

External Debt and Economic Growth in CFA Countries: Political Institutions Matter?

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Abstract

The aim of this paper is to analyse the relation between quality of institutions, external debt and economic growth in the CFA zone. The main contribution of this paper is the endogenous determination of the threshold for quality of institutions beyond and above which external debt affect economic growth differently. The methodology focuses on the estimation of a Panel Smooth Transition Regression (PSTR) model inspired by González et al. (2005). The sample includes 10 countries on the period 1985-2015 on annual frequency. From the empirical analysis, we derive the following conclusions: in countries with lower corruption and a high level of democracy, the level of debt for which the effect of debt on growth becomes negative is higher. This implies that poor institutional quality prevents a country from taking full advantage of its credit opportunities. As a result, only countries with good institutions can fully benefit from the advantages of external debt for economic growth.

Keywords: External debt, economic growth, political institutions, CFA countries.

1. Introduction

The issue of external indebtedness is a major concern for the economic and social development of any nation. In particular, the question of the debt sustainability of low-income countries is raising greater concern in the financial markets since these countries have a massive access to the international financial markets (Euro-bonds).

For several decades, the economic literature on this subject has focused on the correlation between external debt and growth by identifying threshold effects of the level of the external indebtedness (Kourtellos et al., 2013). Several authors like Touna Mama (1985), Khan and Haque (1985), Krugman (1988) and Sachs (1989) have long argued that there is a critical debt threshold beyond which a nation's external debt generates adverse effects on its global economy. In other words, when debt's levels are above critical debt's thresholds, economic growth should be negatively impacted due to a depression in private and public investment. The work of Reinhart and Rogoff (2010) reveals the existence of a weak relationship between public debt and economic growth for countries whose debt is less than 90% of GDP. On the other hand, for countries with a debt-to-GDP ratio above 90%, debt may have negative consequences for economic growth. Pattillo et al. (2002) in a cross-sectional study of 93 developing countries from 1969 to 1998, also showed that, on average, a country's external debt had negative effects on growth when it exceeded a critical threshold of 160-170 % of exports or 35-40% of its GDP. Before reaching this threshold, external indebtedness has positive effects on economic growth.

Most recent economic studies converge to say that the level of debt is a key variable in the debt-growth relationship analysis. However, given the heterogeneity of the levels of development of countries (industrialized countries, middle-income countries, low-income countries), we propose to analyse the role of the quality of their political institutions (democracy) on the relationship between external debt and economic growth. We defend the idea that politico-institutional factors (democracy, political stability) can be decisive and become themselves sources of threshold effects.

As early as 1962, Gerschenkron argues that appropriate institutional strategies would allow developing countries to catch up with advanced countries. He emphasized the role of institutions in the performance of national economies. In the early 1990s, this logic drives research and work in the economic literature. The notion of Good Governance has been strengthened by the Bretton Woods institutions with the establishment of market mechanisms and the implementation of institutional reforms (Diarra and Plane, 2012). More recently, Acemoglu and Robinson (2012) reinforced the idea that the policy framework was a decisive factor for economic growth and productivity. Institutional quality is therefore a preponderant factor in economic development. Thus, the debate about institutional quality in developing countries remains relevant (Collier and Hoeffler 2005, Olsson 2009, Omgba

2015). In Francophone sub-Saharan Africa, the performance in terms of governance and quality of institutions needs to be improved. This is evidenced by the fact that the democracy index reporting on governance is below 4 out of 10 in most of these countries (The Economist, 2016).

In line with recent work on developing countries, we analyse the impact of politico-institutional factors on the debt-growth relationship. This study finds its case of application on the African countries of the Franc zone. The originality of this study lies in the simultaneous taking into account of politico-institutional variables (democracy, political stability) but also the use of recent econometric techniques in the specific context of the African countries of the franc zone. No study, to our knowledge, provides information on this topic as suggested by Kourtellos *et al.* (2013). We will use a non-linear model, the *Panel Smooth Threshold Regression* (PSTR) model. The rest of the paper is organised as follow: Section 2 presents the literature review, section 3 analyses the evolution of external debt, institutions and economic growth in Franc zone. Section 4 presents the methodology and the last section presents the results.

2. A Review of The Literature: From Theoretical Foundations to Empirical Investigations

In this section, we will see how the relationship between external debt, the quality of institutions and economic growth has been analysed from a theoretical and empirical point of view in the field of economic developments.

2.1. Theoretical review

Since the beginning of the 1980s, the point of the debate's crystallization between the Keynesian analysis and the neoclassical analysis of public debt is based on the contribution of the debt in growth. There are two opposing views on the subject: the conception of the New Keynesian Economy (NKE) and the conception of the New Classical Economy (NCE). The logic of the New Keynesian Economy defends a positive impact of the debt on growth through the channel of investments. If we look at the endogenous theories of growth, spending on education and health will in the long run move the country's growth path.

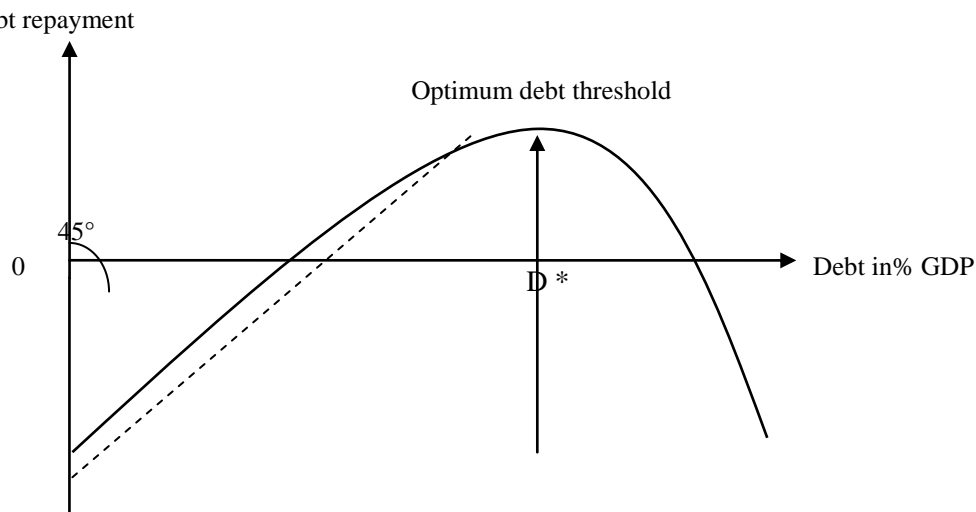
However, it is necessary in the case of developing countries to grant loans within reasonable limits. Indeed, as capital returns are decreasing, any net benefit from a new investment may decrease as the debt increases. There is therefore a threshold beyond which indebtedness negatively influences growth. This is the main argument developed by neoclassical theory, which sees the external debt as a brake on economic growth. New classical economists have developed an analysis focused on the negative effects of over-indebtedness. Krugman (1988) explain, for example, that economic growth is negatively impacted by high public debt because it discourages private investment.

If the future debt exceeds the repayment capacity of the debtor countries, the cost of its service will discourage private investment and slow down growth. This is shown by Oks and Wijnbergen (1995). Foreign exchange risks (depreciation and devaluation of the currency) and tax rate increases to secure debt service payments can also precipitate capital flight into the private sector and compound the country's debt.

The cross-checking of the two NKE and NCE analyses leads to the conclusion that there is a limited level of debt, beyond which the process of growth and economic development would be impeded. This relationship between growth and the level of indebtedness is close to the relationship defined in "Curve of Laffer"¹ debt. Beyond a certain threshold of debt (D^*), the debtor country is no longer encouraged to repay and the interest of the creditor is then to reduce the outstanding debt (Figure 1).

¹ It is a curve representing an economic model based on a relationship between the tax rate and the growth rate of government revenues. Developed by Arthur Laffer, this relationship has seen several increases and modifications even on the theme of public debt (Krugman 1988; Sachs, 1989)

Figure 1: Laffer Curve of External Debt



Source: authors from literature review

The question of institutions has for a long time remained on the side-lines in the economic literature of development. However, Grenier (2006) identifies three historical characteristics (apart from being freely consented and transferable) that clearly reveal the important role of the institutions: a public debt must be impersonal, unpronounceable and known.

First, the debt of a state must be public or impersonal. In other words, it must appear as the commitment of the community as a whole and especially should not appear as the commitment of a person. To qualify the royal debt as a public debt is therefore a political nature. The second characteristic is continuity. Often, commitments made by a monarch or a state have not been respected by his successors (who have sometimes overthrown). From the 19th century in Europe, the belief in the strength and perpetuity of the state develops, and therefore in its concern to respect the commitments contracted. This continuity (which is a guarantee for the subscribers of the debt) will be built through institutions. The third characteristic of public debt is the information available to lenders on the state of public finances.

The three characteristics identified by Grenier (2006) raise many questions as to their complete realization. It is indeed rare for a large part of the countries of the world today to respect these criteria. This is why the public debt “modern” according to the criteria mentioned above is a relatively recent concept, truncated and whose completion is challenged by political hazards. In developing countries, the financial commitments of the governments of these countries have very often been equated with a heinous debt (King, 2003).

The correlation between economic development and the quality of institutions in governance has occupied the economic literature of development since the late 1990s. Institutional quality has become a key variable in the decision-making process of lenders and investors in the financial markets. The pioneering idea of North (1989) to define good Institutions has improved their understanding of their impact on a country's economic performance (Acemoglu et al., 2005). Kaufman and Kraay (2002) point out that quality institutions in developing countries should help reduce growth volatility.

Specifically, innovative approaches attempt to include variables such as democracy, corruption or religion in politics to better explain the impact of institutional quality on the external debt process and on economic growth.

2.2. Empirical review

Two generations of model coexist in the analysis of interactions between external debt and quality of institutions. The first generation of analysis model of the external debt-growth relationship defends the existence of a debt burden that compromises economic development. The second generation of model, still embryonic, integrates the role of institutions in the economic performance of a country.

The first generation of empirical tests is based on the pioneering work of Krugman (1989) and Ojo (1989). The authors attempt to empirically verify the existence of a critical debt threshold or the hypothesis of debt overhang (Krugman, 1989). It is a question of studying the threshold of the external debt beyond which the impact would be negative on the economic growth. Ojo (1989)

already gives a little more precision on the determinants of the evolution of the stock of debt/GDP: the change in exports, the ratio of imports / GDP, the demographic rate and the growth rate of GDP. His econometric studies of some thirty African countries over the period 1976-1984 reveal the negative correlation between the stock of debt / GDP and the variation in exports and the growth rate of GDP. The level of imports and the economic growth rate, on the contrary, are likely to increase the stock of debt.

The work of Acemoglu, Johnson and Robinson (2001) forms the basis of a new generation of empirical tests. The contribution of these authors is of paramount importance in the study of the impact of institutions on economic growth. Indeed, Acemoglu et al. (2001) provided empirical evidence of this institutional influence on economic indicators, especially in developing countries. These results have been confirmed by empirical studies by the IMF (2003) on the relationship between the quality of institutions and economic growth.

In a recent study, Ousmane (2010) analyzes the interactive effect of external debt relief, the quality of institutions and economic growth in the WAEMU area. His study reveals two main results. First, it helps to verify the positive relationship between the quality of institutions on the level of development and the economic growth of the countries of the zone. Second, the statistical results reveal that the debt relief process (HIPC) improves economic performance in the West African Economic and Monetary Area. Improving the quality of institutions is positively linked to domestic credit in the beneficiary countries of the initiative. The assessment of governance is based on various criteria: corruption, law enforcement, government effectiveness, quality of regulation, political stability, etc. Between two countries with identical debt ratios, if one is politically unstable, it will present a risk of default a priori greater than the other country in which the institutional quality is superior (Ousmane, 2010).

3. External Debt and Quality of Institutions in the Franc zone : state of play

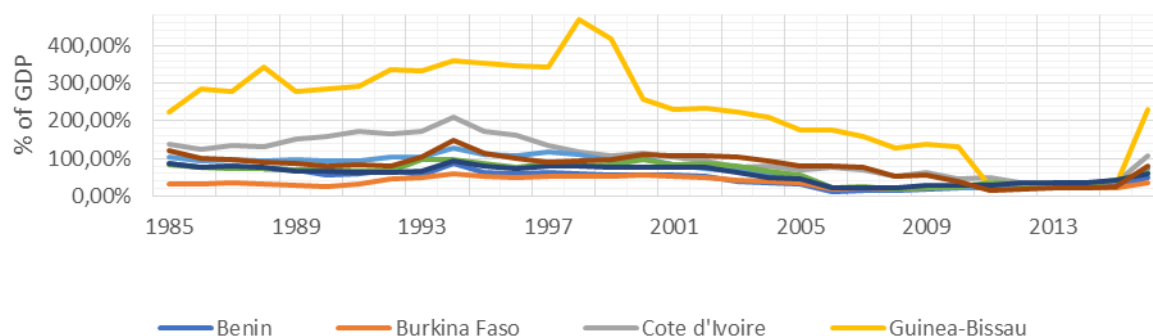
In this section, we analyse descriptively the evolution of the external debt, and the institutional situation in the Franc zone (WAEMU and CEMAC).

3.1. A first look at the external debt in the Franc zone

3.1.1. Situation of external debt in WAEMU

The analysis of the evolution of the external debt-to-GDP ratio in the whole WAEMU zone (see Figure 1) reveals two groups of countries. The first relatively homogeneous group consists of Mali, Burkina Faso, Niger, Senegal and Togo with a debt / GDP ratio of around 60% over the period. Group B is represented by Ivory and Guinea Bissau, whose debt-to-GDP ratio has reached more than three times the union average.

Figure 1: Evolution of the debt-to-GDP ratio of WAEMU over the period 1985-2015

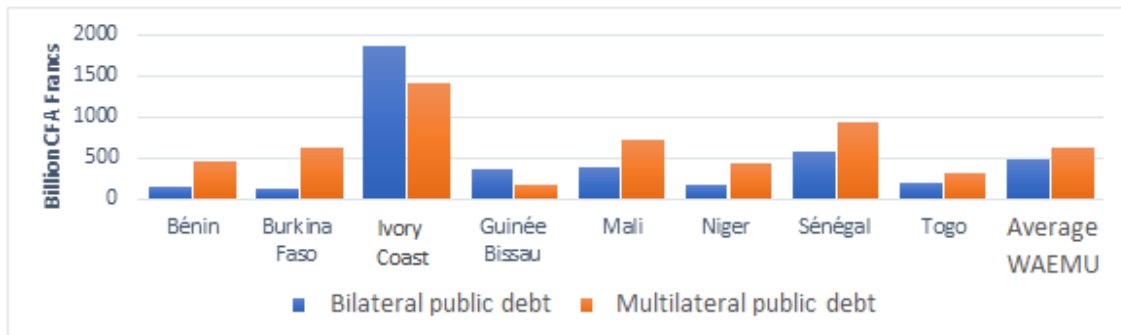


Source:

Authors from World Development Indicators (WDI) Data.

This analysis of the external debt is completed by an analysis of the composition of the external debt structure of the WAEMU countries. With the exception of Ivory Coast, most of WAEMU countries' outstanding external debt is due to the international financial institutions (IMF, World Bank, AfDB, etc.). The bilateral debt remains important, however, particularly because of the relations between the countries of the zone and certain Western countries, notably France and China. Ivory Coast's bilateral debt is much larger and far surpasses that of WAEMU (Figure 2).

Figure 2: Average Composition of the External Debt Portfolio (1985-2015)

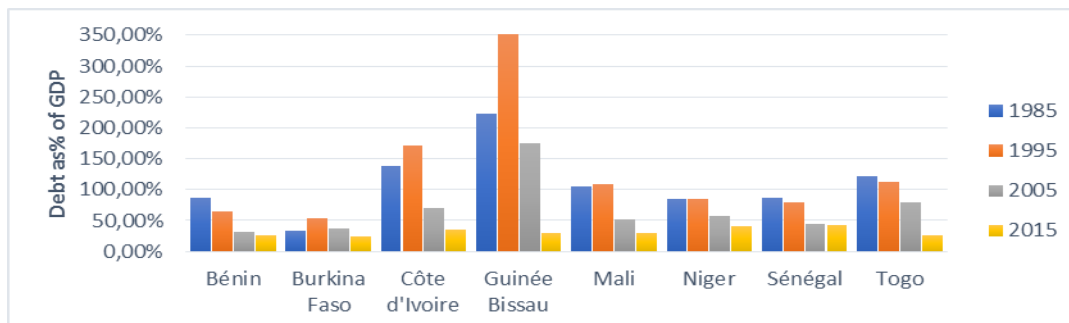


Source: Authors from BCEAO data, <https://edenpub.bceao.int/>

In terms of debt sustainability, all countries in the region have signed a debt convergence agreement under the WAEMU Treaty. The debt-to-GDP ratio should not exceed 70% of GDP. Over the period 1985-2015, only Burkina Faso and Benin met this criterion, while the rest of the countries had a much higher ratio, especially between 1990 and 2000.

At the end of the 2000s, this criterion was respected by all the countries of the Union thanks to the reduction of the external debt (HIPC). In 2015, this ratio stands at less than 70% of GDP for all countries. It stands at around 40% for Senegal and Niger and less than 35% for others (Benin, Burkina Faso, Mali, Guinea-Bissau and Ivory Coast). Guinea-Bissau and Ivory Coast have recently benefited from HIPCs (respectively in 2011 and 2012). The burden of their debt has therefore been considerably reduced.

Figure 3: Evolution of the debt ratio in WAEMU



Source: Authors from BCEAO data, <https://edenpub.bceao.int/>

The completion point of the Heavily Indebted Poor Countries (HIPC) initiative has completely changed the structure of their debt. Released from the burden of debt, those governments have fiscal space to increase public investment and drive sustainable and inclusive economic growth.

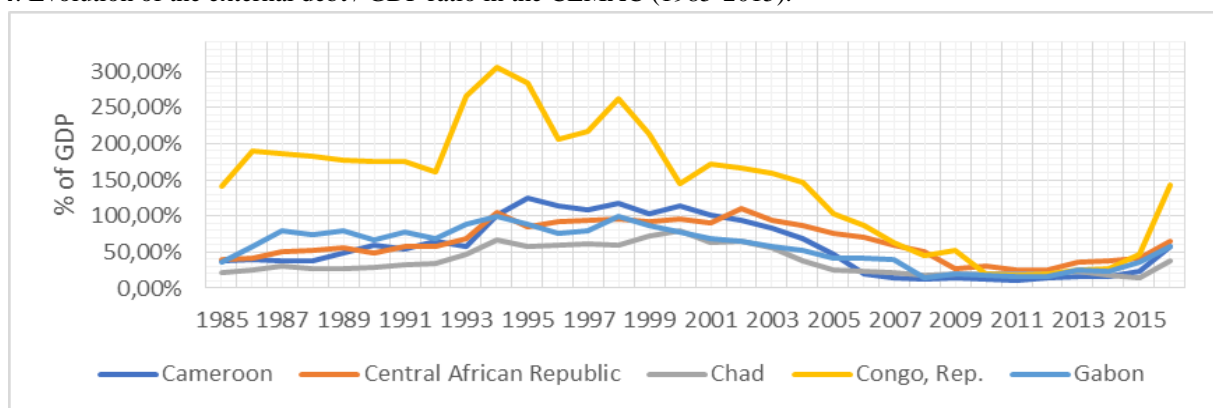
3.1.2. State of public debt in CEMAC

Analysis of the evolution of the external debt/GDP ratio of CEMAC reveals two main outcomes. First of all, the evolution of the external debt of the CEMAC countries is very similar to that of the WAEMU countries. The external debt ratio grew strongly during the 1980-1990 period before exploding in the mid-1990s due to the devaluation of the CFA Franc. Subsequently, the trend was reversed as a result of the economic and fiscal reforms related to reaching the completion point of the external debt relief process. Second, apart from Congo, which has a very high ratio compared to the country of the zone with a peak reached in 1994 (nearly 300%), all the countries in the zone have an average ratio of around 54% over the period.

The debt reduction process continued in the 2000s despite the increase in arrears on principal and interest on long-term debt. In general, the improvement of the public and external, combined with the accounts of the oil-producing countries of the sub-region program of external debt relief (HIPC), contributed to the encouraging trend in debt ratios. In 2011, the outstanding external debt of CEMAC countries (excluding Equatorial Guinea) stood at less than 20% of GDP (against 40% in 2007). Since 2012, the stock

of external public debt of the CEMAC states has been growing. Foreign borrowing through sovereign debt issues is used to finance major infrastructure projects in the transportation, energy, and agri-food sectors. The slowdown in global economic activity that began in the second half of 2014 due to the fall in commodity prices coupled with the rise in US interest rates (as of 2015) led to a rise in CEMAC's external debt. The external debt-to-GDP ratio of 25% in 2013 almost tripled to nearly 70% in 2015. The analysis of the composition of the external debt portfolio also reveals a convergence between CEMAC and WAEMU. Multilateral debt is the main component of the external debt of the countries in the zone.

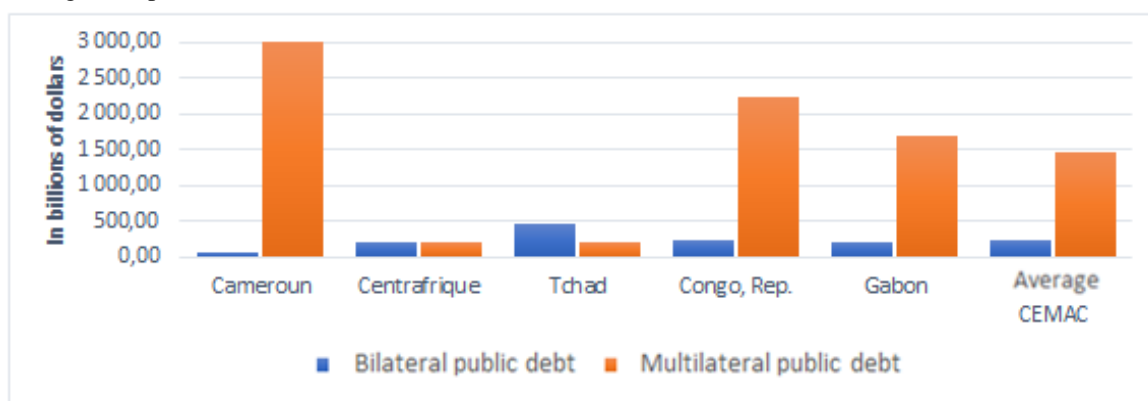
Figure 4: Evolution of the external debt / GDP ratio in the CEMAC (1985-2015).



Source: Authors from WDI Data.

Congo, Cameroon and Gabon have debt to international institutions representing more than 80% of their total external debt. Only Chad has a bilateral debt greater than its multilateral debt. The Central African Republic has almost identical bilateral and multilateral debt amounts.

Figure 5: Average Composition of the External Debt Portfolio in CEMAC (1985-2015)



Source: The authors from IMF data (World Economic Outlook, 2017)

3.2. Institutional situation in the countries of the Franc zone

The situation of the institutions varies from one country to another in WAEMU and CEMAC. However, the two economic and monetary unions are characterized by fragility of institutions at different levels. Numerous upheavals (coups d'état and social protests) have shaken most countries in the Franc zone since the late 1990s. Moreover, the poor regional economic conditions (rising unemployment and poverty) have reinforced fragility political systems.

Table 1 : Institutional characterization of some countries in the WAEMU zone (1985-2015).

Indicators	Average over the period	Burkina Faso	Ivory Coast	Mali	Niger	Senegal	Togo
Political stability	1985-1994	4.86	4.91	4.88	4.33	6.86	4.59
	1995-2004	8.93	7.88	8.24	8.59	8.96	8.60
	2005-2015	7.26	7.63	8.74	7.28	8.92	8.96
Military Influence in Politics (out of 6)	1985-1994	1.17	4.73	1.60	3.13	3.00	1.74
	1995-2004	2.52	2.43	3.87	2.03	2.34	1.00
	2005-2015	2.58	1.68	3.19	2.47	2.17	0.20
Influence of religion in politics (out of 6)	1985-1994	5.00	6.00	2.40	2.56	3.05	5.00
	1995-2004	5.00	5.15	4.00	2.48	3.00	5.00
	2005-2015	5.00	2.00	4.00	2.00	3.00	5.00
Corruption (out of 6)	1985-1994	3.70	3.38	1.63	3.56	3.00	2.00
	1995-2004	2.25	2.66	2.43	1.06	2.85	1.06
	2005-2015	2.05	1.85	1.88	1.39	2.27	1.39

Source: Authors based on ICRG 2017 database data.

Table 2: Institutional characterization of some countries in the CEMAC zone (1985-2015)

Indicator	Average over the period	Cameroon	Congo	Gabon
Political stability	1985-1994	5.88	5.71	6.18
	1995-2004	9.28	9.10	8.57
	2005-2015	9.21	10.71	8.67
Military Influence on Politics (out of 6)	1985-1994	3.56	1.47	4.56
	1995-2004	4.00	0.28	2.00
	2005-2015	3.42	0.23	2.00
Influence of Religion in Politics (out of 6)	1985-1994	2.43	5.00	5.00
	1995-2004	4.00	3.84	5.00
	2005-2015	4.73	3.00	5.00
Corruption (out of 6)	1985-1994	2.50	3.00	1.68
	1995-2004	2.25	3.21	1.00
	2005-2015	2.60	1.83	1.78

Source: Authors based on ICRG 2017 database data.

The analysis of corruption in the whole Franc zone reveals a slight increase in this index. Efforts to fight corruption in some countries such as Burkina Faso, Ivory Coast and Niger between 1985 and 1995 have shown their limits. In CEMAC, very few reforms have also been applied in the field despite the relative political stability in some countries such as Gabon (Table 2).

Regarding military influence on politics, it remains fairly important in both regions with the extreme cases of Togo (1995-2015), Ivory Coast (2005-2015) in WAEMU and Congo (1985-2015). On the other hand, religion is a factor that has long remained on the margins of politics thus reducing the risk of internal conflicts in the area as a whole.

However, pockets of tension exist. The extreme case is that of the Central African Republic in civil war since 2013 amidst social disputes and religious differences. Regional tensions (Sudan, Central African Republic, Congo DRC and Congo) coupled with

rising terrorist risks have led to significant migratory flows. In the WAEMU, the situation remains precarious and unstable, particularly after the Ivorian post-electoral crisis (2010-2011), recurring attacks related to terrorism (Burkina Faso, Mali, Niger) and persistent political instability in Guinea Bissau. In total, since the beginning of the decade, the persistence of conflicts has made the business climate unstable and tense within the Franc zone despite good economic performance.

4. Methodology

4.1. Estimation Method

In the economic literature, two types of threshold panel modelling are commonly presented: the modelling proposed by Hansen (1999) and that of Gonzalez et al. (2005). In Hansen's (1999) methodology, non-linearity results in the creation of two distinct processes depending on the value taken by the dependent variable (or transition variable). In our case, this parameter is the democratic performance and the specification of the model to be estimated takes the following form:

$$GROWTH_{it} = \mu_i + a_1 Debt_{it} + a_2 Debt_{it} \Gamma(q_{it}; c) + a_3 X_{it} + \varepsilon_{it} \quad (1)$$

With: μ_i the individual fixed effect for country i , $Debt_{it}$ the ratio of external debt to GDP, $GROWTH_{it}$; the growth rate of GDP per capita, X_{it} a set of control variables, q_{it} the transition variable, which is here, democracy for country i at date t . The function $\Gamma(q_{it}, c)$ is an indicator function and corresponds to the transition function. It takes the following values:

$$\Gamma(q_{it}; c) = \begin{cases} 1 & \text{si } q_{it} > b \\ 0 & \text{si } q_{it} < b \end{cases} \quad (2)$$

In this model, the linearity test consists in checking if the parameter a_2 is different from 0. The associated hypotheses are

written as follows:

$$H_0: a_2 = 0 \quad \text{vs} \quad H_1: a_2 \neq 0 \quad (3)$$

Assuming linearity, the sensitivity of the growth rate to the external debt would be equal to a_1 . In the opposite case, it would be equal to $a_1 + a_2$. The specification of Hansen (1999) assumes that the transition between the two regimes is brutal. On the contrary, it may well be that this transition is rather smooth. PSTR modelling proposed by Gonzalez et al. (2005) makes it possible to model situations where the transition from one regime to another is done gradually. Thus, the transition function will be, not an indicator, but rather a continuous function. Under PSTR modelling, the model to estimate is as follows:

$$GROWTH_{it} = \mu_i + a_1 Debt_{it} + a_2 Debt_{it} f(q_{it}; \gamma, c) + a_3 X_{it} + \varepsilon_{it} \quad (4)$$

Where the transition function $f(q_{it}, \gamma, c)$ is continuous and depends on q_{it} the transition variable, γ the slope of the transition function and c the centering parameter. In line with the work from Granger and Teräsvirta (1993), Gonzalez et al. (2005) use a logistic transition function, whose form is as follows:

$$f(q_{it}; \gamma, c) = \left[1 + \exp(-\gamma(q_{it} - c)) \right]^{-1} \quad (5)$$

With $\gamma > 0$ the slope of the transition function $f(\cdot)$

The analysis on PSTR has several advantages over the PTR (*Panel Threshold Regression*) specification. It allows the elasticity of economic growth relative to the external debt to vary not only over time, but also according to the level of democracy of the countries in the sample. Thus, the PSTR model makes it possible to take into account the heterogeneity of the relationship between economic growth, external debt and the quality of political institutions.

Taking into account the threshold effect introduced by the transition function f , the sensitivity of the economic growth to the external debt of country i to date t is given by the following expression:

$$S_{it} = \frac{\partial GROWTH_{it}}{\partial Debt_{it}} = a_1 + a_2 f(q_{it}; \gamma, c) \quad (6)$$

Equation (6) shows that the sensitivity of economic growth to external debt can be considered as a combination of the coefficients a_1 and a_2 , obtained in the two extreme regimes. The definition of the transition function imposes $0 < f(q_{it}; \gamma, c) < 1$. For $a_2 < 0$, we have $a_1 + a_2 < S_{it} < a_1$; on the other hand if $a_2 > 0$, we have $a_1 < S_{it} < a_1 + a_2$. However, it is interesting to note that the coefficients obtained do not always correspond to the direct impact of the external debt on growth: for example the coefficient a_1 corresponds to the impact of external debt on growth only when the function transition $f(q_{it}; \gamma, c)$ tends to 0. On the other hand,

when $f(q_{it}; \gamma, c)$ tends to 1, the sensitivity corresponds to the sum of the two parameters a_1 and a_2 . Between the two extreme regimes one has a continuum of regimes defined by the weighting of a_1 and a_2 .

Another advantage of PSTRs is that they are a generalization of the PTR: indeed, when $\gamma \rightarrow \infty$ the transition function $f(\cdot)$ becomes an indicator function. The model then becomes identical to Hansen's (1999) transition model. Since we do not know the nature of the transition that actually exists in the model, we use smooth transition modelling (PSTR) for the rest of our estimates. Indeed, the slope of the transition function being determined endogenously, it will be possible to highlight a rather abrupt transition when the parameter of the slope is high. When $\gamma \rightarrow 0$, then the function $f(\cdot)$ has the value 1/2 whatever the value taken by the threshold variable q_{it} . The threshold effect therefore disappears and the model is nothing other than a linear panel.

Three major steps are generally used in a PSTR model. The first step of PSTR modelling is to check for nonlinearity. For this, Gonzalez et al. (2005) propose a test that consists in comparing a linear model with a PSTR model. The null hypothesis associated with this test is: $H_0: \gamma = 0$ or $b_1 = 0$. In the second step, we determine the number of thresholds (m) to admit the transition variable

q_{it} , such that $c_{j,min} > \min_{it} \{q_{it}\}$ et $c_{j,max} > \max_{it} \{q_{it}\}$, $j = 1, \dots, m$. Colletaz and Hurlin (2006) propose to retain the value of m of the model that minimizes the sum of squares of residuals, AIC (Akaike Information Criterion), BIC (Bayesian Information Criterion).

However, Gonzalez et al. (2005) consider that in practice it is usually sufficient to retain $m = 1$ or $m = 2$, since these values generally make it possible to capture the variations in the parameters to be estimated. Finally, in the third step we estimate the parameters of the PSTR model using the non-linear least squares method. Under the null hypothesis the model contains nuisance parameters (Davis, 1987). We thus replace the transition function $f(q_{it}; \gamma, c)$ by its Taylor expansion of order 1 in the neighbourhood of $\gamma = 0$. The equation to be estimated thus becomes:

$$GROWTH_{it} = \mu_i + b_1 Debt_{it} + b_2 q_{it} Debt_{it} + a_3 X_{it} + \varepsilon_{it}^* \quad (7)$$

b_2 is proportional to the slope of the transition function γ , and the nonlinearity test can be reduced to: $H_0: b_2 = 0$ against $H_1: b_2 \neq 0$. Gonzalez et al. (2005) propose a test statistic based on the Lagrange Multiplier (LM) and Fisher version (LM_F). An extension of these tests is carried out on the principle of pseudo-likelihood ratio (*pseudo-LTRT*) by Colletaz and Hurlin (2006). The three previous test statistics are:

$$LM = TN (SSR_0 - SSR_1) / SSR_0 \square \chi^2(K) \quad (8)$$

$$LM = \frac{(SSR_0 - SSR_1) K}{SSR_0 / (TN - N - K)} TN \square F(K, TN - N - K) \quad (9)$$

$$pseudo-LRT = 2 [\log(SSR_0) - \log(SSR_1)] \square \chi^2(K); \quad (10)$$

Where SSR_0 is the sum of the square of the residuals of the constrained model (under the null hypothesis, i.e. linear panel model with individual fixed effects) and SSR_1 is the sum of the square of the residuals of the unconstrained model (PSTR).

4.2. Data sources and measures of key variables

The data used in this research are from the World Development Indicators 2017 (WDI) database, with the exception of those related to the quality of political institutions that come from the ICRG databases. The sample covers the period 1985-2015 (30 years) and includes 10 African countries in the Franc zone. As a reminder, our analysis model takes the form presented in equation (1):

$$GROWTH_{it} = \mu_i + a_1 Debt_{it} + a_2 Debt_{it} \Gamma(q_{it}; c) + a_3 X_{it} + \varepsilon_{it}$$

- *GROWTH*: The endogenous variable corresponding to the growth rate of GDP per capita.
- *Debt*: an explanatory variable of interest defining external debt relative to GDP. According to the economic literature, one should expect a positive coefficient up to a certain level of external indebtedness.

- q : The transition variable. This is the index of democracy; we will use alternately the indices of democracy and *Polity IV* and *Freedom House*.
- X regrouping the other selected control variables with regard to the growth theory and the context of the countries in the Franc zone.

Variables	Definition	Source
Economic Growth	Real GDP per capita growth, It is an economic indicator that measures the wealth produced within a country or geographical area over a specified period of time. It captures economic growth.	WDI
Government consumption	Ratio of Government consumption to GDP.	WDI
Population	Growth rate of total population is introduced to capture the potential effect of a variation in the size of the country.	WDI
Domestic credit	Credit to private sector (% of GDP)	WDI
demopolity 2	Democracy index; between -10 (absolute dictatorship) and 10 (perfect democracy).	WDI
demopolity4	The Democracy indicator is an additive eleven-point scale (0-10). The operational indicator of democracy is derived from codings of the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive	Polity IV (2016) Polity IV (2016)
External Debt	Public debt (% of GDP), it measures the share of the external debt in the national wealth of a country.	WDI
Law and Order	“Law and Order” form a single component, but its two elements are assessed separately, with each element being scored from zero to three points. To assess the “Law” element, the strength and impartiality of the legal system are considered, while the “Order” element is an assessment of popular observance of the law. Thus, a country can enjoy a high rating – 3 – in terms of its judicial system, but a low rating – 1 – if it suffers from a very high crime rate if the law is routinely ignored without effective sanction (for example, widespread illegal strikes).	International Country Risk Guide (ICRG)
DemoICRG	This is a measure of how responsive government is to	International Country Risk Guide (ICRG)

Corruption (CORP)	its people, on the basis that the less responsive it is, the more likely it is that the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one This is an assessment of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the economic and financial environment; it reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability; and, last but not least, introduces an inherent instability into the political process.	International Country Risk Guide (ICRG)
Government Stability (GOVS)	This is an assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents, each with a maximum score of four points and a minimum score of 0 points. A score of 4 points equates to Very Low Risk and a score of 0 points to Very High Risk.	International Country Risk Guide (ICRG)
Socioeconomics conditions	This is an assessment of the socioeconomic pressures at work in society that could constrain government action or fuel social dissatisfaction.	International Country Risk Guide (ICRG)

5. Results

For the linearity test, we will use in this study the Fisher LM test. Results are provided in Table 3.

Table 3. LM Fisher linearity test

Variables de transition	Test LM _F	P-Value
GOV STABILITY	11.911	0.00
CORUPTION	2.170	0.04
SOCIOECONOMIC CONDITION	11.911	0.00
DEMOCRATIC ACCOUNT	3.212	0.00
LAW & ORDER	0.628	0.05
DEMOCRATY POLITY 4	0.379	0.76
DEMOCRATY POLITY 2	4.466	0.00

H_0 : linear model Vs H_1 : PSTR model with at least one threshold.

The numbers in parentheses are p-values of F-statistics.

The null hypothesis is that the model is linear is rejected for transition variables except for Democracy Polity 4. The relationship is non-linear is concluded. Therefore, a PSTR model is used to estimate that relationship, after carefully choosing between PESTR (Panel Exponential Smooth Transition Regression) and PLSTR (Panel Logistic Smooth Transition Regression) family of models. This test is presented in Table 4.

Table 4. Sequence test of Fisher: Choice between PESTR and PLSTR

Non-linear Variables	PLSTR		PESTR	
	F stat	P-value	F stat	P-value
CORUPTION	H01	0.4754279	0.6224	
	H02	1.2163263	0.2986	
	H03	4.8418839	0.0089	
GOV STABILITY			H01	4.684942 0.0100
			H02	9.247581 0.0001
			H03	19.727416 0.0000
SOCIOECONOMIC CONDITION			H01	2.8199100 0.0616
			H02	5.0352773 0.0072
			H03	1.6236514 0.1994
DEMOCRATIC ACCOUNT			H01	0.8549131 0.3560
			H02	0.5589963 0.4553
			H03	0.4723377 0.4925
LAW & ORDER	H01	0.8549131	0.3560	
	H02	0.5589963	0.4553	
	H03	0.4723377	0.4925	
DEMOCRACY POLITY 2	H01	10.488013	0.0014	
	H02	1.356550	0.2454	
	H03	1.434187	0.2323	

Once the linearity test and the test of the choice between PESTR and PLSTR are used, the problem is to identify the number of transition functions. The methodology of sequential test F-statistic LM_F is generally used for the No remaining nonlinearity test (Test of number of regimes). We find that the model with one threshold (two regimes) adequately captures the non-linear relationship. Thus, a PSTR model with one transition function seems to be appropriate in this paper. Table 5 presents PSTR estimates using the Nonlinear Least Squares method.

Table 5. External debt, institutions and Economic Growth

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Corruption	Gov Stability	Socio Economic	Democratic account	Law and order	Democracy Polity 2
Constant	-0,49 (-0.987)	0.0366 (0.789)	-520.074 (0.009)	-7.49*** (-0.7599)	26.002 (0.00885)	0.28* (1.787)
Government consumption	0.59*** (3.278)	0.48** (2.393)	-3.494 (-0.008)	3.7103*** (9.533)	-54.92 (0.008)	-0.386 (-0.255)
Domestic credit	0.10 (0.565)	0.98*** (16.994)	348.97 (0.009)	0.2395*** (3.2056)	0.341*** (3.864)	-0.09 (-1.032)
Population	0.97*	19.356	520.04	7.838***	-25.78	0.139

	(1.871)	(0.004)	(0.009)	(7.948)	(-0.008)	(0.682)
$Debt:a_1$	0.11 (0.580)	-0.059 (-0.780)	4.125 (0.010)	-3.166*** (-8.135)	55.321 (0.008)	-0.033 (0.325)
$Debt_{it} * f(q_{it}; \gamma, c):a_2$	-0.04 (-0.219)	-0.0755 (-1.202)	-348.59 (-0.009)	0.0799 (1.225)	0.163* (1.579)	0.051 (0.507)
γ	134.56* (1.772)	0.881 (0.890)	0.810 (0.066)	285.94 (0.001)	0.806 (0.768)	0.281 (0.576)
C	1.92 (2.384)	0.777** (2.458)	-0.63 (-0.0147)	3.308*** (6.158)	-6.206 (-0.041)	1.768 (1.442)

c : the threshold parameter and γ the slope parameter.

The numbers in parentheses are absolute value of t -statistics.

* and *** indicate statistical significance at the 1% and 10% level.

The slope γ appears to be low for 4 transition variables (the highest value is 0.881 for Government stability). It is concluded that a smooth transition and consequently the PSTR is well adapted. It means that in condition to those variables, the relationship between external debt and growth cannot be reduced to a limited number of regimes. Also, we found that the shift between the two extreme regimes occurs around the location parameter c (the 4 location parameters seem far from their respective mean values). We conclude that only countries with good institutions can exploit the advantages of external debt on growth. However, the slope γ appears to be high for 2 transition variables (Corruption: 134.56 and democratic account: 285.94).

Results confirm the existence of non-linear relationship between external debt and economic growth. Economic growth is less sensible to external debt in countries with low institutions. We find an instable negative direct (with values ranging between -348.59,

and -0.04) impact of public debt on growth, measured by a_2 , insignificant in 3 regressions (corruption, government stability and socioeconomic conditions). This result is in line with results of empirical literature which shows that there is a negative relationship between external debt and economic growth. This result is similar to the conclusions of the previous studies (Shleifer and Vishny, 1993; Ciocchini et al., 2003; Nieberding, 2004; Cadoret et al., 2014)

However, we find an instable positive direct (with values ranging between 0.05 and 0.16) impact of external debt on growth in 3 regressions (democratic account, law & order and democracy polity 2). This result is consistent with findings of Jalles (2011).

Also, we find for all transition variables, external debt - economic growth coefficient a_1 is instable. This implies that an increase of the transition variables entails an increase of external debt -growth coefficient. In Countries with high level of institutions, there is positive effect of public debt on economic growth. This result, so far, confirms the idea that good institutions (for example low level of democracy and government stability) is considered one of the main factors for growth maximization for African countries. It is pointed out that high quality of institutions influences the level of external debt and consequently growth.

Conclusion

The issue of institutions and debt is at the heart of all development programmes. For this purpose, it is recognised that a better political-institutional quality is essential to achieve this objective. As the political institution itself is multidimensional, the objective of this paper was to determine its influence on the relationship between external debt and economic growth in the African Franc zone. The main contribution of this study is the determination of an endogenous threshold of institutional quality beyond which external debt would affect economic growth differently. The methodology focuses on estimating a smooth transition panel regression model (PSTR, *Panel Smooth Threshold Regression*) based on González et al (2005). The sample

includes 10 countries in the African Franc zone over the period 1985-2015. From the empirical analysis, we draw the following conclusions: in countries with lower corruption and a high level of democracy, the level of debt for which the effect of debt on growth becomes negative is higher. This implies that poor institutional quality prevents a country from taking full advantage of its credit opportunities. As a result, only countries with good institutions can fully benefit from the advantages of external debt for economic growth.

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