


## ORIGINAL ARTICLE

# Macroeconomic implications of escalating stock of public debt: Evidence from sub-Saharan African economies

Olumide Olusegun Olaoye<sup>1</sup>  | Mosab I. Tabash<sup>2</sup> | Olatunde Julius Omokanmi<sup>1</sup> | Rotimi Ayoade Ogunjumo<sup>3</sup> | Matthew Oyeleke Ojelade<sup>4</sup> | James A. Ishola<sup>5</sup>

<sup>1</sup>Department of Economics, Thomas Adewunmi University, Oko, Nigeria

<sup>2</sup>College of Business, Al Ain University, Al Ain, United Arab Emirates

<sup>3</sup>Department of Economics, Landmark University, Omu-Aran, Nigeria

<sup>4</sup>Department of Business Administration, Koladaisi University, Ibadan, Ibadan, Nigeria

<sup>5</sup>Department of Business Administration, Thomas Adewunmi University, Oko, Nigeria

## Correspondence

Olumide Olusegun Olaoye, Thomas Adewunmi University, Oko, Nigeria.  
Email: [oluweds34@gmail.com](mailto:oluweds34@gmail.com) and [olumide.olaoye@tau.edu.ng](mailto:olumide.olaoye@tau.edu.ng)

## Abstract

The study investigated the effect of public debts on macroeconomic indicators, such as inflation and the exchange rate, using a panel of 25 sub-Saharan African (SSA) economies. The study contributed to extant studies by looking at the separate effect of domestic and foreign debts on inflation and exchange rate. We adopted a battery of econometric tools such as the Driscoll–Kraay standard errors and the dynamic panel threshold model. The results show that foreign debts worsen the inflation rate and expose the economy to unanticipated movements in the exchange rate, whereas domestic debts help to reduce the inflationary pressure. The study also found a nonlinear relationship between public debts and macroeconomic indicators of inflation and exchange rates. This implies the further accumulation of foreign debt will heighten the inflation rate and expose the region to unanticipated movements in the exchange rate. The study recommends that governments and policy-makers in SSA should ensure that foreign debts are sufficiently hedged against currency and interest rate risks to reduce the exposure of SSA economies to exchange rate risks. The study also recommends that governments adhere strictly to the maximum debt limit of 60.59% (of gross domestic product), otherwise inflation and exchange rates may worsen.

## KEYWORDS

domestic debts, exchange rate, foreign debts, inflation, public debt

## 1 | INTRODUCTION

One major issue that is attracting the attention of scholars and policymakers globally, and in sub-Saharan African (SSA) countries, in particular, is the rapid increase in the level of public debts over the last few decades (Akram, 2016; Beqiraj et al., 2018; Carner et al., 2021; Fambeu et al., 2022; Kassouri et al., 2021; Law et al., 2021; Makun, 2021; Napo, 2022; Olaoye, 2022a, 2022b; Owusu-Nantwi & Erickson, 2016; Sennoga & Balma, 2022; Wang et al., 2021). In the last two decades, the total public debt for SSA increased from an average of 27% of gross domestic product (GDP) in 2010 to over 56% in 2018. Although SSA countries recorded an increase in GDP of about 23% between 2010 and 2017, public debt rose by over 90% over the same period (World Bank, 2020). More specifically, in about a third of the countries in SSA, the public debt-to-GDP ratio remains above 60%.

The increase in public debt may be associated with the poor performance of some macroeconomic indicators (such as stock market prices, exchange rate, unemployment rate, inflation rate, GDP growth rate, etc.) in the region. For instance, in the region's largest economy, Nigeria, following the rapid increase in public debts, the interest rate rose from 13% in 2010 to 17.52% in 2017, and the rate of unemployment rose to 24% in 2018 from 8% in 2015 (CBN, 2018).

In recent literature, the effects of an increase in public debt on the inflation rate are currently generating a lot of interest among scholars and policymakers. This is understandable since a high and volatile inflation rate erodes the confidence of investors, increases interest rates and the level of uncertainty in the economy, lowers the level of capital investment rate, and slows down long-term economic growth, which could jeopardize the African Union's 2063 development targets (World Economic Forum, 2019).

Importantly, available evidence shows that there is a change in the composition of public debt, away from domestic borrowing to external borrowing. Domestic public debt is the component of the total government debt in a country that is owed to lenders within the country, whereas foreign public debt is the money borrowed by a government from another country's government or private lenders. Foreign debt also includes obligations to international organizations such as the World Bank, Asian Development Bank (ADB), and the International Monetary Fund (IMF).

Domestic public debt decreased from an average of 72.45% of GDP in 2000 to about 33% of GDP in 2016. By 2018, domestic public debt accounts for just about a third of the total public debt burden of SSA countries. In particular, in 11 of the SSA countries, obligations to domestic creditors are currently only about 30% of GDP on average. In contrast, foreign debts have increased significantly across SSA countries. SSA now hold a public debt portfolio with a share of foreign debt almost twice the size of domestic liabilities. The combined external debt stock of SSA countries increased to 18% in 2017, from 7% in 2016, while the external debt stock of SSA in 2018 has more than doubled its 2010 figures.

Against this background, the study addresses the following important questions: what are the macroeconomic implications of the rising stock of public debt across SSA? Do domestic and foreign debts affect macroeconomic performance differently?

Although there have been a few attempts (Djimeu, 2018; Olabisi & Stein, 2015; Siddique et al., 2016) to provide a clear understanding of the public debt–economic growth nexus in Africa, the empirical evidence presented thus far suffers some significant shortcomings.

First, most of the existing studies adopted the total public debt. Unfortunately, this might be too restrictive in the empirical analysis, as Eberhardt and Presbitero (2015) note that the impact of public debt on economic growth does not depend only on the levels of debt, but also on public debt composition (i.e., domestic versus external and foreign or domestic currency-denominated).

Secondly, previous studies (see Beqiraj et al., 2018; Djimeu, 2018; Siddique et al., 2016) work on the assumption that error terms are cross-sectionally independent. However, evidence (see Kassouri et al., 2021) suggests that there is a potential cross-sectional dependence in the error structure as common fiscal policy measures may give rise to cross-country dependence (Bouvet et al., 2013).

The study contributes to the public debt literature in the following significant ways:

1. The study investigates the separate effect of domestic and foreign public debt on macroeconomic performance in SSA.
2. This study extends the public debt literature beyond the public debt–economic growth analysis, to examine the relationship between public debt and other macroeconomic indicators such as inflation and exchange rate.
3. The study examined the possibility of a potential nonlinear relationship between public debt and the macroeconomic indicators of inflation and exchange rate.
4. The study addresses the issue of cross-sectional dependence in panel data analysis.

The results challenge upfront the common assumption that domestic financing is riskier, and has a more adverse effect on macroeconomic performance than external financing. Specifically, the study found that foreign debt worsens inflation and exchange rates, whereas domestic public debt can help to reduce the rate of inflation and improve the exchange rate in the region. Similarly, the study found that the level of corruption in SSA hinders fiscal policy from achieving the desired economic outcomes.

The rest of the paper is structured as follows: Section 2 provides a review of the literature, Section 3 describes the theoretical framework, data and methodology; Section 4 presents the empirical analysis and discussion of results; and Section 5 concludes, including implications for policy.

## 2 | REVIEW OF LITERATURE

### 2.1 | Theoretical review

The theoretical literature on the public debt–macroeconomic indicators nexus is mixed. The study highlights the main arguments in the literature. One line of theoretical insight is the Neo-Classical School. According to this school, government borrowing distorts private investments from productive uses to non-productive ones, which negatively affects capital accumulation, crowds out private investment, and leads to a decline in economic growth. They conclude that government policies stifle rather than promote investment and economic growth due to the inherent bureaucratic and inefficient nature of government. Another line of theoretical insight is the Ricardian Equivalence Perspective led by David Ricardo. According to this school, the impact of public debts on economic growth is neutral, and that taxation and public borrowing are equivalent forms of financing public expenditures. That is, public debts do not increase aggregate demand since household spending decisions take into account the present value of their future tax liabilities, and thus do not increase their spending.

On the other hand, the Keynesian theory of public debt argues in favour of government borrowing. Keynesianism emphasizes that in a period of economic downturn, the state is called to supplement the efforts of the markets and correct market inadequacies, spur economic growth and end the economic recession. They conclude that an increase in government spending via debts can spur economic growth by ensuring efficient allocation of resources, effective market regulation, stabilization of the economy, and providing resolutions to social conflicts (Keynes, 1936). Other lines of theoretical arguments include Debt Overhang Theory, proposed by Krugman (1988). According to Krugman (1988), there is a debt overhang when public debt accumulation introduces negative externalities higher than the transfer of economic resources since domestic and foreign investors anticipate the increase in future taxes and uncertainty in the economy, which creates a disincentive for investment in the debtor country and depresses private investment.

There is also the Modern Monetary Theory (MMT) championed by Stephanie Kelton. The MMT argues that public debts can be used without harmful economic effects. The essential message of the MMT is that there is no financial constraint on government borrowing in circumstances of low inflation and interest rates.

### 2.2 | Empirical review

#### 2.2.1 | The impact of public debt on economic growth and related studies: A brief review

A large volume of empirical studies has examined the impact of public debt on economic growth in both developed and developing economies. This section presents an overview of these studies.

In groundbreaking work, Barro (1974) investigated the effects of public debts on economic growth using the overlapping generation model. The study found that the impact of public debt on economic growth is neutral.

Reinhart and Rogoff (2010) examined the impact of public debts on the growth rate of GDP over the period 1790–2009 using simple correlation statistics. The study revealed that when debt/GDP ratios are below a threshold of 90% of GDP, the association between government debt and long-term growth was weak. In a related study, Checherita and Rother (2012) using the fixed effects model and instrumental variables approach, found that there is a negative impact of debt on long-term growth, at about 90–100% of GDP.

Baharumshah et al. (2016) analysed fiscal sustainability in an emerging market economy over the period 1980–2014 using the Markov-switching model. The findings indicate that the increase in public debt raises long-term interest rates, increases taxation, and creates greater uncertainty, and vulnerability, especially when debts exceed a certain threshold. Kassouri et al. (2021) and Law et al. (2021) found a public debt threshold of 25.09 and 51.65 (percentage of GDP) respectively, beyond which debt exerts a negative impact on economic growth in developing countries.

In a recent study, Gómez-Puig et al. (2022) investigated the heterogeneous link between public debt and economic growth over the period 1995–2016 using the group fixed effect estimator and a multinomial logit model. The study found that the impact of public debt on economic growth is moderated by the quality of the institutions and the proportion of productive expenditure. Fambeu et al. (2022) studied the effect of government spending on happiness in 39 African countries from 2006 to 2018. They found that public spending positively affects happiness in the poorest countries of Africa.

Using a disaggregated approach, Olabisi and Stein (2015) analysed foreign debt (via sovereign bond issues) using the ordinary least square (OLS) approach. The findings reveal that borrowing a foreign currency might put additional

pressure on a country's foreign reserves and exchange rates. Paret (2017) analysed debt sustainability in emerging market countries using the probabilistic approach. The results show that a large portion of foreign currency-denominated debt in the public debt portfolio increases a country's exposure to currency risk. Wang et al. (2021) examined the effects of external debt on economic growth over the period 1970–2018 using the proxy vector autoregressive model. The study found that sovereign external debt expansion causes economic slowdown. In a similar study, Makun (2021) investigated the relationship between external debt and economic growth in Pacific Island countries over the period 1980–2018 using the autoregressive distributed lag model. The study found that as debt increases, external debt has a stronger negative effect on growth than domestic debt.

### 3 | DATA AND METHODOLOGY

The study adopts an (unbalanced) panel data set of 25 SSA countries with 19 years of data spanning 2000–2018 (see Table 5 for the list of the selected countries). The study made use of annual secondary data.<sup>1</sup>

To measure macroeconomic performance, this study follows Makin (2005, 2014) and Checherita and Rother (2012) to adopt macroeconomic indicators such as inflation and exchange rate (see Table A1 in the Appendix for the list of variables and data sources).

#### 3.1 | Theoretical framework and model specification

##### 3.1.1 | Theoretical framework

The study is anchored on the Modern Monetary Theory (MMT) of public debt. The MMT argues that public debts can be used without harmful economic effects. The essential message of the MMT is that there is no financial constraint on government borrowing in circumstances of low inflation and interest rates. The proponents of this view argue that the government are in full control, and is not operationally constrained by revenues when it comes to federal government spending. The MMT has been used in policy debates to argue for government borrowing to finance social investment programmes such as universal healthcare and other public programmes for which governments claim to not have enough money to fund. However, the proponents of the MMT acknowledge that government borrowing can lead to inflation. MMT notes that inflation can result. The study extends the framework to include exchange rates since the rate of inflation can have a major impact on the value of the country's currency and the rates of foreign exchange via interest rates.

##### 3.1.2 | Methodology

*Model specification for the effect of public debt on macroeconomic performance*

In line with the MMT, the model is specified as:

$$\pi_{it} = \tau\pi_{i,t-1} + \theta CGD_{it} + \vartheta K_{it} + \phi I_{it} + \gamma X_{it} + \eta_i + \varepsilon_{it} \quad (1)$$

where subscript  $i$  denotes cross-sectional units,  $t$  is the time index,  $\pi$  is a vector of dependent variables (inflation and exchange rate),  $CGD$  is government or public debt (decomposed into domestic and foreign public debt (as a percentage of GDP)),  $K$  is used to represent physical capital,  $I$  represents institutional quality (captured by control of corruption),  $\eta_i$  represents the country fixed effect and  $\varepsilon_{it}$  is the error term.  $X$  is a vector of control variables that may affect economic performance as established in the literature—these are, interest rate, trade openness and foreign direct investment.

In general, the final empirical estimable equation is:

$$\pi_{it} = \tau\pi_{i,t-1} + \theta DD_{it} + \alpha FD_{it} + \phi GFC_{it} + \chi CORRUP_{it} + \lambda CORRUP_{it} * CGD + \pi X_{it} + \varepsilon_{it} \quad (2)$$

where  $DD$  denotes domestic debts,  $FD$  is foreign debt,  $GCF$  is gross capital formation (as a measure of physical capital),  $CORRUP$  denotes control of corruption, and  $CGD$  measures total public debt.

### Model specification for threshold level of public debt

*Dynamic panel threshold model.* It is now widely recognized in recent literature that public debt series may not follow a linear path (see Bökemeier & Stoian, 2018) and, thus, the linear process assumed in extant studies might not be appropriate. Therefore, following Seo and Shin (2016) and Seo et al. (2019), the study adopts the dynamic panel threshold regression model shown in Equation (3):

$$y_{it} = (1, x'_{it})\phi_1 1(q_{it} \leq \gamma) + (1, x'_{it})\phi_2 1(q_{it} > \gamma) + \varepsilon_{it}, i = 1, \dots, n; t = 1, \dots, T, \quad (3)$$

Equation (4) can be expressed explicitly as:

$$y_{it} = (1, y_{i,t-1})\phi_1 1(CGD_{it} \leq \gamma) + (1, y_{i,t-1})\phi_2 1(CGD_{it} > \gamma) + \varepsilon_{it}, i = 1, \dots, n; t = 1, \dots, T, \quad (4)$$

where  $y_{it}$  is a vector of macroeconomic indicators used in this study,  $y_{i,t-1}$  is the lagged dependent variable,  $1(\cdot)$  is the indicator function,  $CGD$  is the debt-to-GDP ratio and the regime-dependent variable,  $\gamma$  is the threshold parameter,  $\phi_1$  and  $\phi_2$  are the slope parameters associated with different regimes, and  $\varepsilon_{it}$  consists of the error components:

$$\varepsilon_{it} = \alpha_i + v_{it}, \quad (5)$$

where  $\alpha_i$  is a fixed effect term and  $v_{it}$  is a zero-mean random disturbance.

### 3.1.3 | Techniques of estimation

#### *Driscoll–Kraay non-parametric covariance matrix estimator*

The study adopts the Driscoll–Kraay non-parametric covariance matrix estimator. The method addresses the well-known problems of cross-sectional dependency inherent in panel models (for details, see Driscoll & Kraay, 1998).

#### *The dynamic panel threshold regression model*

To determine the threshold level of public debt, the study adopts the dynamic panel threshold model to control for endogenous threshold variables and regressors (for details, see Seo & Shin, 2016).

## 4 | EMPIRICAL ANALYSIS AND DISCUSSION OF RESULTS

### 4.1 | Cross-sectional dependence test

Before estimating the model, the test for cross-sectional dependence is carried out to see whether the countries are cross-sectionally dependent.

To test for cross-sectional dependence, the study applies various cross-sectional dependence tests (see Tables 1 and 2 for results). The result shows that across all specifications that there is cross-sectional dependence in the model. As revealed in Tables 1 and 2, the results clearly reject the null hypothesis of cross-section independence, since the cross-sectional dependence tests show across all specifications that the  $p$ -values are less than 0.001. This suggests that previous estimates that ignored cross-sectional dependence might be unreliable, fallacious, and misleading.

#### 4.1.1 | Unit root tests (test for stationarity in the presence of cross-sectional dependence)

The test for the stationarity properties of the variables is conducted. It is important to test for stationarity properties to determine the appropriateness of the methodology adopted in this study.

TABLE 1 Panel cross-section dependence tests in the model (in the regression)

Test	Results
<b>CGD</b>	
1. Pesaran (2004)	32.60*** (0.0000)
2. Baltagi et al. (2012)	43.130*** (0.0000)
3. Frees (2004)	6.383*** (0.0000)
4. Friedman (1937)	151.169*** (0.0000)
5. Pesaran (2004) CD	25.253*** (0.0000)
Average absolute value of the off-diagonal elements = 0.538	

Notes: The cross-section dependence test is set under the null hypothesis of cross-section independence. 1: Pesaran (2004) cross-sectional dependence in panel data models test; 2: Baltagi et al. (2012) bias-corrected scaled LM test; 3: Frees (2004) for cross-sectional dependence by using Frees' Q distribution (T-asymptotically distributed); 4: Friedman (1937) test for cross-sectional by using Friedman's  $\chi^2$  distributed statistics; 5: Pesaran (2004) CD test for cross-section dependence in panel time-series data. Tests include the intercept. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .

Source: Authors' computation.

TABLE 2 Panel cross-section dependence tests (in the variable)

Variable	CD
CGD	25.33*** (0.0000)
INF	6.47*** (0.0000)
FDI	2.01** (0.045)
Unempl	5.86*** (0.000)
Exchange rate	3.005** (0.032)
Tax revenue	12.25*** (0.0000)

Notes: The cross-section dependence test is set under the null hypothesis of cross-section independence, CD~N(0,1)  $p$ -values close to zero indicate data are correlated across panel groups. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ .

Source: Authors' computation.

Having established strong evidence of cross-section dependence, the study re-examines the stationarity properties of the variables. The results show that after accounting for cross-sectional dependence, the variables are integrated at level, that is, I(0) or integrated at first difference, that is, I(1), see Table 3.

#### 4.1.2 | Multicollinearity test

The study adopts the Variance Inflation Factor (VIF) to test for multicollinearity among the explanatory variables. The result is consistent with the findings under the correlation matrix. Specifically, the rule of thumb decision rule is that there is multicollinearity among variables with a VIF above 4.0.

The result in Table 4 shows the mean VIF to be 3.14. For the individual variables, the VIF is below 3.0 for all the variables except domestic and foreign debts, which are measures of public debt. The result is presented in Table 4. Thus, to avoid the issue of multicollinearity, the study used domestic and foreign debts in different models.

#### 4.1.3 | Descriptive statistics

The results presented in Table 5 show that for the selected countries, the standard deviation is low, which means the data are clustered around the mean and have fewer extreme values. This indicates that the sample mean is close to the true mean of the overall population.



TABLE 3 Results of panel unit root tests in presence of cross-section dependence

	CIPS <sup>a</sup>	CADF <sup>b</sup>	First difference
	Level		
CGD	−3.034***	−3.082***	
INF	−3.290***	−3.292***	
FDI	−2.641***	−2.084***	
Tax revenue	−2.249***	−1.855	−3.009***
Unempl	−2.164***	−1.307	−1.594**
E.debt	−3.034***	−3.082***	

Notes: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$ . CGD, INF, FDI, Unempl and Edebt denote public debt, inflation, foreign direct investment, unemployment and external debt respectively.

<sup>a</sup> $H_0$  (homogeneous non-stationary):  $bi = 0$  for all  $i$ .

<sup>b</sup>The null hypothesis assumes all series are non-stationary in a heterogeneous panel with cross-sectional dependence.

TABLE 4 Variance inflation factor analysis

Variable	VIF	I/VIF
Foreign	8.59	0.116
Domestic debt	8.20	0.121
Tax	2.41	0.414
Credit to private sector	2.18	0.458
Corruption	1.58	0.631
Debt service	1.47	0.681
Interest rate	1.43	0.700
Gross capital formation	1.24	0.804
Foreign direct investment	1.17	0.855
Mean VIF	3.14	

Abbreviation: VIF, Variance Inflation Factor.

Source: Authors' computation.

The study adopts Driscoll and Kraay's robust standard error estimate, which is robust to all forms of temporal and cross-sectional dependence. The results are presented in Table 6.

The results show that there is a differential impact of domestic and foreign public debt on macroeconomic performance in SSA; however, the result challenges upfront the common assumption that domestic financing is riskier, and adversely affects macroeconomic performance than external financing. This can be clearly seen in Table 6.

The separate impact of foreign and domestic debts on inflation and exchange rate in models 1 and 2 in Table 6 show that there is a positive and statistically significant impact of foreign debt on inflation, indicating that an increase in foreign debt heightens the inflation rate in the region. The result on the differential impact of domestic and foreign debts is supported by Wang et al. (2021) and Makun (2021).<sup>2</sup>

The results in Table 6 (column 2) also indicate a differential impact of domestic and external debt on the exchange rate. Specifically, the result indicates that external debt leads to a depreciation in the exchange rate. This result is consistent with extant studies (see Bua et al., 2014; Olabisi & Stein, 2015; Ramzan & Ahmad, 2014; Rodrik, 2008).<sup>3</sup>

On the other hand, domestic public debt has a positive, albeit statistically insignificant effect on inflation, indicating that domestic public debts do not contribute to the inflationary pressure in the region. The result is consistent with the results in extant studies<sup>4</sup> (see also Abbas & Christensen, 2010).<sup>5</sup> On the effect of domestic debt on the exchange rate, the results show a negative and statistically significant effect of domestic debt on the

TABLE 5 Summary statistics of key variables for some selected sub-Saharan African countries

Country	Mean			Standard deviation		
	CGD	INF	EXCH	CGD	INF	EXCH
Angola	52.85	51.75		1.29	79.7	
Botswana	12.99	7.21		5.68	4.8	
Burkina Faso	17.58	2.08		9.99	2.9	
Cape Verde	88.95	6.7		0.66	2.5	
Congo	114.50	2.58	132.28	0.31	2.1	100.93
Congo Dem. Rep.	75.37	60.6	168.60	54.30	144.4	109.09
Gambia	67.75	2.41	103.88	18.82	1.6	27.88
Ghana	59.39	15.85	91.55	22.66	6.7	13.66
Eritrea	–	–		–	–	
São Tomé	187.66	12.89		45.53	6.8	
Malawi	60.57	15.83	98.65	36.47	7.3	26.08
Seychelles	123.38	6.27	–	51.46	10.5	
South Africa	38.72	5.40	89.04	8.08	2.4	11.03
Sudan	91.04	15.24		26.39	11.1	
Ethiopia	64.12	11.7		25.82	12.1	
Equatorial Guinea	14.32	4.67	91.1	14.43	2.3	14.53
Kenya	48.89	9.44		6.8	5.2	
Namibia	26.20	7.00		7.6	3.21	
Nigeria	20.49	12.04	95.87	15.60	3.8	16.28
Zambia	78.75	12.51	86.04	75.9	5.7	16.49
Zimbabwe	51.46	8.27		15.1	21.9	
Liberia	222.05	9.24		206	3.12	
Côte d'Ivoire	67.75	2.41	98.63	18.8	1.6	5.44
Mali	36.28	2.06		19.7	3.16	
Mozambique	68.42	7.29		30.5	3.7	

Notes: Mean and standard deviation are computed from yearly percentages of unemployment, inflation, central gross debt, real gross domestic product, and exchange rate. Data period is 2000–2018.

Source: Authors' computation.

exchange rate. This result is consistent with the findings of Bacchiocchi and Missale (2012) and Hausmann et al. (2006).<sup>6</sup> However, these results negate the findings of Bal and Rath (2014).<sup>7</sup>

One economic implication of these findings is that further accumulation of foreign debt in SSA countries will worsen inflation and expose the economy of the region to unanticipated movements in the exchange rate.

The result in Table 6 also shows that institutional quality (proxied by control of corruption) worsens the inflation rate and leads to depreciation of the exchange rate across the region. This view is supported by Alzahrani (2018) and Elkamel (2019).<sup>8</sup>

## 4.2 | Controlling for other potentially relevant variables

Following Baum et al. (2013), the study used total domestic credit to the private sector as a proxy for private debt.



TABLE 6 Dynamic panel estimates (pooled OLS, with Driscoll–Kraay robust standard errors)

Variable	Inflation Model 1a Driscoll–Kraay (pooled OLS)	Inflation Model 1b Driscoll–Kraay (pooled OLS)	Exchange rate Model 2 Driscoll–Kraay (pooled OLS)
CGD	0.0027* (0.0016)	–	–
E.DEBT	0.22** (0.12)	–	0.13* (0.07)
D.DEBT	0.027 (0.13)	–	–0.22** (0.11)
GOV	–	–0.0408** (0.013)	–
INT	0.001 (0.022)	–0.0008 (0.0005)	0.071 (0.35)
FDI	1.80e-09** (0.228e-09)	–0.001 (0.041)	1.09e** (3.07e)
GCF	0.15 (0.15)	–4.62e-10***	–0.05 (0.10)
TRADE	–	–	–
CORRUP	4.60 (3.17)	–	–3.26 (3.16)
DebtServ	1.29 (1.1348)	–0.030*** (0.0045)	–1.27 (1.45)
TAX	0.36 (0.5286)	0.0045 (0.0176)	0.81 (0.32)
CORR*CGD	–	0.041*** (0.0023)	0.11 (0.069)
Country dummies (included)			
Year dummies (included)			
Significant levels ( <i>p</i> -values)			
<i>F</i> -statistics	24.44	45.13	30.35
Prob( <i>F</i> -statistics)	0.0000	0.0000	0.0000
Observations	292	245	141

Notes: Table 6 presents the results for the 25 selected SSA countries considered as debt-laden or debt-distressed countries. The countries are: Eritrea, Cape Verde, The Gambia, São Tomé and Príncipe, Congo, Ghana, Malawi, Mauritania, Angola, Sudan, Seychelles, Ethiopia, Kenya, Equatorial Guinea, Botswana, Congo Dem. Rep., Namibia, Zimbabwe, Côte d'Ivoire, Burkina Faso, Mali, Liberia, Mozambique, Zambia, and Nigeria. Eritrea was excluded in empirical investigation due to data non-availability. \*, \*\*, \*\*\* denote 10%, 5%, and 1% levels of significance, respectively. Country dummies are to capture economic and social characteristics specific for each country which might remain constant over. Year dummies are to control for common shocks across countries. Year 2010 are dummies for debt waves in the region, while 2008 and 2014 are dummies for the global financial crisis and commodity terms of trade shocks respectively. The figures in parentheses are Driscoll–Kraay robust standard errors.

Source: Authors' computation.

The study found that private debt influenced economic growth in a positive way. However, when private debt interacted with public debt, the result indicated that the joint effect of both private and public debt on economic growth is statistically not significant. This implies public debt drags down the positive impact of private debt on economic growth (see Table 7). This suggests that lending institutions should increase private sector lending to spur economic growth.

### 4.3 | Threshold regression results

Table 8 presents the results of the dynamic panel threshold regression. Our result indicates a threshold value of public debt/GDP ratio of 56.82% and 60.59% on the exchange rate and inflation rate respectively. The results show that the estimated threshold level splits the observations into two regimes. This implies that when public debt levels rise beyond the respective estimated threshold points, inflation and exchange rate in SSA countries deteriorate. This is tenable since increased public borrowing limits fiscal space for human and physical capital investment, which slows down economic and productive activities across SSA.

TABLE 7 Dynamic panel estimates (pooled OLS, with Driscoll–Kraay Robust standard errors) (controlling for private debt stock)

Variable	Inflation Model 1 Driscoll–Kraay (pooled OLS)	Exchange rate Model 2 Driscoll–Kraay (pooled OLS)
CGD	0.11* (0.06)	0.08 (0.091)
INT	0.43 (0.25)	−0.12 (0.028)
GCF	−0.05 (0.07)	0.07 (0.08)
TRADE		
CORRUP	−0.35 (1.11)	1.81 (4.39)
DebtServ	3.85** (1.74)	−2.32 (2.04)
TAX	1.05 (0.66)	−3.36*** (0.99)
Private Sector Credit	1.12** (0.047)	0.57*** (0.13)
Private Sector Credit*CGD	−0.004 (0.003)	−0.002 (0.001)
Country dummies (included)		
Year dummies (included)		
Significant levels ( <i>p</i> -values)		
<i>F</i> -statistics	42.70	23.95
Prob( <i>F</i> -statistics)	0.0000	0.0001
Observations	270	140

Notes: \*, \*\*, \*\*\* denote 10%, 5%, and 1% levels of significance, respectively. Country dummies are to capture economic and social characteristics specific for each country which might remain constant over time. Year dummies are to control for common shocks across countries. Year 2010 are dummies for debt waves in the region, while 2008 and 2014 are dummies for the global financial crisis and commodity terms of trade shocks respectively. The figures in parentheses are Driscoll–Kraay robust standard errors.

Source: Authors' computation.

## 5 | CONCLUSIONS AND POLICY RECOMMENDATIONS

The main conclusion from this study is that there is a rapid buildup of public debt in SSA. The study also found that foreign debt worsens inflation and exchange rates, whereas domestic public debt can help to reduce the rate of inflation and improve the exchange rate in the region. The results also confirm the existence of a non-linear relationship between public debts and macroeconomic indicators of inflation and exchange rates. Against this background, this study recommends the following.

First, governments and policymakers in SSA need to ensure that foreign debts are sufficiently hedged against currency and interest rate risks to reduce the exposure of SSA economies to exchange rate risks.

Alternatively, governments should also consider developing the domestic debt markets since a well-developed domestic debt market can help to strengthen the financial market, reduce foreign exchange risks, provide long-term financing for physical and social infrastructure, and promote debt and economic sustainability.

Second, the study recommends that governments and policymakers in SSA countries should consider reducing the share of foreign debt in the composition of public debt—as the results show that foreign debt financing is riskier and has a more adverse effect on macroeconomic performance—in favour of domestic borrowing, which is denominated in local currency, and does not suffer the shocks and volatility associated with external credit flows, especially when the borrowing countries do not have a reliable stream of future income in the borrowed foreign currency.

Third, since private debt spurs economic growth, to finance government programmes, the government may need to adopt the Private Public Partnership model to reduce public borrowing.

Fourth, the study also recommends that SSA governments adhere strictly to fiscal rules such as the maximum debts limit of 60.59% of GDP established in this study, otherwise, these countries will continue to accumulate debt which might worsen inflation and exchange rates in the region.

Last, SSA governments must develop institutions that promote transparency, reduce corruption and hold governments accountable.

TABLE 8 Threshold estimate of public debt using the dynamic panel threshold with a kink

Dependent variable	(INFLATION)	(EXC)
Lag_y_b(-1))	...	...
CORRUP	-0.5561	-0.0023**
CGD	0.0666***	-0.019***
TAX	-0.0002	-0.0463
Kink_slope	-0.0862***	-0.0043*
<i>r</i>	60.5901***	56.8201**
Public debt (CGD)	(INFLATION)	(EXC)
Bootstrap <i>p</i> -value	0.0000	0.0000
Threshold estimate	60.5901	56.8201
<i>lower regime (δ)&lt;</i>		
Dependent variable	(INFLATION)	(EXC)
CGD	0.0400**	-0.0064**
CORRUP	6.5253	-0.0030*
TAX	-0.0036***	0.0834
<i>upper regime (δ1)&gt;</i>		
CGD	0.3789***	-0.0103***
CORRUP	-4.7150	-0.0380**
TAX	0.0045***	0.0024*

Notes: The bootstrap algorithm to test for the presence of the threshold effect is set under the null hypothesis  $H_0 : \delta_0 = 0$ . Lag\_y\_b denotes the endogenous independent variable ((-1)), CORRUP denotes control of corruption, EXC is the exchange rate and TAX denotes tax revenue. \*, \*\*, \*\*\* denote 10%, 5%, and 1% levels of significance respectively. Instrumental variables used are private sector credit and average public debt-to-GDP ratio (average debt). Panel Var: COUNTRID, Time Var: YEAR, Number of moment conditions: 320, Bootstrap *p*-value for linearity test = 0.

Source: Authors' computation.

## 5.1 | Suggestions for further studies

The study investigated the separate effect of domestic and foreign public debts on inflation and exchange rate and identified the threshold beyond which public debts worsen these two macroeconomic indicators. Future studies can build on this study by investigating the threshold level of inflation that helps public debt to achieve the desired economic outcome since it is affirmed that public debts can be helpful in an environment with low inflation and interest rates.

### CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### ORCID

Olumide Olusegun Oloaje  <http://orcid.org/0000-0002-0988-6499>

### ENDNOTES

<sup>1</sup> Note: The study used the variables in terms of GDP ratios. This is because several authors (e.g., Brady & Magazzino, 2019) affirm that analysis based on GDP ratios provide more credible information about the fiscal series than the raw and real data. We exclude the control of corruption index, which is already standardized, and other variables such as interest rate and inflation rates, which are already in rates.

<sup>2</sup> Wang et al. (2021) found that sovereign external debt expansion causes economic slowdown in developing countries. Makun (2021) found that external debt exerts a stronger negative effect on growth compared to domestic debt as indebtedness increases.

- <sup>3</sup> Bua et al. (2014) and Olabisi and Stein (2015) found that a switch from domestic public debt to foreign debt puts pressure on foreign reserves and exchange rates at the time of loan repayment and leads to a fall in exchange rate. Likewise, Hausmann (2003) found that foreign currency-denominated debt increases solvency risk. According to him, the increase in solvency risk implies debt service and repayment of loan is largely dependent on the exchange rate, which is often volatile and vulnerable to macroeconomic shocks, thereby leading to a currency mismatch.
- Céspedes et al. (2004) notes that a switch from domestic to foreign public debt means that a country might be trading a currency mismatch for a maturity mismatch—which might be worse than the maturity mismatch associated with domestic debt.
- Rodrik (2008) added that foreign borrowing creates macroeconomic and structural vulnerabilities, which in turn, hurts competitiveness and lowers investment and economic growth.
- <sup>4</sup> Forslund et al. (2011) found that domestic debt led to a decline in inflation rate in developing countries. Calvo (2005) argues that a large share of domestic debt in the total debt portfolio reduced the exposure of the economy to currency risk and vulnerability to capital flow reversals. Mehrotra et al. (2012) posit that domestic debts allow the monetary authority to undertake countercyclical policy to mitigate the effect of external shocks on the local economy unlike foreign debt that is often volatile, highly procyclical and suddenly stops.
- <sup>5</sup> Abbas and Christensen (2010) found that when domestic public debt was below 35% of total bank deposits, it led to an increase in output growth, whereas above the threshold, debt undermined economic activity by crowding out private investment and increasing inflationary pressures.
- <sup>6</sup> Domestic public debt does not expose a country to volatility in exchange rate and, thus, allows a country much freedom to use the exchange rate to protect the economy against external shocks.
- <sup>7</sup> Bal and Rath (2014) found that an increase in both domestic debt and external debt affected economic growth in India in the same way. The authors noted that their results might mean that a large portion of both domestic and external debts were spent on non-productive investments, whereas a small percentage was allocated to productive investment.
- <sup>8</sup> Alzahrani (2018) affirmed that the differential impact of public debt on macroeconomic performance between G7 and ASEAN countries might be due to ‘allocation effect’, ‘threshold effect’, and ‘institutional effect’. Whereas Elkamel (2019) found that in the presence of corruption, the use of public finance leads to a higher level of inflation.

## REFERENCES

- Abbas, S. M. A., & Christensen, J. E. (2010). The role of domestic debt markets in economic growth: An empirical investigation for low-income countries and emerging markets. *IMF Staff Papers*, 57, 209–255.
- Akram, N. (2016). Public debt and pro-poor economic growth evidence from South Asian countries. *Economic Research-Ekonomska Istraživanja*, 29(1), 746–757.
- Alzahrani, A. A. (2018). The impact of government debt on macroeconomic indicators: Evidence from G7 and ASEAN countries. A thesis submitted to the Department of Economics, Eastern Illinois University.
- Bacchiocchi, E., & Missale, A. (2012). Multilateral indexed loans and debt sustainability. UNCTAD Discussion Papers, No. 209.
- Baharumshah, Z., Ahmad, Z., Soon, S.-H., & Evan, L. (2016). Fiscal sustainability in an emerging market economy: When does public debt turn bad. *Journal of Policy Modelling*, 39(1), 99–113.
- Bal, D. P., & Rath, B. N. (2014). Public debt and economic growth in India: A reassessment. *Economic Analysis and Policy*, 44, 292–300. <https://doi.org/10.1016/j.eap.2014.05.007>
- Barro, R. J. (1974). Are governments bonds net wealth? *Journal of Political Economy*, 82(6), 1095–1117.
- Baltagi, B. H., Feng, Q., & Kao, C. (2012). A lagrange multiplier test for cross-sectional dependence in a fixed effects panel data model. *Journal of Econometrics*, 170(1), 164–177.
- Baum, A., Checherita-Westphal, C., & Rother, P. (2013). Debt and growth: New evidence for the euro area. *Journal of International Money and Finance*, 32, 809–821.
- Beqiraj, E., Fedeli, S., & Forte, F. (2018). Public debt sustainability: An empirical study on OECD countries. *Journal of Macroeconomics*, 58, 238–248.
- Bökemeier, B., & Stoian, A. (2018). Debt sustainability issues in Central and East European countries. *Eastern European Economics*, 56, 438–470. <https://doi.org/10.1080/00128775.2018.1496456>
- Bouvet, F., Brady, R., & King, S. (2013). Debt contagion in Europe: A panel-Vector Autoregressive (VAR) analysis. *Social Sciences*, 2, 318–340.
- Brady, G. L., & Magazzino, C. (2019). The sustainability of Italian fiscal policy: myth or reality. *Economic Research-Ekonomska Istraživanja*, 32(1), 772–796.
- Bua, G., Pradelli, J., & Presbitero, A. F. (2014). Domestic public debt in low-income countries: trends and structure, Policy Research Working Paper Series 6777. The World Bank.
- Carner, M., Fan, Q., & Grennes, T. (2021). Partners in debt: An endogenous non-linear analysis of the effect of public and private debts on growth. *International Review of Economics & Finance*, 76, 694–711.
- Calvo, G. (2005). *Emerging capital markets in Turmoil*. MIT Press.
- Central Bank of Nigeria. (2018). Statistics. [cbn.gov.ng](http://cbn.gov.ng)
- Céspedes, L. F., Chang, R., & Velasco, A. (2004). Balance sheet and exchange rate policy. *American Economic Review*, 94(1), 1183–1193.
- Checherita-Westphal, C., & Rother, P. (2012). The impact of high government debt on economic growth and its channels: An empirical investigation for the Euro area. *European Economic Review*, 56(7), 1392–1405.

- Djimeu, E. W. (2018). The impact of the Heavily Indebted Poor Countries initiative on growth and investment in Africa. *World development*, 104, 108–127.
- Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics*, 80, 549–560.
- Eberhardt, M., & Presbitero, A. F. (2015). Public debt and growth: heterogeneity and non-linearity. *Journal of International Economics*, 97, 45–58.
- Elkamel, H. (2019). The effect of corruption, seigniorage and borrowing on inflation. *PSU Research Review*, 3(1), 1–15.
- Fambeu, A. H., Mbondo, G. D., & Yomi, P. T. (2022). Bigger or better? The effect of public spending on happiness in Africa. *African Development Review*. <https://doi.org/10.1111/1467-8268.12669>
- Forslund, K., Lima, L., & Panizza, U. (2011). The determinants of the composition of public debt in developing and emerging market countries. *Review of Development Finance*, 1(3), 207–222.
- Frees, E. W. (2004). *Longitudinal and panel data: Analysis and applications in the social sciences*. Cambridge University Press.
- Friedman, M. (1937). The use of ranks to avoid the assumption of normality implicit in the analysis of variance. *Journal of American Statistical Association*, 32, 675–701.
- Gomez-puig, M., Sosvilla-Rivero, S., & Martinez-Zarzoso, I. (2022). On the heterogeneous link between public debt and economic growth. *Journal of International Financial Markets, Institutions and Money*, 77. <https://doi.org/10.1016/j.intfin.2022.10128>
- Hausmann, R., Panizza, U., & Rigiobon, R. (2006). The long run volatility puzzle of the real exchange rate. *Journal of International Money and Finance*, 25(1), 93–124.
- Hausmann, R. (2003). Good credit ratios, bad credit ratios: The role of debt structure. In book: Rules-based fiscal policy in emerging markets (pp. 30–52). [https://doi.org/10.1057/9781137001573\\_3](https://doi.org/10.1057/9781137001573_3)
- International Country Risk Guide. (2019). *The Political Risk Services Group (PRS)*. PRS Group.
- Kassouri, Y., Altıntaş, H., Alancioglu, E., & Kacou, K. Y. T. (2021). New insights on the debt-growth nexus: A combination of the interactive fixed effects and panel threshold approach. *International Economics*, 168, 40–55.
- Keynes, J. M. (1936). The general theory of employment. In *Interest and money*. Harcourt, Brace and Company.
- Kim, D.-H., Wu, Y. C., & Lin, S. C. (2018). Heterogeneity in the effects of government size and governance on economic growth. *Economic Modelling*, 68(C), 205–216.
- Kmenta, J. (1986). *Elements of econometrics* (2nd ed., p. 1986). Macmillan.
- Law, S. H., Ng, C. H., Kutan, A. M., & Law, Z. K. (2021). Public debt and economic growth in developing countries: Nonlinearity and threshold analysis. *Economic Modelling*, 98, 26–40.
- Magazzino, C. (2014). Government size and economic growth in Italy: An empirical analysis based on new data. *International Journal of Empirical Finance*, 3(2), 38–54.
- Magazzino, C. (2013). Alcune linee guida per una spending review. In C. Magazzino & G. C. Romagnoli (Eds.), *Legge di Stabilità e politica economica in Italia* (pp. 95–120). Franco Angeli.
- Makin, A. J. (2005). Public debt sustainability and its macroeconomic implications in ASEAN-4. *ASEAN Economic Bulletin*, 22(30), 284–298.
- Makun, K. (2021). External debt and economic growth in Pacific Island countries: A linear and nonlinear analysis of Fiji Islands. *The Journal of Economic Asymmetries*, 23, e00197. <https://doi.org/10.1016/j.jeca.2021.e00197>
- Mecagni, M., Kriljenko, J., Gueye, C., Mu, Y., Yabara, M., & Weber, S. (2014). Issuing International Sovereign Bonds Opportunities and Challenges for sub-Saharan Africa, African Department 14/02. IMF, Washington DC.
- Mehrotra, A. N., Miyajima, K., & Villar, A. (2012). Developments of domestic government bond markets in EMEs and their implications. Fiscal policy, public debt and monetary policy in emerging market economies. *Bank for International Settlements*, 67, 31–50.
- Mustapha, S., & Prizzon, A. (2018). *Africa's rising debt: how to avoid a new crisis*. Scribbr. <https://odi.org/en/publications/africas-rising-debt-how-to-avoid-a-new-crisis/>
- Napo, S. (2022). Assessing public debt sustainability under COVID-19 uncertainty: Evidence from Côte d'Ivoire. *African Development Review*, 34, S1. <https://doi.org/10.1111/1467-8268.12649>
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- Olabisi, M., & Stein, H. (2015). Sovereign bond issues: Do African countries pay more to borrow. *Journal of African Trade*, 2, 87–109.
- Olaoye, O. O. (2022a). Sub-Saharan Africa's rising public debt stock: Before another debt relief. *African Journal of Economic and Management Studies*. <https://doi.org/10.1108/AJEMS-03-2022-0105>
- Olaoye, O. O. (2022b). Sub-Saharan Africa's debt-financed growth: How sustainable and inclusive? *African Development Review*. <https://doi.org/10.1111/1467-8268.12670>
- Owusu-Nantwi, V., & Erickson, C. (2016). Public debt and economic growth in Ghana. *African Development Review*, 28(1), 116–126. <https://doi.org/10.1111/1467-8268.12174>
- Panizza, U. (2008). Domestic and external public debt in developing countries. United Nation Conference on Trade and Development. Discussion Paper, No. 188. March, 2008.
- Paret, A. C. (2017). Debt sustainability in emerging market countries: Some policy guidelines from a Fan-Chart approach. *Economic Modelling*, 63, 26–45. <https://doi.org/10.1016/j.econmod.2017.01.010>
- Pesaran, M. (2004). “General diagnostic tests for cross section dependence in panels”, Cambridge Working Papers in Economics No. 0435 Faculty of Economics, University of Cambridge.
- Ramzan, M., & Ahmad, E. (2014). External debt growth nexus: Role of macroeconomic policies. *Economic Modelling*, 38, 204–210.
- Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *American Economic Review*, 100(2), 573–578.

- Rodrik, D. (2008). The real exchange rate and economic growth. *Brookings Papers on Economic Activity*, 39(2), 365–439.
- Rodrik, D. (1999). Where did all the growth go? External shocks, social conflicts, and growth collapse. *Journal of Economic Growth*, 4, 385–412.
- Sennoga, E., & Balma, L. (2022). Fiscal sustainability in Africa: Accelerating the post-COVID-19 recovery through improved public finances. *African Development Review—Revue africaine de développement*, 4, S8–S33. <https://doi.org/10.1111/1467-8268.12648>
- Seo, M. H., Kim, S., & Kim, Y. J. (2019). Estimation of dynamic panel threshold model using stata, to appear.
- Seo, M. H., & Shin, Y. (2016). Dynamic panels with threshold effect and endogeneity. *Journal of Econometrics*, 195, 169–186.
- Siddique, A., Selvanathan, E. A., & Selvanathan, S. (2016). The impact of external debt on growth: Evidence from highly indebted poor countries. *Journal of Policy Modeling*, 38(5), 874–894. <https://doi.org/10.1016/j.jpolmod.2016.03.011>
- Slesman, L., Baharumshah, A. Z., & Ra'ees, W. (2015). Institutional infrastructure and economic growth in member countries of the Organization of Islamic Cooperation (OIC). *Economic Modelling*, 51, 214–226.
- Teles, V. K., & Cesar Mussolini, C. (2014). Public debt and the limits of fiscal policy to increase economic growth. *European Economic Review*, 66(C), 1–15.
- Wang, R., Xue, Y., & Zheng, W. (2021). Does high external debt predict lower economic growth? Role of sovereign spreads and institutional quality. *Economic Modelling*, 103, 105591. <https://doi.org/10.1016/j.econmod.2021.105591>
- Warner, A. M. (2014). Public investment as an engine of growth. IMF Working Paper, No 14/148.
- World Bank. (2019). World development indicators. <https://databank.worldbank.org/reports.aspx?source=2&Topic=21>
- World Bank. (2020). World development report 2021. World Bank Publications.
- World Economic Forum. (2019). How has COVID-19 affected global debt. Visual Capitalist. <https://www.weforum.org/agenda/2020/12/global-debt-gdp-covid19/>

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## APPENDIX

**TABLE A1** Data, sources, and measurements

Variables	Definition	Measurement	Source
External debt	Total external debt is a debt owed to non-residents repayable in currency, goods, or services	External debt stocks, total (% of GDP)	World Bank (2019)
Domestic debt	Due to data unavailability, the study follows Panizza (2008) to define domestic debt as the difference between total debt and external	Percentage of GDP	Authors' calculation (2019)
Total debt	This consists of all government debts. That is central government, state government, and local government debts	Central government debt (% of GDP)	World Bank (2019)
Gross domestic product (GDP)	This measures the productive capacity of an economy	Current US\$	World Bank (2019)
Inflation rate	Inflation shows the rate of price change in the economy as a whole	Inflation, GDP deflator (annual %)	World Bank (2019)
Lending interest rate	The lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector	Lending interest rate (percentage)	World Bank (2019)
Institutional Quality (Control of Corruption)	This indicator measures the extent to which public power is exercised for private gain	The control of corruption index is measured by no corruption	ICRG (2019)

Source: World Bank (2019), International Country Risk Guide (2019), authors' computation.