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Public spending and economic growth in Ivory Coast: Wagner's law

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ABSTRACT

This study simultaneously tests Wagner's law on one hand and Keynes proposition on the other hand related both government spending and output in Ivory Coast that experiencing long run economic growth and widened deficit. That challenges the country's fiscal sustainability. With annual data from 1980 to 2020, results show that Wagner's law holds, the elasticity of government spending to output is greater than one. There is bidirectional causality between government size and output validating Keynesian idea that public expenditure is an exogenous factor and a policy instrument for increasing national income. Wagner law and public deficit can justify Ivorian over-indebtedness.

KEYWORDS

Government spending, GDP growth, Wagner law, Causality

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1. Introduction

Ivory Coast is the economic lead country in West African Economic and Monetary Union (WAEMU) with almost 35% weight. This area is in a positive economic growth dynamic since the mid-1990s. The average GDP growth rate for this period reached 3.5% while the public deficit has trendily widened as illustrated in figure 1.

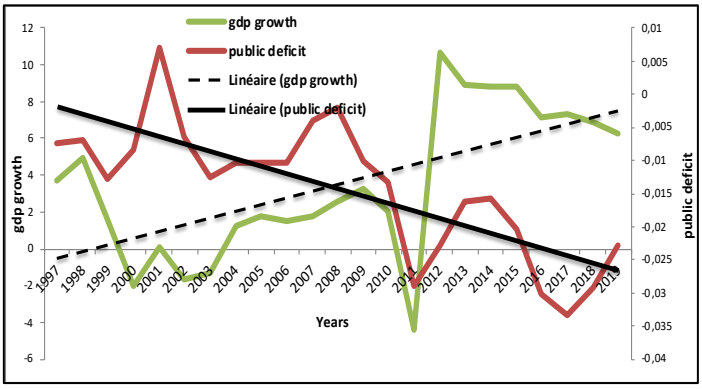

Figure 1. Public deficit and gdp growth in Ivory Coast.

Trendily analyzed there is a countercyclical dynamic following the idea that optimal fiscal policy is countercyclical aiming to keep the output close to its potentials (Slimane and Tahar, 2010). In detailed analysis, there is an almost ten years procyclical fiscal policy from 2003 to 2013 corresponding to political and military crisis in Ivory Coast. The sub optimal fiscal policy originated from structural or institutional arguments. Structural fiscal policy landscape deals with the limited access to domestic and foreign funds (Gavin and Perotti, 1997; Riascos and Vegh, 2003; Caballero and Krishnamurthy, 2004). The institutional arguments concern the weakness of country's institutions (Acémoglu et al., 2003), such as corruption and other such diseases.

Fiscal policy counter cyclicity could be seen as a way of good deficit management. Theoretically, equilibrium growth paths ought to be supported by adequate fiscal policy. The WAEMU treaties impose the practical necessity of sustainable public accounts, keeping the public debt/GDP ratio below 60%, and the public deficit/GDP ratio below 3%. Despite these restrictions and safeguards, there is a rise of over-indebtedness in the area making sustainability of fiscal policies a main topic with simultaneous regard to public policy and economics. Effectiveness of public policy can be seen through public deficit and economics by GDP growth.

According to (Hakkio and Rush, 1991), a necessary condition for sustainable fiscal policy is a long-run elasticity of 1 between public expenditures, including interest payments and revenues, implying that increases (decreases) in government expenditures need to be matched in the long-run by identical revenue increases (decreases) (Quintos, 1995), instead distinguishes weak sustainability (elasticity = 0) from strong sustainability (elasticity = 1). Afonso (2005), Kirchgässner and Prohl (2008) analyzed sustainability of public finances in a growing economy, relying on GDP ratios of fiscal variables. This brings us closer to Wagner's law that postulates a specific long–run relationship between the size of the public sector and economic development. GDP increases lead to even higher increases in public spending. Wagner (1883) argues in favor of a superior income elasticity (greater than one) of public goods and services, which leads to a disproportionately large expansion in income-elastic cultural and welfare expenditures when domestic income grows. In other words, the more the society develops, the more expensive the concerning state is (Phu and Pham, 2017). Koester and Priesmeier (2013) argue that Wagner's law will be of special importance in analyzing conditions needed to ensure fiscal sustainability when the concerned economy is growing with a large fiscal deficit. It appears in literature that fiscal deficit in the absence of Wagner's law is cyclical and is not matter insofar as it is destined to disappear in favor of growth. If Wagner's law holds, the public deficit becomes structural and in the long term it can lead to over-indebtedness. On another hand, Keynes argued that public expenditure is an exogenous factor and a policy instrument for increasing national income. Wagner's law and

Keynes idea combined suppose bidirectional causality.

Ivory Coast is in a growing economy dynamic with a public deficit, which is widening in a trend. Is there a growing over-indebtedness risk? Specifically, does Wagner's law hold? Is there bidirectional causality between growth and government spending? This study tests Wagner's law and Keynes postulate using autoregressive distributed lag, error correction model and granger causality test.

The following paper is organized in some sections where the second deals with literature review. The third detailed the methodological aspects. Then results and findings are given in section four and section five concludes.

2. Literature review

The growth of public sector spending has been a subject of extensive empirical investigation since Wagner [10] 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. There are mixed results in literature analyzing empirically Wagner's law since methods, representative variables for government size and economy are diverse.

There are many results lines in the empirical landscape. The first line concludes that Wagner's law holds, saying that government spending is very elastic with respect to economic activity (Wagner and Weber, 1977; Abizadeh and Gray, 1985; Chang, 2002; Aregbeyen, 2006; Akitoby et al., 2006; Rehman et al., 2007; Phu and Pham, 2017). The second one establishes a one-way causality from public spending to economic growth (Ebaidalla, 2013). This is contrary to Wagner's hypothesis, but in line with Keynesian theory according to which fiscal policy constitutes one of the determinants of growth (Easterly & Rebelo, 1993). A third group of studies suggests that there is a retroactive loop between government spending and national income (Wu et al., 2010; Govindaraju et al., 2011). These results simultaneously validate Wagner's law if the elasticity is greater than one, as well as Keynes' predictions. Finally, a fourth group of studies find that there is no or weak link between public expenditure and economic activity (Henrekson, 1993; Ansari et al., 1997; Burney, 2002; Huang, 2006; Semedo, 2007; Dogan and Tang, 2006). 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.

3. Methodology and data

3.1. Data and variables

The aim of this study is to test Wagner's law and Keynes hypothesis in Ivory Coast. The two hypotheses relate government expenditure to economic growth. The study uses data from 1980 to 2020 taking total government expenditure and GDP both in current local currency (billions CFA). Data are from the International Monetary Fund World Economic Outlook, April 2021 and the study takes the logarithm of variables.

3.1.1. Total Government expenditure

Total government expenditure (GOV) consists of total expense and the net acquisition of nonfinancial assets. Data for Ivory Coast are available from 1997 to 2020. We estimated government expenditure data between 1980 and 1996 by exponential extrapolation from available data with a coefficient of determination of 0.92.

3.1.2. 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.

3.2. Model specification

To test Wagner's law in Ivory Coast we follow (Akitoby et al., 2006). Cyclicality is at the heart of the analysis. If government spending increases when output is below its potential, then spending is countercyclical. The focus is on government spending and GDP and we suppose this relationship to be expressed by:

$$GOV = (A.GDP)^{\beta} \quad (1)$$

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, α = log(A) is a constant. The estimated equation is:

$$LGOV_t = \alpha + \beta LGDP_t + \varepsilon_t \quad (3)$$

ε_t is the error term.

Using different steps and methods we are able to test Wagner's law and Keynes hypothesis, estimating long and short run relationship between public spending and output. We deal with unit root and cointegration tests, followed by ARDL estimation determining long and short run nexus. The methodology ends by Granger causality estimation to test Keynes idea.

4. Results and findings

Table 1 gives descriptive statistics. It appears that GDP shows more significant deviations from its central value than government expenditure.

Table 1. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Variance	Skewness	Kurtosis
GOV	41	1,942.211	1,797.155	$3.23e^{+12}$	1.359805	3.91257
GDP	41	$1.27e^{+07}$	9,483.790	$8.99e^{+13}$	0.993056	2.93619

Empirical works based on time series data assume that the underlying series are stationary. We use Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to perform unit root tests for LGOV and LGDP. Results in table 2 show that the output variable is nonstationary at level, but its first difference is stationary at 1% level both for ADF and PP tests. The variable LGDP is integrated at order 1, I(1). For government spending, it appears that LGOV is stationary at level around a deterministic trend. That describes a tacit renewal of past government spending with growth overdetermined by lasting shocks (Semedo, 2007).

Table 2. Unit root tests results.

	Spécification	Level		First difference		Decision
		ADF test	PP test	ADF test	PP test	
LGOV	No constant	-0.09	-0.24	-7.31***	-11.17***	I(0)
	Constant	-3.15**	-4.93***	-7.24***	-11.04***	
	Trend	-4.46***	-6.31***	-7.14***	-10.88***	
LGDP	No constant	2.44	2.57	-3.72***	-5.91***	I(1)
	Constant	-0.44	-0.47	-5.29***	-7.44***	
	Trend	-3.13	-3.50*	-5.22***	-7.33***	

*Note: *, ** and *** indicate significant levels at 10%, 5% and 1%.*

Unit root tests indicate that variables are integrated at different order less than 2, I(0) and I(1). The appropriate cointegration test to apply in this case is the Bounds test for cointegration proposed by Pesaran et al. (2001) and the estimation technique is the autoregressive distributed lag (ARDL) model.

The null hypothesis stating that there is no level relationship is reject if the critical values for desired level that concern I(0) variable are closer to zero than both F and T statistics. The null hypothesis rejection for I(1) variable is decided when both F and T statistics are more extreme than critical values. From table 3, both statistics F and T reject null hypothesis of no level relationship between government spending and GDP in Ivory Coast since 1980. There is cointegration and we can estimate the short and long run relationship by ARDL and error correction (ECM) models.

Table 3. Bounds test for cointegration.

H_0: No level relationship										
Tests	Statistics		Critical values						p-value	
			10%		5%		1%			
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	7.002**	7.002*	5.80	6.65	7.05	8.02	10.00	11.24	0.05	0.08
T	-6.17***	-6.17***	-3.14	-3.44	-3.49	-3.80	-4.20	-4.54	0.00	0.00

*Note: *, ** and *** indicate null hypothesis rejection level at 10%, 5% and 1%.*

Table 4 reports the short- and long-term elasticity between government spending and GDP in Ivory Coast, the adjustment coefficient ECT and diagnostic statistics. Diagnostic statistics indicate estimation's robustness, residuals are stationary and R^2 and adjusted R^2 are 0.73 and 0.68 respectively. Adjustment coefficient is significantly negative indicating, not a dynamic stability but a long-term runaway dynamic rather, since it is greater than one in absolute value. This indicates that there is an effective risk of over-indebtedness in Ivory Coast. The long run GDP elasticity of government spending (1.72) is significant at 1% level and greater than one. That is consistent with the narrow interpretation of Wagner's law and indicating that in the long run, the public sector grows in importance more than proportionally to GDP. The return to equilibrium following shocks in government spending is uncertain. The short run elasticity of government spending to output is significant and positive, showing that Ivorian government cuts and expands capital investment proportionally more during recessions and expansions times, respectively. It appears a procyclical dynamic, indicating that Ivorian fiscal policy is not optimal, and output is not close to its potentials following (Slimane and Tahar, 2010). With the holding of Wagner's law, Ivory Coast's public deficit becomes structural and the risk of over-indebtedness increases.

Table 4. Short and long run coefficients estimation results.

Government spending (LGOV) explained by output (LGDP)			
Coefficients		Diagnostics statistics	
ECT	-1.63*** (0.00)	R^2	0.73
Long run	1.72*** (0.00)	R^2_{adj}	0.68
Short run	1.49** (0.04)	ADF test (residuals)	-5.29***
Trend	-1.81* (0.06)	PP test (residuals)	-7.93***
Constant	3.66* (0.06)		

*Note: *, ** and *** indicate significant levels at 10%, 5% and 1%. Values in parentheses () are p-values.*

The previous results stand that output impact positively government spending in short and long term. Ivory Coast is in an economic growth long dynamic. We look therefore empirical support to Keynes proposition's that public expenditure is an exogenous factor and a policy instrument for increasing national income. The Granger causality test results in table 5 show significant Wald statistics. Lagged values of GDP cause government spending

at 1% level and lagged government spending cause GDP at 5% level, holding Keynesian view. There is a bidirectional causality effect output and government size in Ivory Coast.

Table 5. Granger Causality test results.

Causal variables	Dependent variables	
	LGOV	LGDP
LGOV	-	7.13** (0.02)
LGDP	38.34*** (0.00)	-

*Notes: ** and *** indicate significant levels at 5% and 1%. Values in parentheses () are p-values.*

5. Conclusion

The aim of this study is to analyze fiscal sustainability in Ivory Coast regarding its long run economic growth and widened fiscal deficit. Wagner and Keynes relate government spending and output. Wagner supports that in the long run the public sector grows in importance more than proportionally to GDP. Keynes argues that public expenditure is an exogenous factor and a policy instrument for increasing national income. With annual government spending and GDP data from 1980 to 2020, the study tests both propositions. Unit root tests indicate that variables are integrated at different order I(0) and I(1). Bounds test reveals cointegration and ARDL and ECM estimate short and long run relationship between variables. Results show that Wagner's law holds, the elasticity of government spending to output is greater than one. There is bidirectional causality between government size and output validating keynesian idea that public expenditure is an exogenous factor and a policy instrument for increasing national income. Wagner law and public deficit can justify Ivorian growing risk of over-indebtedness.

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Declaration of Competing Interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

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