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The Effect of Foreign Debt on Economic Growth in Sub-Saharan African Sub-Regions

Arsène Aurelien NJAMEN KENGDO*, Luc NEMBOT NDEFFO, Désiré AVOM*****

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ABSTRACT

The main objective of this paper is to verify the effect of foreign debt on economic growth in sub-Saharan African sub-regions from 1980 to 2017. The paper applies the Generalized Method of Moments (GMM) with robust standard deviations using the Lewbel's estimator (2012). Results indicate that foreign debt significantly enhances growth in four zones (SADC, EAC, CEMAC and ECOWAS) with different bearable thresholds. This seems to suggest that creditors may be aware that countries do not exceed their bearable threshold at least at regional level.

1. Introduction

The controversy over the debate on debt efficiency is still ongoing (Touna, 1985; Sami and Mbah, 2018; Bernadin et al, 2018). In the theoretical analysis of debt, there are two main strands of debate: the Classicals and the Keynesians. For the Keynesians, advocates of interventionism, indebtedness does not cause any burden, either for future generations or for present generations because of the investments it generates. However, the Classicals see external debt as a burden likely to compromise the accumulation of capital, present and future consumption. They liken debt to a future tax and attribute a negative connotation to the State intervention (Yapo, 2002). From this theoretical controversy stems the problem of the ability of foreign debt to enhance economic growth.

After the 2007 financial crisis, many procedures were employed to enclose the negative effects of this crisis. The relevance of this therapy was justified by a certain economic recovery, observed in developing countries. These countries have gradually put themselves on the path of growth. This has been highly noticed in sub-Saharan African countries (SSA) which are experiencing remarkable growth episodes: -0.94% during the period 1980 to 2000, 2.7% during the period 2000 to 2008, 0.27% in 2009; 2.74% in 2010; 1.24% in 2012; 0.09% in 2015, -1.44% in 2016 and -0.16% in 2017 (World Development Indicators Data, WDI, 2018).
During the same period, it is noted that debt has taken on considerable proportions in SSA. Thus, the region's level of indebtedness rises from $60.65 billion to $213.9 billion among 1980 and 2000 (WDI, 2018). Increases debt is therefore a reality to be admitted. Despite reaching the Heavily Indebted Poor Countries (HIPC) Initiative, countries' foreign debt continues to increase. In fact, the total foreign debt stock of the States now amounts to $236.2 billion and $300.6 billion respectively in 2008 and 2010, $379.3 billion in 2012, $457.5 billion in 2015 and $554.9 billion in 2017 (WDI, 2018). This raises the interrogation of whether the merit reserved for external debt benefits sub-Saharan African countries in terms of growth.
The rest of this paper is organised as follows: section two criticises the existing literature; followed by section three which gives highlights on the econometric strategy and data; thereafter the empirical finding will be presented in section four and section five concludes the paper.

2. Literature review

The presentation of the theoretical framework allows a better understanding of the empirical verifications.

2.1. Review of theoretical works

This sub-section focuses on theoretical work on this subject, these include: the debt-growth model, the debt-cycle theory, and the theory of the virtual debt burden are presented.

*,**,*** University of Dschang, Faculty of Economics and Management/CERME, Dschang, Cameroon. E-mail addresses arsenekengdo@yahoo.fr (A. A. Njamen Kendgo - Corresponding author), ndefluc@yahoo.fr (L. Nembot Ndeffo), davom@hotmail.com (D. Avom).

2.1.1. The debt-growth model

The debt-growth model considers debt in terms of its capacity to ensure economic growth (Bekolo, 1984). This conception recommends that debt should be allocated primarily to investment. And a country can continue to incur debt if the Gross Domestic Product (GDP) growth rate is superior than or equal to the interest rate. Qayum (1966) considers that indebtedness allows a more complete use of domestic resources. The effects of borrowing flows on growth will improves domestic savings, and these effects are such that they gradually substitute for debt until it becomes zero. However, this model ignores the risks of substitution of domestic capital by foreign capital after this one has taken up all profitable investment opportunities.

Chenery and Strout (1966) specify that external debt stimulates savings, which constitute the resource to meet the needs of investors, and which encourages exports to build up the reserves needed to meet commitments to creditors. This optimal allocation of funds makes it possible to constitute the country's pledge to its creditors to improve its future debt capacity.

The debt-growth model is criticised on a number of points. Aliber (1980) questions the optimal debt level. For him, the consequences for debt growth can be analysed separately for solvency and liquidity problems. To ensure long-term solvency, it is essential that the real interest rate and the marginal productivity of capital are equal. Therefore, the growth rate of foreign debt must be equal to the real interest rate. Hence, the debt grows at the same rate as the country's capacity to pay debt service. The next approach below shows that debt follows a cycle.

2.1.2. The debt cycle theory

The debt cycle theory is based on the neoclassical approach to optimal debt. Avramovic (1964) distinguishes three stages in the debt cycle. In the first, domestic savings are insufficient for financing needs. External borrowing helps to partially finance investments and pay interest. In the second stage, domestic savings increase and supports a significant part of investments, but remain insufficient. In the third stage, debt begins to decline and domestic savings exceed investment.

The length of a cycle varies according to the assumptions made about the target growth rate, the interest rate, the savings rate, the investment rate and the average loan duration. Avramovic considers that starting from zero debt, the debt cycle can last 36 years, of which 26 years for the growth phase and 10 years for the decline phase. Furthermore, this theory is problematic because most developing countries remain confined in the first phase of the cycle with an explosion of debt and poor economic performance. Therefore, Avramovic considers that debt ratios that do not experience an explosive trend would be sufficient to ensure the possibility of continued indebtedness. But, this condition is not sufficient because the level of indebtness reached may be high and unbearable in the long term.

2.1.3. The theory of the virtual debt burden

The theory of the virtual debt burden is based on a particular analysis of sustainability. Sustainability can be perceived in two ways. Firstly, the traditional approach, which neglects the effect of debt on growth. According to her, a country reimburses its debt when it has sufficient financial funds. Secondly, in a broader view, the debtor country maximizes its interest by comparing the debt service with the cost of sanctions related to non-repayment. According to the latter approach, debt is supposed to have a negative influence on investment and thus, by extension, on growth (Idlemouden and Raffinot, 2005).

The work of Cohen and Sachs (1986), Krugman (1988), Cohen (1995) gave rise to the theory of the virtual debt burden. According to this theory, starting from a threshold, debt discourages consumption and investment and limits economic growth. However, if external debt has an undesirable effect on economic activity, the effect is not systematic and only manifests itself at a certain level. Based on the view that there is a theoretical link between investment behaviour and the amount reimbursed by the debtor country, an inverted U-shaped curve linking foreign debt to growth rate was created. It allows a more suitable empirical method for low-income states (Pattillo et al, 2002).

The main lesson of the Laffer debt curve is that beyond the sustainable threshold, the debtor country is no longer able to honour its commitments without compromising the welfare of the population. It is then in the creditor's interest to reduce the debt stock. But this approach has a major drawback because the authors do not say what happens after the decline phase. Indeed, this conception suggests that economic growth declines indefinitely.

Despite criticisms of these theories, they have been subjected to a number of empirical tests.

2.2. Review of empirical works

The link between the degree of indebtedness and certain macroeconomic variables has been the subject of several empirical studies. Ojo (1989), who, using an econometric approach, shows that the foreign debt-stock/GDP ratio of about thirty African countries during the period 1976 to 1984 is determined by: GDP growth rate, imports, exports and population growth rate. The results allow him to conclude that the foreign debt-stock/GDP ratio negatively affects exports, the GDP growth rate and positively affects imports and population growth rate.

Along the same lines as Ojo (1989), Yapo (2002) in an empirical study on the debt determinants of African HIPC, establishes that the economic growth and debt have inverse relationship in Ivory Coast. Thus, a high economic growth rate reduces the opportunities for indebtedness.

Pattillo et al, (2002) investigate the effects of foreign debt on growth in HIPC using two methods (linear and non-linear specifications). The results indicate a negative effect of foreign debt on investment and growth in both methods, but this negative effect in the non-linear specification is after a certain threshold (estimated at 160 to 170% of exports and 30 to 40% of GDP). In a second paper, Pattillo et al, (2004) show that doubling the external debt would lead to a decrease in GDP growth of about one percentage point through the channels of reduced capital accumulation (1/3) and reduced aggregate productivity (2/3).

Benedict et al, (2005) examine how external debt relief can boost HIPC growth. Their results suggest that reducing HIPC debt service by six points would directly increase investment by 0.75 to one point per year. The reduction in debt service could also give an indirect boost to growth through its effect on domestic investment.

Recently, Senadza et al, (2018), Bernadin et al, (2018) establish a negative linear link between foreign debt and economic growth. Despite the relevance of these works, they neglect threshold effects in their analysis, so the importance in terms of economic policy is no longer to be demonstrated. This aspect is the focus of this study.

3. Methodology

3.1. Estimation method: The Generalized Moment Method (GMM)

The methodology used is that of system GMM of Blundell and Bond (1998). This methodology presents three main advantages (Magnac, 2005): *(i)* they allow identifying effects that are not observable in cross-section; *(ii)* to control the presence of unobservable heterogeneity; *(iii)* to formulate dynamic models. It is this last characteristic that interests us in this section. The robustness of the results obtained is based on two main tests: the absence of 2nd order autocorrelation and the validation of the Sargan over identification test. To apply the system GMM, the number of individual dimension should be greater than the time dimension. This results in convergent and efficient coefficients (Roodman, 2009).

To take into account the results of system GMM estimation in which the estimated equation is under-identified, the method proposed by Lewbel (2012) can be applied. The Lewbel's estimator (*Using Heteroskedasticity to Identify and Estimate Mismeasured and Endogenous Regressor Models*) is used to identify structural parameters in under-identified regression models. To do this, external instruments can be constructed from the residuals of the auxiliary equations. This method produces three evaluation programs: *(i)* traditional estimation using instrumental variables, *(ii)* single estimation using the instruments produced, and *(iii)* estimation using the instruments produced and excluded. It is the second case that interests us, with an under-identified equation. In order to apply the procedure proposed by Lewbel, we must verify two necessary and sufficient conditions: firstly, the heteroskedasticity of the residuals and, secondly, the correlation of the squared residuals with the dependent variable (Lewbel, 2012; Behrens et al, 2015).

3.2. Econometric Specification

In this study, we adopt a dynamic quadratic model based on the model proposed by Odjo and Oshikoya (1995). It is presented in equation 1:

$$Tcrois_{it}=a_0 + a_1 Tcrois_{it-1} + a_2 Txpop_{it} + a_3 Servexp_{it} + a_4 Apd_{it} + a_5 Open_{it} + a_6 Khu_{it} + a_7 Tinv_{it} + a_8 Dext_{it} + a_9 Dext^2_{it} + a_{10} Tinteret_{it} + E_{it} \quad (1)$$

Where, *Tcrois* is the per capita GDP. The variables of interest are: debt service/exports ratio (*Servexp*), human capital as measured by the primary school enrolment rate (*Khu*), domestic investment rate (*Tinv*), foreign debt/GDP ratio (*Dext*) and the same variable squared ($Dext^2$). The control variables are: population growth rate (*Txpop*), an indicator of official development assistance from all donors (*Apd*), an indicator of trade openness (*Open*), and the interest rate (*Tinteret*). With "*i*" the individual effect, "*t*" the time effect and E_{it}, the error term.

3.3. Data

The sample is made up of 33 SSA countries whose annual data are collected over the period 1980-2017. The study focuses on four regional groups: CEMAC (Central African Economic and Monetary Community), ECOWAS (Economic Community of West African States), EAC (East African Community) and SADC (Southern African Development Community). The distribution of countries by sub-region is shown in table 1.

Table 1. List of countries

SADC (10)	EAC (5)	CEMAC (5)	ECOWAS (13)
Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mozambique, South Africa, Swaziland, Zambia, Zimbabwe	Burundi Ethiopia Kenya Mauritius Rwanda	Cameroon Central African Republic Chad Gabon Republic of Congo	Benin, Burkina Faso, Ivory Coast, Gambia, Ghana, Guinea Bissau, Sierra Leone, Liberia, Mali, Niger, Nigeria, Senegal, Togo

Source: authors

Taking countries into groups is justified by the fact that the overall results can hide important disparities in the sample. The data are from secondary sources, gotten from the World Bank database. The choice of study period and number of countries depends exclusively on the availability of data. Estimates are made using Stata 11 software. The results are showing in the following section.

4. Results

Table 2 sum up the different results.

Table 2. the results of the different groupings

	SADC	EAC	CEMAC	ECOWAS
$Tcrois_{it-1}$	0.9712 ***	0.955 ***	0,8534 ***	0,80411 ***
	(0.0124)	(0.0312)	(0.0312)	(0.0277)
Servexp	0.000342	-0.000419	-0,00288	-0,000543
	(0.00123)	(0.00132)	(0.00217)	(0.00065)
Open	0.000299	0.001859	-0,00011	-0,000963 **
	(0.000299)	(0.0012)	(0.000878)	(0.00045)
Tinteret	-0.001972	-0.00085	0,00356	-0,001798
	(0.00385)	(0.0031)	(0.0064)	(0.0016)
Txpop	-0.01766 *	0.000332	0,0661 **	0,0041189
	(0.010464)	(0.0073)	(0.0292)	(0.0091)
Apd	0.00474	-0.014094	0,00996	0,0187675 *
	(0.00866)	(0.01324)	(0.0156)	(0.0095)
Khu	-0.000442	0.000503	0,001159	0,0003788
	(0.000316)	(0.000845)	(0.000847)	(0.000434)
Tinv	-0.0006955	-0.000679	0,000872	0,0017449 *
	(0.000876)	(0.00249)	(0.00144)	(0.00092)
Dext	0.3239 ***	0.1202 **	0,44209 ***	0,3075***
	(0.0282)	(0.0486)	(0.0437)	(0.0259)
$Dext^2$	-0.1862***	-0.0775***	-0,24772***	-0,197991***
	(0.0141)	(0.0239)	(0.022)	(0.012)
Observations	349	175	174	442
Number of countries	10	5	5	13
Wald chi2	21039.16	11378.32		
Prob> chi2	0.000	0.000		
F-statistic			218.82	473.78
Prob > F			0.0000	0.0000
Centered R2			0.9323	0.9187
P-value test AR2	0.56	0.43	0.18	0.083
P-value Sargan test	0.607	0.903	0.001	0.003
P-val Sargan obtain by Lewbel's estimator			0.59	0.11

Note: Robust standard errors in parentheses. Significance levels: (***) 1%, (**) 5%, (*) 10%

This table shows the absence of second order autocorrelation (*P-value test AR2* > 5%) for all groups. The p-value associated with the Sargan over-identification test (*P-value Sargan test*) is above the 5% threshold in the SADC and EAC zones. We therefore accept the hypothesis of validation of the instruments. Furthermore, the probability associated with the Wald statistic (*Prob > chi2*) is below the 5% threshold in the SADC and EAC zones. This means that the selected variables significantly explain the variations in economic growth in these groupings.

In the CEMAC and ECOWAS zones, the results of system GMM estimation show that the instruments are invalid because a p-value below the 5% threshold is obtained (*P-value Sargan test*). To take this into account, we adopt the method proposed by Lewbel (2012). Lewbel's estimator gives a probability associated

with the Fischer statistic (*Prob > F*) which is less than 5%, with a centered R^2 of 0.9323 and 0.9187, respectively. This means that the variables selected significantly explain the variations in economic growth in these groups. Moreover, the probabilities associated with the Sargan over-identification test are above the 5% threshold (*P-val Sargan obtain by Lewbel's estimator* = 0.59 and 0.11 respectively in CEMAC and ECOWAS). This implies that the instruments provided by the Lewbel's estimator are valid. These results allow a number of commentaries to be made.

The GDP per capita lagged by one period ($Tcrois_{it-1}$) has a significantly enhances economic growth. This result is in line with the theory of convergence (Barro, 1990), which statuses that the level economic growth of countries tends to be closer together over time.

The estimated debt-service ratio (*Servexp*) has a positive sign in the SADC, contrary to what was expected. In the EAC, CEMAC and ECOWAS, it has a negative sign. This result corroborates the work of Pattillo et al, (2004).

Trade openness (*Open*) positively (negatively) affect economic growth in the SADC and EAC (in the CEMAC and ECOWAS). Result in CEMAC and ECOWAS is in contradiction with Falvey et al, (2012), Manwa et al, (2019) which suggests that trade openness benefits economic growth.

Regarding the interest rate (*Tinteret*), our results show a deleterious effect on economic growth in SADC, EAC and ECOWAS. Chouraqui et al, (1986) obtained a similar result. They highlight the risk of crowding-out resulting from the accumulation of large budget deficits and restrictive monetary policy. According to these authors, a permanent increase in debt associated with a growth in the budget deficit (due to increased debt service) will probably raise interest rates; causing a decline in investment and consequently a fall in economic growth. A rather satisfactory sign is observed in CEMAC.

Population growth rate (*Txpop*) significantly has a harmful effect on economic growth in the SADC, as in line with the results gotten by Benedict et al, (2005). This a clear indication that, despites investment in human capital in this sub-region, a labour force has been unproductive (Manwa et al, 2019). In the other sub-regions, the effect is positive, but significant only in CEMAC. Thus, the population increases and with it, a workforce to support investment projects, which generates growth.

The Official Development Assistance (*Apd*) positively enhance economic growth in all regional groups except the EAC. In the EAC, *Apd* is not consistent because many countries are victims of unstable political regimes.

Human capital (*Khu*) negatively affect economic growth in SADC. In fact, we already observe a negative effect of the population growth rate on economic growth in this zone. For the other zones, *Khu* positively (but not significant) affects economic growth.

Domestic investment rate (*Tinv*) negatively influence economic growth in SADC and EAC. This result is in contradiction with Benedict et al, (2005). However, a positive impact can be observed in CEMAC and ECOWAS, with a significance of 10% in the latter.

Foreign debt stock/GDP ratio (*Dext*) and the same variable squared ($Dext^2$) have the expected and significant signs in all four groups of countries. Indeed, foreign debt positively affects growth (positive *Dext* coefficient), but above a certain threshold, this effect becomes negative (negative $Dext^2$ coefficient). This result is in conformity with the virtual debt burden theory (Cohen and Sachs, 1986; Krugman, 1988; Cohen, 1995, Pattillo et al, 2002). The bearable thresholds are obtained by equation 2. The calculated thresholds are reported in table 3.

$$Bearable\ threshold = -\ (coefficient\ Dext\ /\ 2 \times coefficient\ Dext^2) \times 100 \quad (2)$$

Table 3. Bearable thresholds

Groups of countries	SADC	EAC	CEMAC	ECOWAS
Bearable thresholds (% GDP)	86,82 %	77,92 %	89,47 %	78,94 %

Source : authors

Beyond of calculated bearable thresholds above, foreign debt negatively affects economic growth in different sub-regions, respectively.

5. Conclusions

The main objective of this study was to analyse the effect of foreign debt on economic growth in SSA sub-regions from 1980 to 2017. The empirical model is estimate by the system GMM in order to control for possible endogeneity. Our findings suggest a non-linear relationship, consequently foreign debt significantly enhances economic growth in the four SSA sub-regions, with the presence of a bearable thresholds that varies according to the sub-region studied.

In order of controlling debt flows in the different groups of countries, creditors must check countries' sustainability before making new loans. Otherwise, this would be likely to create a "snowball effect" (borrowing to pay debt charges). Even if the current situation shows sustained economic growth in certain SSA countries, it is important to place particular emphasis on the uncertainties that could jeopardise this

effort. Firstly, security has been threatened, particularly in Burundi, Mali, Nigeria, Cameroon and Sudan. If the situation were to worsen, this would have considerable regional implications for trade and investment decisions. Secondly, new loans must be analysed considering their current and future impact on the State solvency.

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