expenditure is a natural consequence of economic growth with elasticity of public expenditure greater than one. GDP increases lead to even higher increases in public spending. In other words, the more the society develops, the more expensive the concerning state is (Phu and Pham, 2017). Even today, Wagner’s law prevails in the debate on fiscal deficits and over-indebtedness in an accelerated economic growth context since the early 2000s. Under Wagner’s hypothesis, the risks of deficits and over-indebtedness may increase with growth. Indeed, the widening of the deficit seems to be an obvious consequence of Wagner’s law. On the other hand, the risk of over-indebtedness is linked to the use of deficit. A virtuous use of the deficit is oriented towards investment that sustains growth making deficit cyclical, ensuring sustainable fiscal policy. In this context, Wagner’s law is known to be holding during a country’s industrialization and modernization process. A so-called vicious use of the deficit, oriented towards operating consumption, corruption, embezzlement and waste ... could lead to a runaway deficit and ultimately to over-indebtedness. Such an outcome originally describes unsustainable growth that cannot lead to an industrialized, modern or developed country in the long run. Corrected from financial and health crises in 2008 and 2019 respectively, world growth is positive since years 2000s. Africa is one of the greatest contributors to world growth as shown in figure 1. Growth is stronger in the least developed countries for years and this does not seem to allow them to catch up with the advanced economies.



Source IMF mapper

Figure 1. World real GDP growth

Figure 2 shows the world corruption perception index in 2020 that we use as an indication of the virtuous use of public deficit from 2000 to 2020.

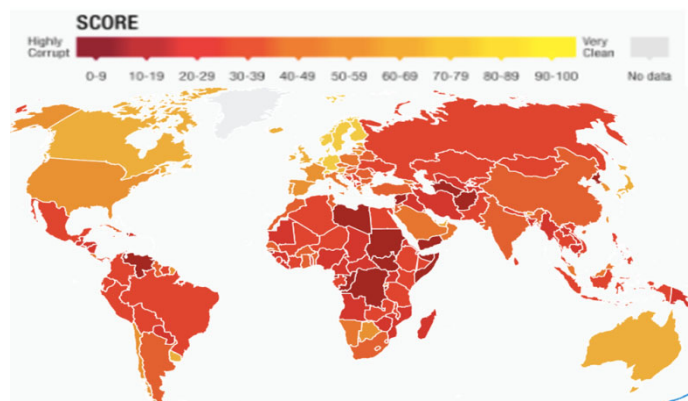


Figure 2. Corruption perceptions index (2020)

Following the score bar, almost the whole continent of Africa appears to be highly corrupted. Only two countries have a score close to 60/100. The others countries’ scores are less than 40/100. This could give an indication of the continent’s

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ability to ensure the sustainability of fiscal policy. The conditions for drift and runaway deficit seem to be met. The over-indebtedness risk increases under Wagner's law in an environment without budgetary or fiscal rigor, such as corruption and embezzlement. We consider 6 panels and individual countries. Panels are based on 5 Regional Economic Communities (REC) and the full sample. Panel unit-root, panel cointegration and error correction analysis reveal Wagner's elasticity evidence for full sample and 2 RECs and evidence for error correction. Wagner's law holds for the most successful RECs and for 98% of individual countries. Procyclical behavior of public spending, the long-term economic growth and embezzlement increase over-indebtedness risk in Africa. This study evaluates this risk, estimating Wagner's law in Africa through the following steps or sections. Section 2 gives a non-exhaustive literature review. Section 3 deals with methodology, while section 4 details result and findings. Then section 5 concludes.

LITERATURE REVIEW

The government size proxied by growth of public sector spending has gained great importance in empirical investigation since Wagner (1883) stated that there is long-run relationship between growth and public spending. Most governments tend to automatically and more than proportionally renew their previous annual expenditures. In such way the elasticity of public expenditure is supposed to be greater than one. The literature analyzing empirically the relationship between growth and government size gives heterogeneous views. There are many results lines in the empirical landscape. (Wagner and Weber, 1977; Abizadeh and Gray, 1985; Chang, 2002; Aregbeyen, 2006; Akitoby *et al.*, 2006; Rehman *et al.*, 2007; Phu *et al.* Pham, 2017) in their works demonstrated that Wagner's law held showing elastic government spending with respect to economic growth. The elasticity coefficient is greater than one. Here, growth causes government size and that is known as "demand-following response" as government responses to demand (Samudram *et al.*, 2009; Thabane & Lebina, 2016). Some other studies established a one-way causality from public spending to economic growth (Loizides & Vamvoukas, 2005; Ebaidalla, 2013). This view follows Keynesian theory (Jacquemin *et al.*, 2000) and it is known as "supply-leading response". A third group of studies reconciles demand-following (Wagner) and supply-leading (Keynes) responses suggesting bidirectional relationship between government spending and national income (Singh & Ahni, 1984; Abu-Bader & Abu-Qarn, 2003; Wu *et al.*, 2010; Govindaraju *et al.*, 2011; Abu-Eideh, 2015.). These results simultaneously validate Wagner's law as well as Keynes' predictions. Finally, a fourth group rejects Wagner's law and Keynes' view finding that there is no or weak link between public expenditure and growth (Henrekson, 1993; Lin, 1995; Afxentiou & Serletis, 1996; Ansari *et al.*, 1997; Burney, 2002; Huang, 2006; Semedo, 2007; Dogan and Tang, 2006; Taban, 2010). This literature review is far from exhaustive. However, Wagner's law is known to be holding during a country's industrialization and modernization process. The empirical results are waited to be no Wagner law in developed countries but holding in developing ones. Following the non-consensus in results, the debate is far from closed. However, under Wagner's law there may be an increased risk of over-indebtedness. This growing risk is linked to the government's inefficiency in optimally directing the wealth previously created. Incompetence, corruption,

embezzlement are all elements among others that could fuel the risk of over-indebtedness under Wagner's law.

DATA AND METHODOLOGY

Data and variables

The aim of this study is to evaluate Wagner's law in Africa. That is down estimating the relationship between economic growth and government spending. The study uses data from 2000 to 2020 taking total government expenditure and GDP both in current local currency. The study collected data for 52 African countries. There are 54 countries in Africa where 52 countries included in this study are organized in Regional Economic Communities (REC). The RECs we deal with are Economic Community of West Africa States (ECOWAS), Economic Community of Central African States (ECCAS), Intergovernmental Authority for Development (IGAD), Southern African Development Community (SADC), Union of the Arab Maghreb (UMA). The study produces empirically results for six panels on one hand, 5 RECs and all the countries, and results by country. Data are from the International Monetary Fund and World Economic Outlook, April 2021 and the study takes the logarithm of variables.

Total Government expenditure: Total government expenditure (GOV) consists of total expense and the net acquisition of nonfinancial assets.

Gross Domestic Product: Gross Domestic Product (GDP) at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Model specification

To estimate the relationship between output and government spending in Africa we follow (Akitoby *et al.*, 2006). We give cyclical a great importance in this analysis. If government spending increases when output is far from its potential, then spending is said to be countercyclical. The focus is on government spending and GDP and we suppose this relationship to be expressed by:

$$GOV = (A \cdot GDP)^\beta \quad (1)$$

Where β represents the long run elasticity of government spending (GOV) to output (GDP). Wagner's law is met if $\beta > 1$. If log-normalizing (1) we have:

$$LGOV = \alpha + \beta LGDP \quad (2)$$

Where LGOV and LGDP are logarithm of government spending and GDP respectively, $\alpha = \log(A)$ is a constant. The estimated equation in this study is:

$$LGOV_{it} = \alpha + \beta LGDP_{it} + \varepsilon_{it} \quad (3)$$

ε_{it} is the error term.

Using different steps and methods we are able to determine short-run relationship and long-run relationship between public

spending and output in Africa and catch some explanations of over-indebtedness. We deal with unit root and cointegration tests, followed by ARDL estimation determining long and short run nexuses. The study produces results for different panels and by country.

RESULTS AND FINDINGS

Descriptive statistics in table 1 show that output and government size have almost the same deviations from their central values. That is an overview at global level.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Variance	Skewness	Kurtosis
LGOV	1,092	0.322	0.729	0.532	0.23	2.81
LGDP	1,092	0.967	0.709	0.502	0.06	2.80

Table 2 reports unit root tests as the first steps to be sure that the estimates will be made with stationary series. We use Im-Pesaran-Sim (IPS) test and Breitung test to perform unit root tests for LGOV and LGDP for the panels. Results show that the output and spending variables are nonstationary at level, but their first differences are stationary at 1% level both for IPS and Breitung tests. Both variables LGOV and LGDP are integrated at order 1, I(1). This describes a first indication for possible co-movements that reflect a steady-state, or long-term path in the cases of all the 6 panels considered in the study. Since our variables are integrated of the same order, it is well advised to carry out a cointegration test to indicate the appropriate estimation method.

Table 2. Unit root test results

Spécification	AFRICA		ECOWAS		
	IPS	Breitung	IPS	Breitung	
LGOV	Trend	3.28	3.30	0.16	-1.07
	No trend	-0.93	9.09	0.89	6.05
LGDP	Trend	5.10	6.11	2.42	2.78
	No trend	-3.12**	9.91	-1.57*	6.65
DLGOV	Trend	-19.18***	-10.54***	-11.52***	-6.28***
	No trend	-19.45***	-12.07***	-12.30***	-7.26***
DLGDP	Trend	-18.23***	-9.12***	-9.40***	-8.46***
	No trend	-16.10***	-12.19***	-8.67***	-9.07***

Spécification	ECCAS		IGAD		
	IPS	Breitung	IPS	Breitung	
LGOV	Trend	2.44	3.01	0.83	1.43
	No trend	-1.17	2.70	0.72	4.16
LGDP	Trend	1.42	3.65	1.22	1.20
	No trend	-2.24**	3.86	1.28	5.27
DLGOV	Trend	-9.68***	-4.00***	-5.84***	-2.99***
	No trend	-9.36***	-4.58***	-7.08***	-4.12***
DLGDP	Trend	-10.44***	-3.32***	-4.86***	-2.68***
	No trend	-9.50***	-3.76***	-5.42***	-4.37***

Spécification	SADC		UMA		
	IPS	Breitung	IPS	Breitung	
LGOV	Trend	1.79	1.72	2.66	1.83
	No trend	-1.55*	4.24	-1.20	2.57
LGDP	Trend	3.50	3.30	3.13	2.34
	No trend	-2.34***	3.30	-1.83**	2.03
DLGOV	Trend	-9.51***	-6.08***	-4.97***	-3.65***
	No trend	-8.41***	-5.88***	-5.10***	-5.86***
DLGDP	Trend	-9.42***	-9.12***	-5.77***	-3.41***
	No trend	-7.25***	-6.72***	-4.27***	-5.05***

Notes: (*), (**) and (***) indicate significant level at 10%, 5% and 1% respectively

Pedroni (1999, 2004) introduced seven test statistics that test the null hypothesis of no cointegration in nonstationary panels. The seven test statistics are grouped into two categories. There are group-mean statistics that average the results of individual country test statistics and panel statistics that pool the statistics along the within-dimension. Nonparametric (ρ and t) and parametric (augmented Dickey-Fuller [ADF] and v) test statistics are within both groups (Neal, 2014). Table 3 reports Pedroni's cointegration test results. There are two categories of results. On one hand the null hypothesis of no cointegration is rejected for three of the six panels: the global sample (AFRICA) and the RECs ECOWAS and ECCAS. Overall, the results indicate a cointegrating relationship between the log of government spending rate and the log of the output. All the tests, except the panel v and group ρ statistics, are significant at least at 10% level. Results support long-run relationship hypothesis between public spending and output. On the other hand, null hypothesis of no cointegration cannot be rejected for IGAD, SADC and UMA RECs as all seven test statistics are non significant. One can perform error correction model as the sample AFRICA exhibits cointegration, that allows us determine short-run and long-run relationship between variables. Group-mean statistics significance indicates individual country cointegration and panel-mean statistics significance is in favor of within dimension cointegration. Table 4 reports panels' error correction models results and table 5 gives individual country's short-run and long-run relationship coefficients between public spending and output. In table 4 there are error correction coefficients, short and long term coefficients. Negative and significant error correction term indicates a possibility of a return to long-term equilibrium or steady state. It is the adjustment coefficient. The results teach us that there would be a co-movement of public spending and output in all the panels except for IGAD. These results agree with those of the stationarity tests except for the SADC and UMA RECs.

The short-run elasticity of public spending to output is positive in all of the samples. The demand-following response view holds in Africa in the short term. For all the panels the short-run elasticity of spending is positive and significant with coefficients less than one. This suggests that face to a given GDP shock public spending will rise but by less in percentage terms compare to GDP changes. IGAD and SADC RECs have almost twice the short-run changes elasticity coefficient of the others regional economic organizations in Africa. This implies that governments cut and expand their expenditures proportionally (Akitoby *et al.*, 2006) less during recessions and expansions, respectively than other RECs. Overall, short-term elasticities in table 4 reveal procyclical behavior of fiscal policy in Africa that contrasts with developed countries in literature. For long-term elasticities there are some important changes from short-term. The common element, and not the least important, is the procyclical behavior of fiscal policy over these two time horizons to output, as coefficients are positive. First, there is no long run relationship for three regional economic communities, IGAD, SADC and UMA. This is in the same line with cointegration test results. The other RECs and the sample AFRICA present significant long-term elasticity at 1% percent level. Second, the significant elasticities are higher than one implying a long-term relationship between government spending and output supporting Wagner's law. Our results are in line with Ansari *et al.* (1997), Sideris (2007), Akinlo (2013), Biyase and Zwane (2015) and Lebina (2016).

Table 3. Pedroni's cointegration test results

AFRICA			ECOWAS			ECCAS		
Tests	Panel	Group	Tests	Panel	Group	Tests	Panel	Group
<i>v</i>	0.46	.	<i>v</i>	-0.35	.	<i>v</i>	0.47	.
<i>rho</i>	-2.13**	0.82	<i>rho</i>	-2.78**	-1.11	<i>rho</i>	-1.75*	-0.39
<i>t</i>	-5.26***	-4.12***	<i>t</i>	-5.61***	-5.45***	<i>t</i>	-3.88***	-3.83***
<i>adf</i>	-4.62***	-4.17***	<i>adf</i>	-5.65***	-5.99***	<i>adf</i>	-3.40***	-3.52***
IGAD			SADC			UMA		
Tests	Panel	Group	Tests	Panel	Group	Tests	Panel	Group
<i>v</i>	0.89	.	<i>v</i>	-0.20	.	<i>v</i>	-0.01	.
<i>rho</i>	0.21	1.31	<i>rho</i>	-0.10	1.38	<i>rho</i>	-0.03	0.89
<i>t</i>	-0.23	0.59	<i>t</i>	-1.06	-0.11	<i>t</i>	-0.63	-0.18
<i>adf</i>	-1.37	-0.81	<i>adf</i>	-1.10	-0.35	<i>adf</i>	-0.84	-0.66

Notes: (*), (**) and (***) indicate significant level at 10%, 5% and 1% respectively

Table 4. Short run and long run Wagner's elasticity by continental organization

Organizations	Error correction term	Short run	Long run	Constant
AFRICA	-0.33***	0.482***	1.107***	-0.238***
ECOWAS	-0.452***	0.387***	1.298***	-0.459***
ECCAS	-0.408***	0.277*	1.110***	-0.294***
IGAD	-0.220	0.736***	-	-0.035
SADC	-0.191	0.789***	-	-0.080***
UMA	-0.239	0.383***	-	-0.069

Notes: (*), (**) and (***) indicate significant level at 10%, 5% and 1% respectively

Table 5. Short run and long run Wagner's elasticity by country

Countries	Method		Countries	Method		Countries	Method	
	Short	Long		Short	Long		Short	Long
Algerie	0.48 (29.73)	1.16*** (40.59)	Ethiopia	0.72*** (58.96)	0.82*** (92.06)	Namibia	0.78*** (13.71)	1.33*** (22.12)
Angola	1.15*** (8.03)	1.12*** (15.20)	Gabon	0.27 (7.23)	0.94*** (8.44)	Niger	0.28 (29.70)	1.18*** (39.07)
Benin	0.25 (26.90)	1.10*** (33.17)	Gambia	0.67** (9.07)	2.33*** (11.70)	Nigeria	0.69** (9.85)	0.86*** (10.27)
Botswana	0.27 (8.90)	0.76*** (14.78)	Ghana	-0.45 (67.03)	1.38*** (61.28)	RDC	0.61*** (32.77)	1.33*** (23.78)
Burkina Faso	0.45* (43.44)	1.26*** (27.15)	Guinea	-0.08 (9.33)	1.49*** (21.43)	Rwanda	-0.16 (49.32)	1.11*** (98.46)
Burundi	0.26 (18.68)	0.94*** (22.08)	Guinea Bissau	0.61 (9.93)	1.16*** (18.68)	Sao Tome Principe	-0.81 (7.15)	0.69*** (12.45)
Cabo Verde	0.33 (20.67)	0.96*** (21.29)	Kenya	0.94*** (75.34)	1.16*** (144.77)	Senegal	0.32 (81.36)	1.34*** (49.06)
Cameroon	1.07*** (19.88)	1.26*** (29.83)	Lesotho	1.25*** (22.81)	1.46*** (38.28)	Seychelles	0.18 (13.92)	0.75*** (10.33)
Cent. African Republic	0.22 (25.6)	1.11*** (17.58)	Liberia	0.64*** (49.65)	1.84*** (43.69)	Sierra Leone	0.26 (16.30)	1.07*** (35.30)
Chad	0.39 (9.25)	1.20*** (5.67)	Libya	1.85*** (0.80)	0.20 (0.38)	South Africa	0.94*** (20.65)	1.28*** (29.47)
Comoros	0.14 (21.86)	1.46*** (9.41)	Madagascar	0.35*** (7.77)	0.69*** (4.67)	Sudan	0.78*** (15.29)	1.27*** (21.05)
Congo	0.26 (10.05)	1.04*** (6.32)	Malawi	0.52** (16.50)	1.29*** (59.90)	Tanzania	0.96*** (17.16)	1.08*** (62.29)
Côte d'Ivoire	-0.02 (42.01)	1.32*** (79.29)	Mali	0.70*** (20.38)	1.03*** (40.08)	Togo	0.33 (17.12)	1.53*** (23.00)
Djibouti	1.55* (13.81)	1.06*** (19.34)	Mauritania	0.94*** (22.60)	0.80*** (28.88)	Tunisia	0.90*** (11.61)	1.07*** (22.86)
Egypt	0.25 (61.34)	1.02*** (93.63)	Mauritius	-0.18 (18.94)	1.04*** (45.52)	Uganda	0.53** (13.02)	0.95*** (23.38)
Equatorial Guinea	-0.25 (20.59)	1.46*** (11.30)	Morocco	0.67*** (32.37)	1.10*** (25.58)	Zambia	0.54** (15.41)	0.84*** (23.67)
Eritrea	-0.12 (10.19)	0.21*** (8.64)	Mozambique	0.36 (22.99)	1.56*** (64.85)	Zimbabwe	2.92*** (33.46)	2.01*** (33.62)
Eswatini	0.68*** (13.58)	1.17*** (10.53)						

Notes: (*), (**) and (***) indicate significant level at 10%, 5% and 1% respectively

This study, beyond the panels, makes a country-by-country analysis of Wagner's law reported in table 5. Short-term and long-term elasticities are produced for each country. It appears that in half of the countries, the short-term elasticity of public expenditure is significantly positive with only 23% greater than 1. On the long-term elasticity side, it appears that only Libya shows an insignificant coefficient.

However, Wagner's law is holding for about 70% of countries on the African continent. Overall, in Africa the fiscal policy has a procyclical behavior to output. Procyclical fiscal policy is policy expansionary in growth increase periods and contractionary in decrease ones. In other words governments cut and expand their spending in response to output shocks (short-term) less than proportionally in percentage terms in our

study. Paradoxically, the long-term situation indicates a procyclical behavior of public spending, but more than proportionally to long-term equilibrium output or steady state.

Conclusion, consequences and political implications

This study investigates the short-run and long-run behaviors of fiscal policy to output in 52 African countries individually, grouped in regional economic communities and at continental level. We use error correction model as the panels show that variables are integrated at the same order one and cointegrated. The main findings of the study highlight the procyclical behavior of public spending in Africa relative to output in both the short and long terms. Some other elements are taken into account to deduce consequences and draw the political implications. On the one hand, there is the fact that since the aftermath of the last oil crisis and that of the price of materials, the African continent has experienced a positive dynamic of economic growth which has lasted three decades. On the other hand, the level of corruption has continued to grow, making the continent the most corrupt area of the world, especially at the institutional level. Also, according to the list drawn up in 2021 by the World Bank, 87% of heavily indebted poor countries are from Africa.

First, the procyclical behavior of public spending to output in follows the voracity view for 1/5 of the countries as their short-term elasticity is significantly greater than unity. The coefficient value above unity is consistent with the voracity hypothesis, as it suggests that in response to a given shock to real GDP, government spending will rise by even more in percentage terms (Akitobi *et al.*, 2006). At regional level through RECs and continental level, voracity hypothesis doesn't hold, fortunately, even if IGAD and SADC come close. Basically, and in a Keynesian dynamic, government spending should play a role of stabilizing force by opposing countercyclical behavior. Failing to make it countercyclical, African countries should set thresholds for changes in public expenditure in response to shocks. This could reduce the risk of voracity effects. ECOWAS and ECCAS are organizations that contain within them a monetary union with strict budgetary rules, which would explain why these RECs have some of the lowest short-term elasticities in table 4. Therefore, the establishment of fiscal rules or laws on fiscal responsibility in the RECs could limit the discretionary power of procyclical fiscal policy in times of economic overheating.

Second, the long-term elasticity is positive and greater than one consistent with the demand-following response view in line with Wagner interpretation. Wagner's law is holding for all the panels and for 98% of individual countries in Africa. It appears that African governments are almost all budget eaters. Two inclusive facts could support this view. The results show that the behavior of government spending to output is procyclical on one hand and Africa experienced almost three decades economic growth on the other hand. Both Wagner's law and long-run economic growth in Africa support fiscal runaway and growing over-indebtedness risk. The dynamic of economic growth seems to be well underway in Africa. It would be beneficial to initiate mechanisms to reverse the trend of procyclical behavior of public expenditure to output. These mechanisms could be both individual and community based.

Third, from José Ugaz Transparency International Chairman (2015); "Corruption creates and increases poverty and

exclusion. While corrupt individuals with political power enjoy a lavish life, millions of Africans are deprived of their basic needs like food, health, education, housing, access to clean water and sanitation", one can guess a perverse destination of the budgets of African governments. Corruption definition is large, and it has many types. We are concerning in this study by the type in line with one of these describe by Andvig (2008), "Most observers would consider embezzlement, stealing and fraud as corruption when the stealing and fraud are made possible by the criminal's public position". Embezzlement of public funds seems to be the perverse side of government budget destinations. And unfortunately, African governments have settled into this vicious circle. Measures of good governance coupled with actions of surveillance and repression will be able to break the chains of public embezzlement which maintain the continent in underdevelopment.

Forth, 84,6% of heavily indebted poor countries are African countries in 2021 according to the World Bank. The previous three points of this part feed the fourth. Indeed, the procyclical behavior of public spending, the long-term growth and the corruption based on embezzlement of public funds can increase the risk of over-indebtedness in Africa. State budgets based on the wealth created being diverted from their virtuous destination which are productive investments to private benefits. The study finds that the long-term procyclical behavior of public spending increases the risk of debt distress in Africa. To get out of the vicious circle of indebtedness, Africa must improve its performance with regard to international indices that measure the quality of governance such as the indices of the Heritage Foundation and the Mo Ibrahim Foundation.

Fifth, states in theory that are growing debt mostly in corruption context should not be experiencing economic growth as explain by Acemoglu and Robinson (2012). In Africa, there is growth and over-indebtedness that the study explains should be due to corruption and embezzlement. Could this tell us that tackling the issue of corruption and embezzlement can even better boost growth in Africa towards double-digit growth? This is a potential future research line.

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