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External Debt and Economic Growth in Sub-Saharan Africa: Threshold Effect and the Role of Government Effectiveness

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Abstract - This study analyzes the relationship between external debt and economic growth between 2004 and 2020 for a sample of 39 Sub-Saharan African countries. It combines a dynamic panel econometric approach (system GMM) and a threshold model to capture potential non-linearities in the debt-growth relationship. The estimation results from the system GMM model reveal a negative effect of external debt on GDP per capita growth, a finding confirmed across various specifications, including the introduction of control variables such as investment and governance indicators. Institutional quality plays a significant moderating role: government effectiveness and control of corruption have a positive effect on growth, and their interactions with external debt significantly reduce its negative effects. Furthermore, the threshold model highlights a non-linear relationship, with an estimated threshold of about 42% of GDP. Below this level, external debt supports growth, whereas beyond it, it becomes detrimental. The majority of the countries in the sample lie above this threshold, reflecting a high exposure to debt distress risks.

JEL Classification
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Key-words
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INTRODUCTION

External debt is an important financing tool for developing countries, particularly in sub-Saharan Africa, where it helps finance infrastructure, bridge fiscal deficits, and support economic growth (Ogunmuyiwa, 2010; Panizza et al., 2010; World Bank, 2020). According to the OECD (2022), additional financing needs to achieve the Sustainable Development Goals (SDGs) in Africa amount to approximately USD 194 billion per year, representing nearly 7% of the regional GDP. In this context, reliance on external borrowing remains an essential source of development financing.

Over the past two decades, sub-Saharan African countries have significantly increased their reliance on external borrowing, leading to a steady rise in debt levels, particularly since 2016. This trend raises growing concerns about debt sustainability, macroeconomic vulnerability, and exposure to external shocks (Onyekwena & Ekeruche, 2019; Ouguehi & Yanoe, 2024). According to the African Development Bank (2018), the number of countries at high risk of debt distress increased from 6 in 2010 to more than 20 in 2022, reflecting a deterioration in fiscal positions.

Furthermore, the development of domestic debt markets is often presented as an alternative that can reduce dependence on external debt by mobilizing domestic savings and limiting exposure to exchange rate risk (Panizza & Presbitero, 2014). However, the effectiveness of this mechanism depends strongly on the depth of financial markets, macroeconomic stability, and institutional quality. In many sub-Saharan African countries, these conditions remain limited, which sustains a high reliance on external borrowing.

In this context, governance quality appears as a key determinant of debt effectiveness. Effective governance, characterized by transparency, administrative capacity, and accountability, improves the allocation of public resources and promotes economic growth (Cooray & Ozmen, 2024; Ben Ali et al., 2019). Conversely, weak institutional quality reduces the effectiveness of debt-financed expenditures and weakens its impact on growth (Tarek & Ahmed, 2017).

From a theoretical perspective, the relationship between debt and growth remains controversial. Classical approaches emphasize the risks associated with borrowing, particularly crowding-out effects and macroeconomic imbalances (Smith, 1776; Ricardo, 1817). In contrast, the Keynesian tradition highlights the positive role of debt when it finances productive investment (Modigliani, 1960; Buchanan, 1958). More recently, empirical literature has identified non-linear relationships, suggesting the existence of thresholds beyond which debt becomes detrimental to economic growth.

Beyond this non-linearity, there is a growing consensus on the central role of institutions in determining the impact of debt. In particular, government effectiveness determines the ability of states to allocate borrowed resources efficiently, limit inefficiencies, and direct public spending toward productive sectors. Good governance is thus likely to reinforce the positive effects of debt, while weak institutional capacity can amplify its negative effects (North, 1990; Cooray & Ozmen, 2024).

In this context, the present study builds on the work of Manasseh et al. (2022), who analyze the relationship between external debt and economic growth in sub-Saharan Africa by incorporating the role of governance into a dynamic panel framework estimated using the GMM method. Their results show that the quality of institutions helps mitigate the negative effects of external debt on economic growth, thereby highlighting the importance of the institutional framework in public debt management.

However, despite the value of this contribution, several limitations remain. First, their approach is based on a linear specification of the debt-growth relationship, whereas a significant portion of the recent literature highlights the existence of nonlinear effects and critical debt thresholds. Second, their analysis does not allow for the identification of the debt level at which debt becomes detrimental to economic growth. Consequently, their study does not distinguish between the different debt regimes that may characterize the economies of sub-Saharan Africa.

This study aims specifically to address this gap by combining a dynamic threshold panel model with a system GMM approach. Unlike Manasseh et al. (2022), this study explicitly introduces the debt-to-GDP ratio as a threshold variable in order to identify a critical level beyond which the marginal effect of debt on growth becomes negative. Furthermore, it retains government effectiveness as a moderating variable to assess the extent to which institutional quality can mitigate the adverse effects of excessive debt.

Thus, this article makes two key contributions. First, it highlights the existence of a nonlinear relationship between external debt and economic growth in sub-Saharan Africa. On the other hand, it shows that government effectiveness plays a decisive role in the ability of economies to transform external debt into a lever for growth. This approach thus makes it possible to simultaneously address the issues of the debt threshold and institutional quality within a unified empirical framework.

The paper is structured as follows: Section 1 presents the literature review and theoretical framework; Section 2 describes the data and methodology and Section 3 presents the empirical results.

1. REVIEW OF THE LITERATURE

1.1. Debt and economic growth

The relationship between public debt, particularly external debt, and economic growth has been the subject of extensive empirical research, though no clear consensus has emerged. One category of studies highlights a negative relationship between debt and growth. Kasasbeh (2021), using data from Jordan for the period 1980-2020, shows that an increase in public debt, linked to expansionary fiscal policies, has an adverse effect on economic growth. Similarly, Albu et al. (2021), using a wavelet analysis applied to eurozone countries, conclude that high levels of public debt hinder growth due to concerns regarding fiscal sustainability.

Similarly, Togbenu et al. (2024), using a dynamic threshold panel model covering the period 2000-2020, confirm the existence of a nonlinear and negative relationship between public debt and economic growth. Similar results are obtained by Lee et al. (2015) and Ben Ltaief (2014), who highlight the adverse effects of high debt on

macroeconomic performance. From a more nuanced perspective, Presbitero (2012) identifies a threshold of approximately 90% of GDP, beyond which public debt no longer has a significant effect on growth, thus suggesting diminishing returns to debt.

Other studies, however, highlight the complexity and heterogeneity of this relationship. Guex et al. (2018), studying Switzerland between 1994 and 2014, find a persistent negative relationship between debt and growth, regardless of the econometric specifications. For their part, Ighodalo et al. (2020), using a sample of 43 African countries, highlight a long-term relationship between public debt and economic growth, the strength of which varies across countries.

More broadly, the literature highlights the lack of empirical consensus. Rahman et al. (2019), based on a systematic review, point to significant heterogeneity in results across countries, methods, and periods of analysis. Similarly, Herndon et al. (2014) show that the results of Reinhart and Rogoff (2009) are sensitive to methodological choices, calling into question the existence of universal debt thresholds. Finally, Akiyo and Gbaguidi (2024) confirm, in the case of the WAEMU, the existence of a nonlinear relationship between bond financing and economic growth. These results are corroborated by the meta-analysis by Heimberger (2023), which highlights the high heterogeneity of debt effects across countries, time periods, and empirical specifications.

1.2. Governance and economic growth

The literature on the institutional determinants of economic growth highlights the central role of governance quality. In general, effective institutions, characterized by strong administrative capacity, greater transparency, and low levels of corruption, promote economic performance. Hassani et al. (2023) emphasize that institutional capacity is a key driver of development, while Mtiraoui (2015), based on GMM estimations, shows that governance quality has a positive and significant effect on economic growth.

In the African context, these findings are largely confirmed. Ziadi (2014) shows that institutional weaknesses constitute a major obstacle to growth, even in countries rich in natural resources. Similarly, Tarek and Ahmed (2017) identify government effectiveness and political stability as key determinants of growth in sub-Saharan Africa. Fayissa and Nsiah (2010) also show that income disparities among African countries are largely explained by differences in institutional quality.

Beyond its direct effect on growth, governance also influences the effectiveness of economic policies. High-quality governance enables a more efficient allocation of public resources and promotes the transformation of financing, particularly external financing, into productive investment. Conversely, weak institutions tend to amplify economic inefficiencies due to corruption, mismanagement, and limited administrative capacity (Abbas et al., 2021; Adiya et al., 2023). In this regard, El Aissaoui et al. (2022) confirm that improvements in governance enhance overall economic performance, although certain institutional dimensions may, in some contexts, produce ambiguous effects (Ahou, 2015).

Overall, these studies converge on the idea that governance quality is a fundamental determinant of economic growth, both through its direct effects and its role in enhancing the effectiveness of public policies.

1.3. Debt, governance and economic growth

The relationship between public debt, governance, and economic growth is attracting growing attention in the literature, but its interactive nature has yet to be sufficiently explored within a unified framework. Recent research suggests that the impact of external debt on growth depends heavily on institutional conditions, which influence the effectiveness of transmission mechanisms.

In this context, Manasseh et al. (2022) analyze the relationship between external debt and economic growth in sub-Saharan African countries by incorporating the role of governance into a dynamic panel framework estimated using the GMM method. Their results show that institutional quality, particularly government effectiveness, significantly reduces the negative effects of external debt on growth. The authors thus conclude that better governance improves the allocation of borrowed resources and promotes their conversion into productive investments.

However, despite the value of this contribution, their analysis remains based on an essentially linear relationship between debt and growth. Yet several recent studies suggest that the effects of debt may vary depending on the level of indebtedness reached, implying the possible existence of a threshold effect. In particular, beyond a certain critical level, debt can become a drag on growth due to rising debt service costs, crowding-out effects on private investment, and macroeconomic imbalances.

Other empirical studies confirm this interaction between institutional quality and debt efficiency. Mohd Daud et al. (2020) show that the negative effects of external debt are mitigated in countries with stronger institutions. Similarly, Nounamo et al. (2021) emphasize that improved governance enhances the efficiency of external resource use and stimulates economic growth.

Overall, the literature suggests that the impact of debt on growth is nonlinear and depends heavily on the quality of institutions. This justifies the adoption of an empirical framework that combines dynamic effects, the nonlinearity of debt, and the conditional role of governance.

1.4. Theoretical foundations and hypotheses development

This study draws on several complementary theoretical frameworks to explain the complex relationship between external debt and economic growth, while highlighting the role of institutional quality as a determining factor. The analysis draws on growth theories (Barro, 1990), approaches to debt sustainability (Krugman, 1988; Minsky, 1986; Reinhart and Rogoff, 2009), as well as institutionalist literature (North, 1990), supplemented by contributions from political economy (Nordhaus, 1975; Alesina, 1989).

From Barro's (1990) perspective, Barro (1990) shows that public debt can promote economic growth when it is used to finance productive investments, particularly in infrastructure and human capital. In this case, debt helps to overcome budgetary constraints and support the accumulation of public capital. However, this positive effect is neither automatic nor unlimited. As the level of debt increases, its marginal benefits tend to decline, and beyond a certain threshold, debt can cause macroeconomic distortions and hinder growth. This idea is formalized by Krugman's (1988) debt overhang hypothesis, according to which a high level of

external debt reduces incentives to invest, as economic agents anticipate that a portion of future returns will be absorbed by debt service. Similarly, Minsky (1986) emphasizes that excessive debt accumulation increases financial fragility and heightens the risk of economic instability, while Reinhart and Rogoff (2009) empirically demonstrate the existence of negative relationships between high debt and growth performance. These contributions thus converge on the idea of a nonlinear relationship between debt and growth, characterized by the potential existence of critical thresholds.

In parallel, institutionalist approaches highlight the central role of governance quality in economic performance. Douglass North (1990) emphasizes that effective institutions reduce uncertainty and foster investment. Extending this analysis, Nordhaus (1975) and Alesina (1989) show that political cycles can influence economic decisions, particularly public borrowing, to the detriment of optimal resource management. Effective governance, characterized by transparency, stability, and administrative capacity, thus helps to limit these distortions and improve the effectiveness of economic policies.

On this basis, the quality of governance is viewed as a conditional factor that influences the productivity of external debt without altering the fundamental structure of the debt-growth relationship. In other words, while the level of debt determines the direction and magnitude of its impact on growth, government effectiveness acts as an amplifier or attenuator of this effect by influencing the quality of the use of borrowed resources.

Overall, this theoretical framework suggests that the relationship between external debt and economic growth is both nonlinear and heterogeneous. The impact of debt depends on the level at which it has accumulated, while government effectiveness determines the ability of economies to turn debt into a driver of growth. Based on this theoretical framework, the following hypotheses are formulated:

- H1: Government effectiveness improves the impact of debt on growth by enhancing the effi-ciency of resource allocation.
- H2: The relationship between external debt and growth is nonlinear, with a critical threshold beyond which the effect becomes negative.

2. DATA AND METHODOLOGY

2.1. Data

The study focuses on a panel of 39 Sub-Saharan African countries for the period 2004-2020. The corresponding data is obtained from various sources, namely: the World Bank's World Development Indicators (WDI) and the World Governance Indicators (WGI) of the World Bank. These sources are clarified in Appendix 2 in relation to the corresponding variables.

2.1.1. Variable dependency

The dependent variable is economic growth, measured by the per capita GDP growth rate. This indicator is widely used in the empirical literature as a standard measure of economic performance and the level of development (Awan et al., 2018; Mtiraoui, 2015; Ziadi, 2014). Per capita GDP growth reflects changes in average real income and is thus a relevant indicator of economic well-being. Unlike aggregate

GDP, it allows for a better accounting of demographic effects and provides insight into the actual dynamics of wealth creation within economies.

2.1.2. Core explanatory variables

The main explanatory variable selected is external debt, expressed as a percentage of GDP. The economic literature highlights the ambiguous nature of its effect on growth. On the one hand, external debt can support growth by financing productive public investments, particularly in economic and social infrastructure. On the other hand, excessive debt levels can have negative effects through fiscal constraints, crowding-out effects, or debt sustainability issues. The expected impact of external debt therefore appears to be potentially nonlinear.

The second key explanatory variable is government effectiveness, used as an indicator of institutional quality. This index measures the quality of public services, the capacity to formulate and implement public policies, and the credibility of government action. According to the literature, better governance promotes a more efficient allocation of public resources, improves the effectiveness of economic policies, and thus supports economic growth (Kaufmann et al., 2003; El Aissaoui et al., 2022). Effective governance should therefore help reinforce the positive effects of debt when it finances productive investments.

2.1.3. Control variables

To limit selection bias and improve the robustness of the estimates, several control variables are included in the model. These include gross fixed capital formation (investment), trade openness, the inflation rate, population growth, and natural resource rents. The inclusion of these variables is well-supported by the literature on economic growth (Solow, 1956; Mandeya & Ho, 2021; Girdzijauskas et al., 2022; Nayak & Pradhan, 2024; Akinlo, 2024).

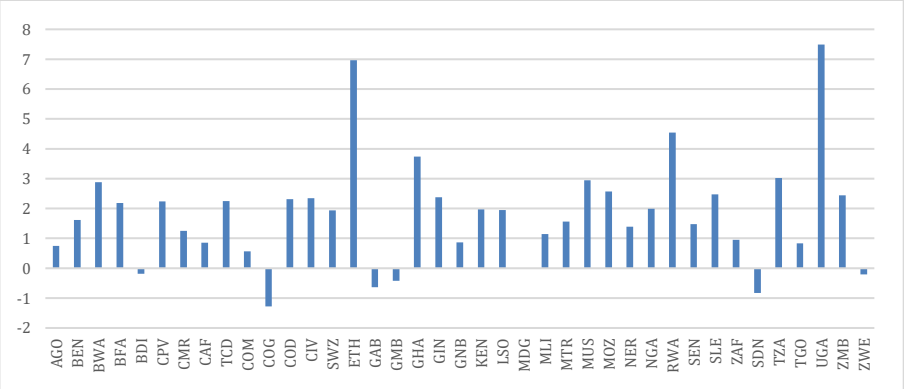
Furthermore, to ensure robustness, the study also uses corruption control (CC) as an alternative indicator of institutional quality. In line with the work of Kaufmann and Kraay (2002), as well as the empirical analyses of Presbitero (2012) and Mensah (2018), better control of corruption promotes a more efficient allocation of public resources, improves the quality of institutions, and enhances the effectiveness of economic policies. In the context of sub-Saharan African countries, better control of corruption should thus allow for a more productive use of resources derived from external debt and mitigate the potential negative effects of debt on economic growth. The introduction of this alternative variable therefore allows for verification of the stability and robustness of the results obtained using the government effectiveness indicator.

2.2. Stylized facts and preliminary analysis

2.2.1. Stylized facts

Prior to the econometric estimation, a descriptive analysis is conducted to highlight certain empirical patterns. Figure 1 presents the annual average growth rates of per capita output by country over the study period. It highlights significant heterogeneity in economic performance across Sub-Saharan African. Some countries, such as Uganda and Ethiopia, exhibit relatively high and sustained growth trajectories, while others, such as the Republic of Congo and Sudan, experience episodes of stagnation or economic contraction. This dispersion suggests the existence differentiated growth dynamics among countries in the region.

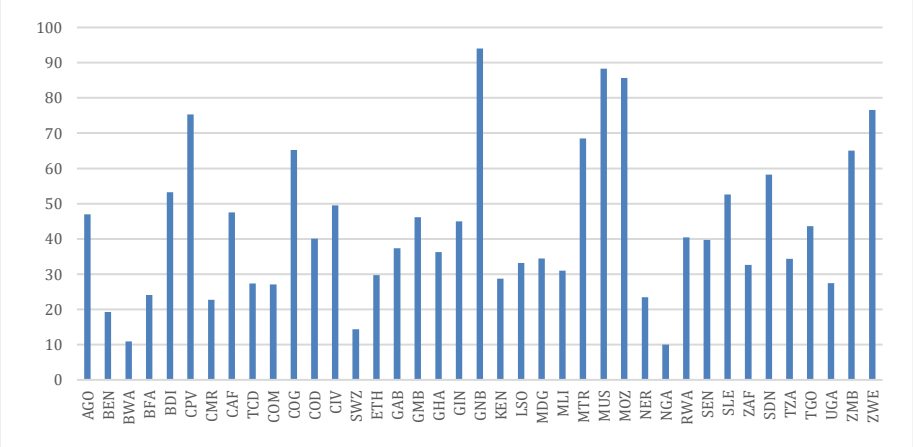
Figure 1: Trends in the average annual growth rate of GDP per capita



Source: Authors.

Figure 2 shows the trend in annual averages of external debt as a percentage of GDP. It reveals significant variability among countries, with levels ranging from less than 15% to more than 90% of GDP. The majority of countries, however, fall within a range between 30% and 60%, confirming the existence of significant structural heterogeneity and suggesting potentially non-linear effects of debt on economic growth.

Figure 2: Trend in in annual average of external debt as a percentage of GDP

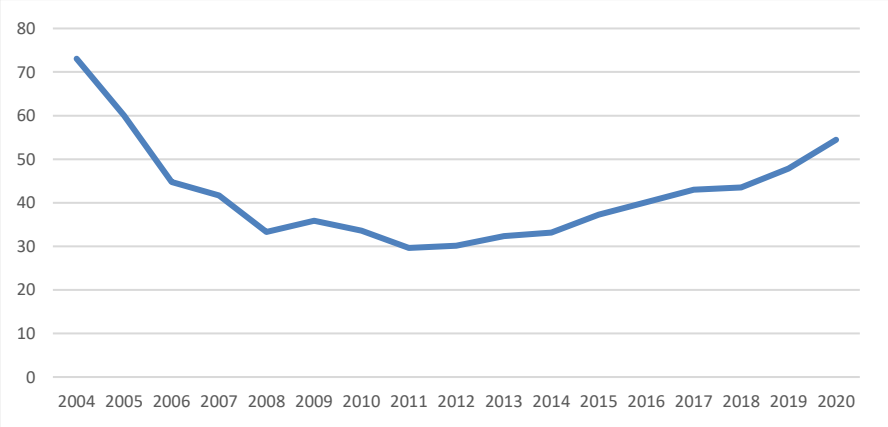


Source: Authors.

Figure 3 shows the trend in average external debt for all SSA countries between 2004 and 2020. Overall, the external debt-to-GDP ratio followed a three-phase trend.

The first phase (2004-2011) was marked by a significant decline in external debt. The ratio fell from 73.06% of GDP in 2004 to 29.63% in 2011, a reduction of more than 59%. This trend reflects a gradual improvement in the debt situation of the countries in the sample during this period.

Figure 3: Trends in the average external debt of all sub-Saharan African countries



Source: Authors.

The second phase (2011-2014) corresponds to a period of relative stability. The average level of external debt fluctuated between 30% and 33% of GDP, indicating a stabilization of debt after several years of continuous decline.

The third phase (2015-2020) is characterized by a gradual resurgence in external debt. The ratio rose from 37.23% of GDP in 2015 to 54.47% in 2020. This increase reflects greater reliance on external financing and marks a break from the downward trend observed during the previous decade.

Overall, the trend in external debt shows a sharp reduction in debt during the 2000s, followed by a stabilization phase, and then a gradual rise beginning in the mid-2010s. Despite this recent increase, the average level of external debt observed in 2020 remains lower than that recorded at the beginning of the period.

2.2.2. Overall descriptive statistics

Table 1 presents the descriptive statistics for all variables in the model.

Per capita GDP growth averages 1.759%, with a standard deviation of 4.598, reflecting high volatility in economic performance across countries and over time. External debt averages 21.945% of GDP, with relatively low dispersion, suggesting broadly comparable levels of indebtedness, although significant differences remain between countries.

Institutional indicators reveal a generally low level of institutional quality in the region. Governance effectiveness is negative on average (-0.792), while control of corruption also has a negative average value (-0.641), reflecting persistent institutional challenges.

Other macroeconomic variables also exhibit high heterogeneity. Inflation is particularity volatile, with extreme episodes reflecting macroeconomic instability in some countries. Investment, trade openness, natural resource rents also show significant dispersion, confirming the diversity of economic structure in the sample.

Table 1. Summary statistics of the variables

Variables	Obs	Mean	St. dev.	Min	Max
GDP	663	1.759	4.598	-36.556	28.676
DEBT	663	21.945	1.419	18.687	25.974
GEF	663	-0.792	0.576	-1.879	1.150
GCF	663	22.685	9.027	2.002	81.021
INF	663	9.195	29.768	-21.165	558.560
POP	663	2.486	1.015	-3.755	5.627
TRADE	663	44.837	30.960	0.000	150.174
RRN	663	18.112	12.845	0.000	62.530
CC	663	-0.641	0.602	-1.870	1.020

Source: Authors.

2.2.3. Descriptives statistics by income group

To account for structural heterogeneity across countries, the sample is subdivided into low-income countries (LICs) and middle-income countries (MICs), according to the World Bank's classification.

Table 2 show that low-income countries (LICs) have a higher average level of external debt (46.46% of GDP) than middle-income countries (39.74% of GDP), suggesting greater reliance on external financing for the poorest economies. However, the relatively high standard deviations within each group indicate significant intra-group heterogeneity, confirming that debt profiles vary considerably even among countries belonging tot he same income category.

Overall, these results highlight the existence of significant structural differences between and within country groups, which fully justifies the use of a dynamic econometric approach that accounts for unobserved heterogeneity.

Table 2. Descriptive statistics by country income level

Group of countries	Number of observations	Average GDP per capita growth (%)	Standard deviation	Average external debt (% of GDP)	Standard deviation
Low-income countries (LICs)	20	1.72	1.86	46.46	21.13
Middle-income countries (MICs)	19	1.88	1.75	39.74	20.18

Source: Authors.

2.3. Methodology

As outlined in the introduction, this study employs an econometric strategy based on two complementary and conceptually distinct approaches. On the one hand, a dynamic panel model estimated using the generalized method of moments (GMM) is employed to account for the dynamics of economic growth, unobserved heterogeneity across countries, and potential endogeneity issues. On the other hand, a dynamic threshold panel model is used to identify any structural nonlinearities in the relationship between external debt and economic growth. This dual approach thus allows for the simultaneous analysis of the conditional effects of external debt depending on institutional quality and the existence of differentiated economic regimes associated with critical debt levels.

To account for persistent economic growth, the potential endogeneity of explanatory variables, and unobserved heterogeneity across countries, the analysis is based on a dynamic panel framework with the following basic specification:

$$GDP_{it} = \alpha_1 + \lambda GDP_{it-1} + \beta_1 Debt_{it} + \beta_2 GEF_{it} + \beta_3 (Debt_{it} x GEF_{it}) + \gamma X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

where GDP_{it} represents per capita GDP growth and GDP_{it-1} captures the persistence dynamics of growth and the lagged effects of the explanatory variables. The main explanatory variables include external debt $Debt_{it}$, government effectiveness GEF_{it}, and their interaction term$(Debt_{it} x GEF_{it})$, which allows us to assess the conditional effect of institutions on the impact of debt. The vector X_{it} comprises macroeconomic control variables, notably investment, inflation, trade openness, population growth, and natural resource rents. Country-specific fixed effects are captured by μ_i, while ε_{it} denotes the idiosyncratic error term.

However, the relationship between external debt and economic growth may not be linear. Beyond a certain level of indebtedness, the impact of debt can become more restrictive and lead to more pronounced negative effects on economic activity. To account for this possibility, the study employs a Dynamic Panel Threshold Model, inspired by the work of Hansen (1999) and later extended by Seo and Shin (2016) and Seo et al. (2019). The specification is as follows:

$$GDP_{it} = \alpha_i + \lambda GDP_{it-1} + \beta_1 Debt.I(q_{it} \leq \gamma) + \beta_2 Debt.I(q_{it} \succ \gamma) + \gamma X_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

where $I\{.\}$ is an indicator function that determines the regime based on the threshold variable q_{it} (external debt). The parameter γ represents the endogenous critical threshold estimated from the data.

The coefficients associated with regimes below and above the threshold make it possible to identify two distinct economic structures, based on the level of debt. This analytical framework thus allows us to assess whether the impact of external debt on growth changes structurally once the critical threshold is crossed.

The inclusion of the lagged dependent variable among the explanatory variables introduces a dynamic panel bias, known as the Nickell bias (1981). To correct this bias and address potential endogeneity issues, this study employs the System Generalized Method of Moments (System GMM), developed by Arellano and Bover (1995) and refined by Blundell and Bond (1998).

There are several reasons for using this method. First, it allows for the treatment of simultaneity biases resulting from the potential presence of endogenous explanatory variables through an appropriate instrumental design. Second, it provides convergent and efficient estimators in dynamic models that include lagged variables. The SGMM consists of simultaneously estimating a first-difference equation and a level equation. In this approach, the lagged endogenous variables at the level serve as instruments for the difference equation, while their lagged differences are used as instruments for the level equation. Finally, given the panel structure of the data and the potentially persistent nature of the explanatory variables, the SGMM estimator appears more appropriate than ordinary least squares, fixed-effects, or difference GMM estimates.

3. RESULTS AND DISCUSSION

3.1. Panel unit root test

Prior to estimating the econometric model, several preliminary tests were conducted to ensure the validity of the dynamic panel estimates.

The panel unit root tests (see Table A3 in the appendix) indicate that the main variables in the model become stationary after appropriate transformation. This result rules out any risk of spurious regression. Serial autocorrelation tests show the absence of second-order autocorrelation in the residuals, an essential condition for the validity of GMM estimators. Furthermore, the Hansen and Sargan tests confirm the overall validity of the instruments used in the estimates.

Overall, these results attest to the robustness of the econometric strategy adopted and the reliability of the estimates obtained.

3.2. Results of the baseline model

The results of the baseline model estimation using the System Generalized Method of Moments (System GMM) are presented in Table 3. Column (1) corresponds to the specification excluding gross fixed capital formation (GCF), while column (2) includes this variable to test the robustness of the results when investment is included.

The introduction of GCF makes it possible to distinguish between the effect of debt that flows through the accumulation of physical capital, which is the traditional channel through which debt can finance public and private investment, and its broader effects, particularly those related to total factor productivity. Indeed, external debt can influence growth not only through investment but also through the efficiency of resource allocation, the quality of public infrastructure, crowding-out effects on private investment, as well as macroeconomic distortions that may affect total factor productivity.

In both models, the coefficient of the lagged GDP variable is positive and statistically significant at the 1% level. It is slightly higher in the model without GCF (0.289 versus 0.298), but this difference remains marginal. This result confirms the strong persistence of economic growth and validates the dynamic dependency hypothesis, regardless of whether investment is included.

External debt continues to have a significant negative effect in both specifications. The coefficient is -0.092 in the model with GCF and -0.089 in the model without GCF. This stability in the coefficients suggests that the negative effect of debt on growth does not depend on the inclusion of public investment in the model. This result suggests that, on average, an increase in external debt has an adverse effect on per capita GDP growth. This finding is consistent with the literature highlighting the effects of excessive debt, particularly through the channels of fiscal pressure, distortion of private investment, and accumulation of macroeconomic risks.

Government effectiveness has a positive and significant effect in both models (0.186 and 0.179, respectively). This result indicates that improving the quality of public institutions helps to stimulate economic growth. This mechanism can be

explained by better allocation of public resources, a reduction in inefficiencies, and improved credibility of economic policies. Similarly, the interaction term between external debt and governance is positive and significant in both cases (0.050 and 0.048). This confirms that institutional quality consistently mitigates the negative effect of external debt on growth, regardless of the specification used. This result supports the view that debt is not inherently harmful, but depends heavily on the institutional capacity to manage it effectively. These results are consistent with the institutional literature, which highlights the decisive role of institutional quality in the effectiveness of economic policies (North, 1990; Acemoglu et al., 2001). In particular, they suggest that debt sustainability cannot be analyzed independently of the institutional framework within which it operates. Overall, external debt can serve as a driver of growth when it remains at sustainable levels and is accompanied by effective governance. Conversely, high levels of debt combined with weak institutional quality tend to have negative effects on economic performance and increase macroeconomic vulnerability.

Table 3. Baseline model estimates

Variables	Model without GCF	Model with GCF
GDP (t−1)	0.289***	0.298***
	(0.061)	(0.065)
DEBT	-0.089**	-0.092**
	(0.041)	(0.043)
GEF	0.179***	0.186***
	(0.066)	(0.069)
DEBT × GEF	0.048***	0.050***
	(0.013)	(0.014)
GCF		0.134**
		(0.055)
INF	-0.015**	-0.016**
	(0.006)	(0.007)
TRADE	0.068***	0.070***
	(0.025)	(0.026)
NRR	-0.043*	-0.045**
	(0.021)	(0.022)
POP	0.071	0.073
	(0.059)	(0.061)
Observations	663	663
Number of countries	39	39
Number of instruments	13	15
AR(1)	-2.51	-2.58
	(0.012)	(0.010)
AR(2)	1.02	1.07
	(0.305)	(0.286)
Hansen test	0.28	0.31

*Notes: (1) ***, **, * indicate statistical significance at 1 %, 5 % and 10 % ; (2) The standard deviations are shown in parentheses below the coefficients, and the p-values are listed under the statistics for the specification tests (AR). (3) The Hansen test (J-test) assesses the validity of the instruments used in the estimation; (4) The Arellano-Bond AR(1) statistic tests the null hypothesis of no first-order serial correlation in the differenced residuals; (5) The Arellano-Bond AR(2) statistic tests the null hypothesis of no second-order serial correlation in the differenced residuals. Source: Authors.*

In the model that includes GCF, this variable is positive and significant (0.134 at the 5 % significance level), indicating that investment in physical capital contributes directly to economic growth. However, its inclusion does not substantially alter the

coefficients of the other variables, which reinforces the robustness of the main results. The other control variables show generally stable results across the two specifications. Inflation has a negative and significant effect, while trade openness has a positive and significant effect. Natural resource rents have a negative but marginally significant effect. Population is not significant in either model.

Overall, a comparison of the two specifications shows that including GCF does not substantially alter the main results. The effects of external debt, governance, and their interaction remain stable, confirming the robustness of the baseline model.

3.3. Robustness analysis

The results of the robustness test (Table 4) generally confirm the findings obtained using the government effectiveness indicator. External debt continues to have a negative and significant effect on economic growth, while efforts to curb corruption have a positive impact on growth.

Table 4. Robustness test: replacing government effectiveness with control of corruption

Variables	Model without GCF	Model with GCF
GDP (t−1)	0.279***	0.287***
	(0.060)	(0.063)
DEBT	-0.091**	-0.095**
	(0.042)	(0.044)
CC	0.167**	0.173**
	(0.068)	(0.071)
DEBT × CC	0.044***	0.046***
	(0.014)	(0.015)
GCF		0.129**
		(0.054)
INF	-0.014**	-0.015**
	(0.006)	(0.007)
TRADE	0.065***	0.067***
	(0.024)	(0.025)
NRR	-0.040*	-0.042*
	(0.021)	(0.022)
POP	0.066	0.069
	(0.058)	(0.060)
Observations	663	663
Number of countries	39	39
Number of instruments	13	15
AR(1)	-2.55	-2.61
	(0.011)	(0.009)
AR(2)	0.98	1.03
	(0.327)	(0.301)
Hansen test	0.30	0.34

*Notes: (1) ***, **, * indicate statistical significance at 1 %, 5 % and 10 % ; (2) The standard deviations are shown in parentheses below the coefficients, and the p-values are listed under the statistics for the specification tests (AR). (3)The Hansen test (J-test) assesses the validity of the instruments used in the estimation; (4) The Arellano-Bond AR(1) statistic tests the null hypothesis of no first-order serial correlation in the differenced residuals; (5) The Arellano-Bond AR(2) statistic tests the null hypothesis of no second-order serial correlation in the differenced residuals. Source: Authors.*

The coefficient of the DEBT×CC interaction term remains positive and statistically significant in both specifications. This result suggests that improved control over corruption reduces the adverse effects of external debt on economic growth. In other words, better institutional governance allows for a more efficient use of borrowed resources and enhances the ability of governments to convert debt into productive investment.

Thus, the results of all the estimates indicate that the study's main findings remain unchanged, both in terms of the direction of the effects and the significance of the observed relationships.

3.4. Dynamic panel threshold estimation

The results in Table 5 reveal a strong nonlinear relationship between external debt and economic growth. The null hypothesis of linearity is rejected at the 1% significance level, confirming the appropriateness of a threshold model.

Table 5: Dynamic panel threshold model results

Variables	Regime 1	Regime 2
GDP-1	0.192**	-0.389***
	(0.077)	(0.096)
Extdebt	0.078***	-0.136**
	(0.026)	(0.063)
GEF	0.143**	0.128**
	(0.065)	(0.062)
GCF	0.118**	0.105**
	(0.055)	(0.053)
INF	0.241***	-0.028**
	(0.081)	(0.014)
TRADE	0.081**	0.076**
	(0.037)	(0.036)
POP	0.281**	0.338*
	(0.133)	(0.177)
NRR	-0.037*	-0.042*
	(0.020)	(0.021)
Threshold γ	41.99*** (t=3.64)	
Share of lower regime (%)	22.04 %	
Share of upper regime (%)	77.96 %	
Linearity test (p-value)	0.000***	
Hansen test (p-value)	0.29	
AR(1)	-2.58**	
AR(2)	1.11	
Observations	663	

*Notes: (1) ***, **, * indicate statistical significance at 1 %, 5 % and 10 % ; (2) The standard deviations are shown in parentheses below the coefficients; (3) Regime 1 corresponds to observations below threshold γ ; (4) Regime 2 corresponds to observations above threshold γ; (5) The Hansen test (J-test) assesses the validity of the instruments used in the estimation; (5) The Arellano–Bond AR(1) statistic tests the null hypothesis of no first-order serial correlation in the differenced residuals; (7) The Arellano–Bond AR(2) statistic tests the null hypothesis of no second-order serial correlation in the differenced residuals.*
Source: Authors.

With regard to external debt, the estimated threshold is 42 % of GDP. The distribution of observations shows that about 78 % of countries are above this threshold, indicating that the majority of the sample operates in a high-debt environment. Below the threshold, external debt is positively and significantly

associated with growth, suggesting that moderate debt can support economic activity, particularly through the financing of public investments and productive infrastructure. Conversely, above the threshold, the effect becomes negative and weakly significant, which is consistent with the hypothesis of debt overhang.

Analysis of the coefficient of the lagged dependent variable also reveals significant differences across regimes. Growth appears more persistent in settings characterized by lower debt or better governance, while it becomes less stable in adverse regimes. The sign changes observed in certain specifications suggest a break in the convergence dynamics, reflecting increased macroeconomic instability as debt or institutional constraints become tighter.

Government effectiveness remains positive and significant under both regimes, confirming its robustness and its structural role in the growth dynamic. The other control variables show relatively stable effects across the regimes, although inflation appears more volatile, suggesting asymmetric effects depending on macroeconomic conditions. The other control variables generally show stable effects across the regimes, with the exception of inflation, which appears more volatile, suggesting asymmetric effects depending on macroeconomic conditions. Thus, in the low-debt regime, inflation appears to reflect demand dynamics associated with economic expansion, whereas in the high-debt regime, it is more indicative of macroeconomic imbalances, fiscal strains, and instability, which are likely to weigh on growth.

Overall, these results highlight a fundamentally nonlinear relationship between external debt and economic growth, characterized by the existence of a critical threshold beyond which debt becomes a constraint.

CONCLUSION AND POLICY IMPLICATIONS

In Sub-Saharan Africa, external debt sustainability represents a major macroeconomic challenge, regularly highlighted in economic policy debates and analyses by international institutions. Despite episodes of debt accumulation, the region continues to exhibit relatively low growth compared to other developing areas. In this context, institutional quality emerges as a key factor, as it conditions the ability of states to transform indebtedness into a driver of growth.

The objective of this study was to analyze the relationship between external debt and economic growth, with a particular focus on the role of institutional quality in developing countries. Using a sample of 39 countries and employing a dynamic panel econometric approach (System GMM) supplemented by a threshold model, the results yield several important insights.

First, the results highlight a generally negative and robust effect of external debt on economic growth. This effect remains stable across different specifications, including after incorporating gross fixed capital formation and replacing the governance indicator with a measure of corruption control. This finding suggests that, beyond a certain level, external debt can act as a constraint on growth, particularly through fiscal pressures, reduced room for maneuver in economic policy, and crowding-out effects on productive investment.

Second, the analysis highlights the critical role of institutional quality. Government effectiveness has a positive and significant impact on growth, while controlling corruption also boosts economic performance. Above all, the results show that governance plays a crucial moderating role: higher institutional quality consistently mitigates the negative effects of external debt. Thus, debt is not inherently harmful, but its impact depends heavily on the institutional framework within which it is managed.

In addition, the threshold model reveals a nonlinear relationship between external debt and economic growth. The estimation of a critical threshold (approximately 41.99% of GDP) shows that moderate debt can support growth, while excessive debt becomes detrimental to economic performance. This asymmetry confirms the over-indebtedness hypothesis and highlights the importance of debt sustainability.

These findings have several implications for economic policy. First and foremost, keeping debt at a sustainable level is a priority. Public authorities should adopt a prudent debt strategy focused on productive investments with high economic and social returns. Strengthening debt management frameworks, particularly through credible fiscal rules and effective sustainability monitoring mechanisms, appears essential.

Second, improving the quality of governance is a key prerequisite for effective debt management policies. Strengthening public institutions, combating corruption, and improving administrative efficiency are essential to ensuring the efficient allocation of resources and maximizing the impact of debt on growth.

Third, strengthening administrative and technical capacity should be viewed as a complementary lever. Investments in training for public officials, particularly in the areas of debt management, budget planning, and public policy evaluation, can significantly improve the quality of economic policy implementation.

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APPENDIX

Table A1: List of countries in the sample

Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Ivory Coast, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

Table A2: Description of selected variables

Variable	Description	Measurement	Source
GDP	Per capita GDP growth rate	%	WDI
GDP (t−1)	Per capita GDP growth	%	WDI
DEBT	External debt	% of GDP	WDI
GEF	Government effectiveness	Index (−2.5 to +2.5)	WGI
GCF	Gross fixed capital formation	% of GDP	WDI
INF	Inflation (GDP deflator)	% annual	WDI
POP	Population growth	%	WDI
TRADE	Trade openness	% of GDP	WDI
RRN	Natural resources rents	% of GDP	WDI
DEBT × GEF	dette-Government effectiveness interaction	Constructed	Authors
CC	Control of corruption	Index (−2.5 to +2.5)	WGI

Note: WGI = World Governance Indicators. Source: Authors.

Table A3: Panel Unit Root Test Results (IPS and LLC Tests)

Variables	Im-Pesaran-Shin		Levin-Lin-Chu	
	I(0)	I(1)	I(0)	I(1)
GDP_{-1}	-12.738***	-	-9.632***	-
GDP	-5.142***	-	-2.803***	-
GOV	-3.529***	-	-4.005***	-
POP	-1.214	-3.151***	-0.987	-11.770***
INF	-8.274***	-	-3.543***	-
DEBT	-1.562	-8.527***	-1.203	-15.850***
GCF	-1.209*	-	-3.500***	-
TRADE	-0.413	-2.987**	-1.889	-3.412**
NRR	-1.845*	-	-2.765**	-

*Notes: (1) IPS = Im-Pesaran-Shin test (2003); LLC = Levin-Lin-Chu test (2002). (2) The null hypothesis for the IPS and LLC tests is that all panel series contain a unit root (non-stationarity). (3) I(0) denotes variables tested at the level; I(1) denotes variables tested at the first difference. (4) *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. (5) Rejection of the null hypothesis implies stationarity of the variable. Source: Authors.*

Dette extérieure et croissance économique en Afrique subsaharienne : effet de seuil et rôle de l'efficacité gouvernementale

Résumé **-** Cette étude analyse la relation entre la dette extérieure et la croissance économique entre 2004 et 2020 pour un échantillon de 39 pays d'Afrique subsaharienne. Elle combine une approche économétrique en panel dynamique (GMM en système) et un modèle à seuil afin de capter les éventuelles non-linéarités dans la relation dette-croissance. Les résultats des estimations économétriques par le modèle GMM en système révèlent un effet négatif de la dette extérieure sur la croissance du PIB par habitant, résultat confirmé à travers différentes spécifications, y compris l'introduction de variables de contrôle telles que l'investissement et les indicateurs de gouvernance. La qualité institutionnelle joue un rôle modérateur important : l'efficacité gouvernementale et le contrôle de la corruption ont un effet positif sur la croissance, et leurs interactions avec la dette extérieure réduisent significativement ses effets négatifs. Par ailleurs, le modèle à seuil met en évidence une relation non linéaire, avec un seuil estimé à environ 42 % du PIB. En dessous de ce seuil, la dette extérieure soutient la croissance, tandis qu'au-delà, elle devient pénalisante. La majorité des pays de l'échantillon se situent au-dessus de ce seuil, traduisant une exposition importante aux risques de surendettement.

Mots-clés
Dette extérieure
Efficacité gouvernementale
Croissance économique
Afrique subsaharienne