

Public Debt and Economic Growth Nexus in Sub Saharan Africa: Does the Quality of Institutions Matter?

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Abstract

This research aimed to provide insights into the relationship between public debt and economic growth in sub-Saharan African (SSA) countries. Our study focuses on 42 countries from 2000 to 2022, utilizing the System Generalized Method of Moments approach to investigate the impact of institutional quality indices on this relationship. The study findings suggest that public debt has a negative impact on economic growth in the SSA region, and that institutional quality is a critical determinant of economic growth. We also established that improving institutional quality can positively influence the relationship between public debt and economic growth. We believe that policymakers have an essential role to play in ensuring that public debt is utilized responsibly to promote sustained economic growth. Our view is that Governments in the SSA region should also focus on improving domestic revenue mobilization and public finance management to ensure the prudent use of public funds. We recommend that governments work to improve institutional quality and manage the public debt stock to create an investment-friendly environment that attracts foreign capital inflows and contributes positively to economic growth in the region. It is our hope that findings of the study will enable policymakers make informed decisions to promote economic growth and development in the SSA region.

Keywords: public debt, institutions quality, economic growth, System GMM, Sub-Saharan Africa

JEL Classification

Introduction

In most Sub-Saharan Africa (SSA) countries public debt has been an important source of financing development projects, mainly as a way of supplementing local revenue sources. However, recently, the global economy has been shocked by the economic crises of 2008, COVID-19, pandemic climate-related events and natural disasters, and high international prices for food, fuel, and fertilizers following the Russia-Ukraine War. As a result, most SSA countries have been exposed to slowing down economic activities and growth, as well as greater debt exposure (Kinyondo et al. 2021). Likewise, the high demand to finance public projects in SSA countries resulted in high public debt (Daba Ayana et al., 2023). Over the 2012-2022 period, the public debt to GDP ratio in SSA has increased by about 30 percentage points, from 28.8 percent of GDP to 59.1 percent (International Monetary Fund, 2023). Most of the countries are experiencing fiscal imbalances and unpredictable development as a result of rising debt levels (Ramzan et al., 2023).

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Empirically, the effect of public debt on growth is not clear. However, public debt can have either positive or negative effects on the economic growth of a country's economy. If public debt is used for development expenditure like building infrastructure then the country may benefit as it may have a multiplier effect on boosting economic growth. Conversely, public debt may retard economic growth if the funds are not channeled towards the right productive activities. Meanwhile, most studies on SSA have shown that public debt harms economic growth, but the quality of governance or institutions may be used to mitigate this negative effect (Kim et al., 2017).

There are several ways in which the quality of institutions may affect the debt-growth nexus. It has been documented that countries with weak institutional quality may tend to redirect public debt from its intended purpose to areas more conducive to misappropriation (Sandow et al, 2022). Theoretically, quality institutions act as a catalyst for growth. Institutional quality may matter in the debt-growth relationship via the efficient and sensible use of public debt. Acemoglu *et al.* (2003) argue that institutions have more casual effects on economic outcomes, and therefore, countries with good governance tend to grow faster. Likewise, Mensah et al. (2018) and Nounamo et al. 2021 showed that public debt enhances economic growth in the presence of good governance or institutions. In contrast other studies (Kinyondo et al., 2021; Oppong et al., 2023) found that, even when we control for institutional quality, government debt still has a negative effect on economic growth. As a result, in the empirical literature, the moderate effect of the public debt-growth nexus has got more attention in the context of SSA.

Moreover, not all indicators of institutional quality are equally important in the debt-growth nexus (Kedir et al., 2023). Therefore, following Huque (2019), we deploy the six indicators of institutional quality (Voice and accountability, Political stability and violence, Government effectiveness, Regulatory quality, Rule of law, and Control of corruption) to investigate how the quality of institutions moderates the public debt-economic growth nexus in SSA. In the spirit of Kedir et al. (2023), we accord special attention to the relative weight of each of the indicators using principal components analysis which is in turn used to build an aggregate index of institutional quality.

Against this background, this paper investigates whether the quality of institutions has an impact on the debt-growth nexus of 42 selected SSA countries during the period 2000 to 2022. We also use the system GMM approach, which has several econometric advantages over the traditional panel approach and thus, provides more robust results and conclusions. Despite capturing the impact of institutions with a single institutional variable, this paper created an institutional index using the six governance indicators using the principal component analysis. We also consider the interaction term of public debt with each institutional quality indicator included to determine if the net impact of public debt on economic growth is boosted or hampered by the quality of institutions existing in SSA. Lastly, the existing studies in SSA have never analyzed the causality between external debt, institutional quality, and economic growth.

After this short introduction, the paper is organized in four other sections. Section 2 discusses the literature on public debt, institutional quality, and the economic growth nexus. Section 3 provides the descriptions of the data set and the econometric methodology used in this study, while Section 4 provides the empirical results and discussion. The final section concludes and suggests some important policy implications.

Literature Review

The neoclassical growth theory suggests that there is a positive relationship between debt and economic growth. This theory posits that in a stable macroeconomic environment with investment-friendly policies, borrowed funds invested in profitable ventures should have a positive impact on economic output (Matthew & Mordecai, 2016). This would make it easier to repay the debt. Specifically, the theory suggests that there is an incentive for capital-scarce countries to borrow and invest, especially when the return on investment is greater than the interest payment on the debt (Nguyen et al., 2003).

Another prominent theory, the overhang theory proposed by Krugman clarifies the debt-growth relationship (Krugman, 1988). According to this theory, external debt hurts economic growth. The overhang theory suggests that if a country's future debt stock is larger than its ability to repay, the expected debt service obligations will likely become a larger portion of the country's output. This can discourage investment and reduce growth due to the imposition of high marginal taxes by external creditors. In essence, debt servicing can reduce the country's potential for growth by exhausting its revenue (Abdullahi et al., 2016).

Empirically, numerous studies have analyzed the relationship between public debt and economic growth in a panel setting. For instance, Eberhardt and Presbitero (2015) studied 118 developing, emerging, and advanced economies covering the period 1960 to 2012 and found a consistent negative relationship between government debt and economic

growth. Similarly, Hussain et al. (2015) examined 48 countries in Sub-Saharan Africa from 1995 to 2012 and also found a negative correlation between public debt and economic growth. In addition, Gachunga (2019) used the system GMM approach to investigate the impact of external debt on the economic growth of 38 SSA covering the period 1990 to 2016, revealing a negative effect on the economic growth of SSA countries. Further, Lau et al. (2022) examined the effect of external debt on the economic growth of 16 developing countries in Asia from 1980 to 2016, and came up with the findings indicating a negative influence of external debt on economic growth in most Asian developing countries.

Recent studies have shown a growing interest in examining how the quality of institutions affects the relationship between public debt and economic growth. For instance, Ashogbon et al. (2023) conducted a study on the Nigerian economy from 1981 to 2021 using the ARDL estimation technique. They found that domestic public debt had a positive impact on economic growth in the long run, while external public debt had a negative effect. Additionally, institutional quality was found to harm economic growth in the long run, but not in the short run. In a similar study in Pakistan from 1996 to 2020, Ramzan et al. (2023) also used the ARDL estimation technique and discovered that public debt had a short-term positive effect on economic growth but a long-term negative impact. However, when combined with institutional quality indicators, public debt showed a significant positive association with economic growth in both the short and long run.

In a study using panel data, Zaib et al. (2023) employed panel quantile regression to examine the intertwined impacts of public debt, political-institutional performance, and economic growth in developing nations from 1996 to 2021. The results indicated a negative correlation between public debt and economic growth across quantiles. Conversely, political institutional performance and its interaction with public debt demonstrated a positive influence on economic growth, suggesting that robust political institutions can alleviate the adverse effects of debt. Additionally, Ouedraogo (2015) conducted a study on the influence of external debt and institutional quality on economic growth within the WAEMU. The estimation results from system GMM revealed the positive impact of external debt on economic growth up to a threshold of 51%, beyond which the economic performance of WAEMU turned negative. The findings also highlighted the positive effects of enhanced institutional quality on economic growth.

In SSA, Mensah et al. (2018) investigated the impact of institutional quality on the external debt–growth nexus for 36 economies over the 1996–2013 period. The results from the IV-System GMM showed a significantly positive effect of external debt and institutional quality on economic growth. However, the interaction term between institutional quality and external debt resulted in a significantly negative effect on economic growth. Additionally, Sani et al. (2019) examined the impact of public debt and institutional quality on economic growth using the GMM approach on a sample of 46 SSA countries over the period 2000–2014. The results confirmed a significantly negative effect of public debt and its interaction with institutional quality on economic growth. However, the measures of institutional quality had a significantly positive effect on economic growth. Similarly, Kinyondo et al. (2021) used the same estimation technique to examine the relationship between debt and economic growth, while also considering the influence of good governance indicators across 41 SSA countries. The data set covers the period from 2002 to 2015. The findings revealed that all governance indicators had a positive impact on economic performance, indicating the importance of good governance. Additionally, the coefficients of external debt and its interaction with governance indicators were negative. This supports the conclusion that even in the presence of good governance, public debt has a detrimental effect on economic performance.

Opong et al. (2023) examined the impact of institutional quality and public debt on economic growth in 35 SSA countries from 2010 to 2020. The study utilized the System Generalized Method of Moments (SGMM) and Fixed Effect techniques. The results showed that an increase in public debt hurts economic growth, but this impact is mitigated when there is an improvement in institutional quality, as proxied by measures such as anti-corruption perception or government effectiveness. Furthermore, the findings demonstrated a positive relationship between institutional quality and economic growth. In a study conducted by Alemu et al. (2023), the impact of external debt on economic growth was analyzed with a focus on the mediating role of institutional quality. The researchers employed a heterogeneous panel Autoregressive Distributed Lag (ARDL) model to examine data spanning the period 1998 to 2019 in East African countries. The findings revealed a significant long-term positive effect of external debt on economic growth, but this effect was limited to a threshold level of 62.9%. Additionally, the interaction effect of institutional quality and external debt was found to have a significant positive impact on economic growth. This suggests that as the institutional quality of the region improves, the negative impact of external debt on economic growth declines.

Data and Methodology

Data

To analyze the role of institutional quality on a debt-growth nexus, this paper used data from 42 SSA countries over the period 2000-2022. The data of GDP per- capita growth (annual %) from World Development Indicators released by the World Bank, while total investment as a percentage of GDP, General government gross debt as a percentage of GDP, current account balance as a percentage of GDP, population in millions inflation, average consumer prices were extracted from World Economic Outlook (WEO) compiled by the IMF. The data for institutional quality were obtained from the Worldwide Governance Indicator database.

The variables that are used in this study are defined as follows:

Dependent variable: Economic Growth which is measured as annual real GDP per- capita income growth.

Independent variables: This study used public debt-to-GDP ratio to measure debt burden in Sub-Saharan Africa (SSA). The expected sign could be positive or negative. Six institutional quality metrics were also used, which were compiled by the Worldwide Governance Indicators (WGI). These institutional indicators are measured on a scale of -2.5 to +2.5, where the highest score signifies better institutional quality and vice versa. As these metrics are multidimensional, it has been argued that they should be aggregated as a principal component to form a single index to avoid the risk of multicollinearity. Therefore, an institutional index (IQI) was created using the Principal Component Analysis (PCA) approach from the six governance indicators of the World Bank (World Bank 2020a). The resulting IQI is strongly and positively correlated with all institutions' variables, providing the most comprehensive explanation of these variables simultaneously. These are shown in Table 1.

Table 1. Correlation Matrix (IQI and Institutional Variables)

	IQI	Va	Ps	Ge	Rq	Rl	Cc
IQI	1						
Va	0.73	1					
Ps	0.65	0.60	1				
Ge	1.00	0.73	0.65	1			
Rq	0.88	0.78	0.59	0.88	1		
Rl	0.91	0.80	0.75	0.91	0.88	1	
Cc	0.84	0.69	0.67	0.84	0.77	0.87	1

Notes: IQI = Institutional Quality Index; ROL = Rule of law; CCORR = Control of Corruption; VAC = Voice and Accountability; RQ = Regulatory Quality; Government Effectiveness, and Political Stability. Source: Authors' Computations using Data Extracted from WGI, 2024.

The IQI calculation involves two components, each with its own eigenvalue (the variance of the component). The first component has an eigenvalue of 4.8226, which accounts for 80.38% of the common variance of the series. The second component has an eigenvalue of 0.4734 and explains 7.89% of the variation. A value greater than one indicates that the component captures more variance than its expected share of the total variance of the variables. Therefore, the first component is used in this instance. Another measure of sample adequacy is the Kaiser-Meyer-Olkin (KMO) index, which compares partial correlations and correlations between variables. A KMO value higher than 0.50 supports the use of PCA. In this case, the KMO value is 0.8940, which means that PCA's use is justified. Table 2 shows some important characteristics of the IQI computation.

Table 2. PCA and Eigenvectors

Variables	Sample
PCA eigenvectors (highest)	4.823
Proportion explained	0.804
Kaiser-Meyer-Olkin (Overall)	0.894

Source: Author's Computations using Data Extracted from WGI, 2024.

To address the main question of investigation of the study, the nexus between debt and growth, we added the interaction term of the institutional quality index with public debt. This was done to establish whether public debt has a positive or negative impact on the net effect of quality institutions on economic growth.

The control variables of the study include counter population in millions, which can have a positive or negative sign. Inflation, measured as the annual change in general price level, is hypothesized to have a negative sign since it is a proxy for macroeconomic stability. The current account is used as an indicator of the relative importance of international trade to a given country. It is measured as a percentage of GDP and its sign is expected to be positive. Lastly, investment as a percentage of GDP is used as a proxy for the level of investment in physical capital, and its sign is expected to be positive. Table 3 presents a definition of the variables, a priori expectations of relationship with dependent variable and sources of the data.

Table 3: Variables used

Variables	Descriptive	Sign	Source of data
GROWTH	Per capita income growth (annual %)	NA	WDI
DEBT	General government gross debt (% of GDP)	+/-	IMF
INV	Total investment (% of GDP)	+	IMF
INF	Inflation, average consumer prices (annual change)	-	IMF
IQI	Institutions quality index	+	WGI
VA	Voice and accountability	+	WGI
PS	Political stability	+	WGI
GE	Government effectiveness	+	WGI
RQ	Regulatory quality	+	WGI
RL	Rule of law	+	WGI
CC	Control of corruption	+	WGI
POP	Population in Millions	+/-	IMF
CA	Current account balance (% of GDP)	+	IMF

Source : Author's Compilation

Model Specification

The modelling approach to studying the direct and indirect impact of institutional quality on the debt-growth relationship is based on dynamic system GMM model by (Siddique et al., 2016). The model is specified as follows:

$$GROWTH_{it} = \beta_0 + \beta_1 GROWTH_{i,t-1} + \beta_2 DEBT_{it} + \beta_3 IQI_{it} + \beta_4 INV_{it} + \beta_5 INF_{it} + \beta_6 CA_{it} + \beta_7 POP_{it} + \mu_{it} \dots \dots (1)$$

where GROWTH is the real GDP per capita growth used as a proxy for economic growth. DEBT is the public debt-to-GDP ratio and IQI is the institutional quality indices; INV is the gross fixed capital formation as a percentage of GDP; POP is the population in millions; INF is the annual inflation rate; CA is the current account as a percentage of GDP; and μ_{it} is the random variable.

Furthermore, to test the hypothesis that institutional quality affects a debt-growth nexus, we follow Kim et al. (2017) and introduce the interaction term (DEB*INS) of public debt and institutional variable in the model based on the multiplicative interactive term. Therefore, the modified equation (1) reads as:

$$GROWTH_{it} = \beta_0 + \beta_1 GROWTH_{i,t-1} + \beta_2 DEBT_{it} + \beta_3 IQI_{it} + \beta_4 (DEBT * IQI)_{it} + \beta_5 INV_{it} + \beta_6 INF_{it} + \beta_7 CA_{it} + \beta_8 POP_{it} + \mu_{it} \dots \dots (2)$$

Estimation Strategy

This paper utilizes the two-step GMM estimator proposed by Arellano and Bond (1991) to estimate the impact of institutional quality on the public debt-growth relationship in Sub-Saharan Africa. The system GMM is preferred due to its ability to address bias and country-specific effects simultaneously. This method provides efficient estimates and handles endogeneity and Heteroskedasticity issues effectively. Additionally, it addresses problems related to reverse causality (Makate et al., 2018) and is suitable for obtaining efficient estimators in the presence of serial correlation (Wooldridge, 2001). The validity of the instruments used in the two-step system GMM estimator is checked through

the Hansen Test, where the p-value is greater than 10 percent, and the absence of a second-order serial correlation test (2).

Furthermore, we apply the technique developed by Juodis et al. (2021) to explore the relationship between public debt, economic growth, and institutional quality in Sub-Saharan Africa. This method reports the Wald test statistic and its p-value, the null and alternative hypotheses, and regression results concerning the HPJ bias-corrected pooled estimator. The approach also offers manual and automatic lag-length selection options using the Bayesian information criterion (BIC) and accounts for cross-sectional dependence and cross-sectional Heteroskedasticity in the errors. Moreover, this test may be utilized for Granger causality in equations with multiple relevant variables, although a balanced panel is required for the command.

Research Results

Preliminary Analysis

Tables 4 and 5 depict the findings of the study's descriptive and correlation analyses for the variables used. Table 4 displays the results of the descriptive summary statistical analysis of the variables used in the study. The results reveal that between 2000 and 2022, the real GDP per capita growth for 42 selected countries in Sub-Saharan Africa (SSA) ranges from -36.8 to 55.6, with an average value of 1.6 and a standard deviation of 5.0. The findings also indicate that the public debt-to-GDP ratio has an average value of 57.9 percent, with a standard deviation of 45.6 percent. Furthermore, the institutional quality indices vary from -2.5 (lowest) to 1.7 (highest). Additionally, Table 4 demonstrates that the mean values for investment, population, and investment were 22.1, 9.4, and 19.7, respectively.

A close look on the correlation matrix presented in Table 5, it is evident that there are mutual or complementary relationships between the variables in the model. The negative correlation between public debt and economic growth is noteworthy. In contrast, all institution quality variables and the index derived from them exhibit a mild but positive association with economic growth (Table 5). Additionally, the result indicates that investment and population have a positive relationship with economic growth, while inflation and current account balance negatively correlate with it. In addition Table 5 shows that the correlation values of the explanatory variables do not appear to be high, indicating absence of Multicollinearity problems in the sample.

Table 4: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Economic growth	966	1.63	5.00	-36.78	55.59
Public debt	966	57.87	45.65	0.49	290.39
Investment	966	22.08	9.87	2.00	79.40
Inflation	966	9.42	33.03	-72.73	557.21
Population	966	19.68	29.76	0.08	216.75
Current account	966	-4.62	9.47	-84.11	24.76
Institutions quality index	966	0.00	1.00	-1.87	3.07
Voice and accountability	966	-0.55	0.73	-2.23	0.98
Political stability	966	-0.49	0.85	-2.50	1.28
Government effectiveness	966	-0.73	0.61	-1.88	1.15
Regulatory quality	966	-0.65	0.61	-2.37	1.20
Rule of law	966	-0.66	0.63	-1.87	1.02
Control of corruption	966	-0.60	0.65	-1.65	1.70

Source: Authors' Computations based on Data Extracted from WDI, WEO and WGI, 2024.

Table 5: Correlation Analysis

	Growth	Debt	Inv	Inf	Pop	cab	IQI	Va	ps	ge	rq	Rl	cc
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Growth	1												
Debt	-0.13	1											
Inv	0.18	-0.07	1										
				-									
Inf	-0.12	0.12	0.08	1									
					-								
Pop	0.06	-0.18	0.02	0.08	1								
						-							
Cab	-0.06	0.01	0.33	0.05	0.08	1							
IQI	0.10	-0.14	0.26	-0.10	-0.09	-0.06	1						
Va	0.07	-0.19	0.20	-0.11	-0.05	-0.10	0.73	1					
Ps	0.06	-0.06	0.24	-0.14	-0.46	0.00	0.65	0.60	1				
Ge	0.10	-0.14	0.26	-0.10	-0.09	-0.06	1.00	0.73	0.65	1			
Rq	0.07	-0.28	0.21	-0.14	-0.08	-0.04	0.88	0.78	0.59	0.88	1		
Rl	0.09	-0.14	0.26	-0.13	-0.16	-0.05	0.91	0.80	0.75	0.91	0.88	1	
Cc	0.08	-0.02	0.23	-0.10	-0.22	-0.06	0.84	0.69	0.67	0.84	0.77	0.87	1

Source: Authors' Computations based on Data Extracted from WDI, WEO and WGI, 2024.

Estimation Results

Table 6 displays the results of estimated models utilizing the dynamic system generalized method of moments (SGMM). The findings indicate that there is a positive and significant impact of economic growth with a one-year lag on economic growth at a 1% level of significance across all columns of the results. This conforms to theoretical expectations as previous levels of economic growth can potentially increase current economic growth through various channels such as an increase in available capital for savings, investment purposes, as well as an increase in aggregate demand (Manasseh et al., 2022). Furthermore, the results reveal a statistically significant negative impact of the public debt-to-GDP ratio on economic growth at a 1% level of significance across all models. This supports the dominant view in the literature that an increase in the debt-to-GDP ratio is associated with a decrease in economic growth. This suggests that public debt has a negative influence on the economic performance of SSA. These results are in line with previous findings (Sani et al., 2019; Manasseh et al., 2022). Nevertheless, Kinyondo et al. (2021) found a negative but insignificant effect of public debt on economic growth, while Mensah et al. (2018) found a positive and significant effect of external debt on economic growth in SSA.

This study has also established that the quality of institutions has a positive and significant effect on economic growth. Indices such as voice and accountability, political stability, government effectiveness, regulatory quality, the rule of law, and control of corruption also have a positive and statistically significant impact on economic growth. This supports Acemoglu et al.'s argument that institutions play a crucial role in economic growth as they shape the incentives of key economic actors in society, affecting investments in physical and human capital and technology, as well as the organization of production. This finding compares well with previous studies by Mensah et al. (2018), Sani et al. (2019), and Kinyondo et al. (2021). Further, the study found that the coefficients for the interaction terms are negative and statistically significant, except for the voice and accountability index. This suggests that even with good governance, government debts can hinder economic growth in Sub-Saharan African countries. However, the magnitude of the negative coefficient between public debt and economic growth declines significantly with the inclusion of the interaction term. This suggests that an improvement in the institutional quality have a significant influence in reducing the negative impact of public debt on economic growth. Therefore, an improvement in institutional qualities plays a pivotal role in not only minimising the negative impact of public debt on economic growth in SSA. This finding is consistent with Sani et al. (2019) and Kinyondo et al. (2021). However, Manasseh et al. (2022) found that the interactive effects of external debt volatility and institutional governance had a positive and significant effect on economic growth in Sub-Saharan Africa.

Most of the control variables used in the models are widely used in the empirical analyses. For example, investment as a percentage of GDP has a positive and statistically significant impact on economic growth in all models, indicating that investment stimulates economic growth in SSA. Furthermore, the population coefficient has a positive and statistically significant effect on economic growth for all model estimation results. This suggests that larger populations in the SSA generate higher economic growth by providing cheap labour and creating markets for goods and services. Furthermore, similar to Ehikioya et al. (2020), we found a negative effect of inflation on economic

growth in SSA. However, the coefficient of the current account as a percentage of GDP is negative but statistically insignificant, at all conventional levels, in influencing economic growth in all estimated models.

Table 6: Estimation Results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Economic growth = L,	-	-	-0.119***	-	-	-	-
	0.098***	0.108***		0.098***	0.102***	0.106***	0.087***
	(0.025)	(0.028)	(0.028)	(0.025)	(0.026)	(0.026)	(0.032)
Public debt	-	-0.012*	-	-	-	-	-
	0.014***		0.022***	0.029***	0.025***	0.023***	0.023***
	(0.004)	(0.007)	(0.005)	(0.008)	(0.008)	(0.007)	(0.007)
Investment	0.067***	0.064***	0.048**	0.067***	0.074***	0.060***	0.061***
	(0.021)	(0.022)	(0.024)	(0.021)	(0.023)	(0.021)	(0.023)
Inflation	-0.015**	-0.013**	-	-0.015**	-0.013**	-0.014**	-0.016**
			0.020***				
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Population	0.016***	0.013***	0.037***	0.016***	0.015***	0.019***	0.022***
	(0.003)	(0.003)	(0.007)	(0.003)	(0.003)	(0.003)	(0.004)
Current account balance	-0.021	-0.010	-0.035	-0.021	-0.014	-0.022	-0.024
	(0.033)	(0.035)	(0.034)	(0.033)	(0.033)	(0.035)	(0.032)
Institution quality index (IQI)	1.089***						
	(0.247)						
IQI*debt	-						
	0.013***						
	(0.004)						
Voice and accountability (VA)		0.913***					
		(0.350)					
VA*debt		-0.004					
		(0.005)					
Political stability (PS)			2.791***				
			(0.645)				
PS*debt			-				
			0.029***				
			(0.008)				
Government effectiveness (GE)				1.775***			
				(0.402)			
GE*debt				-			
				0.020***			
				(0.007)			
Regulatory quality (RQ)					1.090*		
					(0.585)		
RQ*debt					-0.014**		
					(0.006)		
Rule of Law (RL)						1.766***	
						(0.501)	
RL*debt						-0.016**	
						(0.006)	
Control of corruption (CC)							2.057***
							(0.516)
CC*debt							-
							0.022***
							(0.007)
AR(1)	-3.56***	-3.56***	-3.70***	-3.56***	-3.54***	-3.55***	-3.53***
AR(2)	-1.04	-0.49	-0.52	-1.04	-1.00	-0.94	-1.12
Sargan test	1.39	1.66	1.63	1.39	1.59	1.63	1.63

Hansen test	2.44	2.69	2.39	2.44	2.96	2.71	2.39
Observations	920	920	920	920	920	920	920
Number of year	23	23	23	23	23	23	23

Notes: Economic growth is the dependent variable; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denotes statistical significance at 1%, 5% and 10% respectively. Standard errors in parentheses.

Source: Authors' Computation based on Data Extracted from WDI, WEO and WGI, 2024.

Regarding the post estimation statistics, Table 6 shows that we can reject the null hypothesis of no first-order serial

correlation in first differences (AR (1) test) but we cannot reject the null hypothesis of no second-order serial correlation in first differences (AR (2)). Therefore, we can conclude that there is no serial correlation problem in our model since there is absence of the second-order serial correlation in disturbances. Furthermore, the Sargan and Hansen tests of over-identifying restrictions show that we cannot reject null hypothesis that over-identifying restrictions are valid, thus implies all instruments are valid (Table 6).

Granger Causality Test Results

We conducted Granger non-causality tests in heterogeneous panels using the approach suggested by Juodis et al. (2021), which can be accessed using the "stranger" Command. The results are presented in Table 7. We found no evidence to reject the null hypothesis that economic growth does not cause public debt. However, we rejected the null hypothesis that public debt does not cause economic growth, at a 1% significance level. This indicates that the causality is unidirectional, from public debt to economic growth in Sub-Saharan Africa (SSA), and not the other way around. These findings are consistent with previous research by Çiftçioğlu, Sokhanvar (2018) and Kibona and Kirama (2024), and may be explained by the additional accumulation of public debt, which can lead to changes in economic growth. Further, we tested the Granger causality between the quality of institutions and economic growth. The results showed bidirectional causality between the quality of institutions and economic growth, as the null hypothesis was rejected in both directions at a 1% significance level (Table 7). This finding is in line with Nair et al. (2021). Conversely, Asghar et al. (2020) demonstrated a unidirectional causal relationship between institutional quality and economic growth in developing nations of Asia. Kebede and Takyii's (2017) showed a unidirectional relationship between institutional quality and economic growth in Sub-Saharan Africa. As shown in Table 7, all indices related to the quality of institutions indicate a bidirectional causal relationship between voice and accountability and economic growth, but not between political stability and growth. However, other metrics, such as government effectiveness, regulatory quality, the rule of law, and control of corruption, depict a unidirectional causality between each index and economic growth.

Table 7: Juodis et al. (2021) Granger Non-Causality Test Results

Null Hypothesis	HPJ Wald test	pvalue HPJ
Public debt does not Granger-cause economic growth.	24.02	0.00
Economic growth does not Granger-cause public debt.	4.83	0.31
Institution quality does not Granger-cause economic growth.	48.82	0.00
Economic growth does not Granger-cause institution quality	13.14	0.00
Voice and accountability does not Granger-cause economic growth	28.32	0.00
Economic growth does not Granger-cause Voice and accountability.	70.71	0.00
Political stability does not Granger-cause Economic growth.	4.99	0.29
Economic growth does not Granger-cause political stability	4.50	0.21
Government effectiveness does not Granger-cause economic growth	48.82	0.00
Economic growth does not Granger-cause government effectiveness	0.15	0.70
Regulatory quality does not Granger-cause economic growth	31.05	0.00
Economic growth does not Granger-cause regulatory quality	0.21	0.65
Rule of law does not Granger-cause economic growth.	8.09	0.09
Economic growth does not Granger-cause rule of law	0.81	0.37
Control of corruption does not Granger-cause economic growth	10.72	0.03

Conclusion

This study presents a comprehensive analysis of the impact of institutional quality on the relationship between public debt and economic growth in Sub-Saharan Africa (SSA), employing the system GMM approach. The study specifically looks at how public debt and institutional quality interact with debt to impact economic growth in Sub-Saharan Africa. The research, using data from 42 SSA countries spanning over the period 2000 and 2022, came up with several findings. It underscored the negative impact of public debt on economic growth in the SSA region. The analysis also revealed that the quality of institutions has a critical influence on economic growth and can affect the widely observed negative relationship between public debt and economic growth. This underscores the crucial role of institutional quality in shaping the debt-growth relationship. Furthermore, these findings emphasize that good institutions are essential to foster economic growth and serve as a vital tool in mitigating or even preventing the adverse effects of public debt on economic performance.

The study has also identified three other crucial determinants of economic growth: heightened investment levels, reduced inflation rates, and an increased regional population. The Granger causality test also revealed a unidirectional causal relationship between public debt and economic growth while uncovering a bidirectional causal association between institutional quality measures and economic growth.

In the context of sub-Saharan Africa (SSA), responsible borrowing practices are necessary to counteract the negative impact of public debt on economic growth. Given that most SSA countries experience a shortfall in domestic revenue mobilization compared to their expenditure requirements, public debt is an inevitable aspect of the development process. Nevertheless, the prudent utilization of debt for capital accumulation, with the expectation of generating income upon completion while establishing favorable economic development conditions, remains a priority. To reduce the debt burden, SSA countries may need to prioritize concessional loans over commercial ones whenever possible to minimize the financial burden. This however does not under-emphasize the need for enhancing domestic revenue mobilization and public finance management as imperatives to ensure increased domestic resources and the judicious use of public resources. With regard to the institutions that have influence on the debt-growth nexus, SSA countries should consider improving their quality. They also need to carefully and closely monitor the public debt stock, in order to enhance the investment environment and attract more foreign capital inflows which is likely to reduce borrowing requirements.

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Appendix 1: Countries covered

#	Country Name	#	Country Name	#	Country Name
1	Angola	15	Eritrea	29	Mozambique
2	Benin	16	Eswatini	30	Namibia
3	Botswana	17	Ethiopia	31	Niger
4	Burkina Faso	18	Gabon	32	Nigeria
5	Burundi	19	Gambia, The	33	Rwanda
6	Cameroon	20	Ghana	34	Senegal
7	Cape Verde	21	Guinea	35	Seychelles
8	Central African Republic	22	Guinea-Bissau	36	Sierra Leone
9	Chad	23	Kenya	37	South Africa
10	Comoros	24	Lesotho	38	Tanzania
11	Congo, Dem. Rep.	25	Madagascar	39	Togo
12	Congo, Rep.	26	Malawi	40	Uganda

13	Côte d'Ivoire	27	Mali	41	Zambia
14	Equatorial Guinea	28	Mauritius	42	Zimbabwe