

Domestic Debt And Price Stability In Selected Sub-Saharan African Countries

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Abstract

This study analyses the relationship between domestic debt, and inflation in selected sub-Saharan African countries using annual data spanning the period of 1995-2023. Specifically, the study investigates the long and short run effects of domestic debt on inflation in selected sub-Saharan African countries. The study employs the Panel Auto- Regressive Distributed Lag (ARDL) technique. The result reveals that there exists a negative relationship between domestic debt and inflation both in the long run and short run in the selected sub-Saharan African countries. The study recommends that governments in selected Sub-Saharan African countries should prioritize fiscal discipline to mitigate inflationary pressures. This includes: maintaining a balanced budget, implementing structural reforms and focus on reforms that enhance productivity and economic efficiency. Also, there should be effective debt management and coordination to minimize the inflationary impact of domestic debt in the long run.

Keywords: *Domestic debt, Price stability, Panel ARDL, Cointegration, Error Correction, Sub-Saharan Africa*

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I. Introduction

In recent decades, the economic trajectories of Sub-Saharan African (SSA) nations have undergone transformations, signaling a departure from traditional financing mechanisms toward a notable reliance on domestic debt instruments as essential tools for funding governments and the facilitation of economic development. This shift reflects a strategic response to the evolving global economic outlook, wherein traditional sources of external financing have become increasingly volatile and unpredictable. Sub-Saharan African countries, faced with the imperatives of sustaining economic growth, enhancing social welfare, and addressing developmental challenges, have turned inward to harness the potential of their domestic financial markets. This transition underscores a broader definitive shift in economic policy frameworks, driven by the recognition of the inherent strengths and opportunities embedded within domestic financial systems.

The strategic utilization of domestic debt instruments extends beyond mere fiscal expediency, serving as a catalyst for broader economic development objectives. Domestic debt issuance enables governments to finance critical infrastructure projects, stimulate private sector investment, and enhance productive capacity, thereby laying the groundwork for sustained economic growth. Moreover, by fostering the development of domestic financial markets, governments can enhance financial inclusion, deepen capital markets, and promote long-term economic stability. The issuance of domestic debt instruments also facilitates the creation of a liquid secondary market, thereby enhancing market efficiency and investor confidence. In this regard, domestic debt markets emerge not only as a source of financing but also as a conduit for channeling savings into productive investments, unlocking the latent potential of domestic capital for transformative development outcomes (Onwioduokit, 2002).

No contention arises when a country resorts to borrowing, provided the borrowed funds are channeled into productive endeavors that facilitate the eventual servicing and liquidation of the debt. Borrowing emerges as a second-best alternative to money creation during periods of unemployment, serving as a vital instrument for economic management. Domestic loans serve as a mechanism for bridging domestic savings gaps, especially amid dwindling government revenues from domestic sources, exacerbated by volatile prices of primary commodity exports and diminishing foreign exchange earnings. Governments grappling with substantial recurrent budget deficits may find themselves compelled to address these gaps by tapping into domestic savings, often through the issuance of domestic debt.

However, figure 1 showed the domestic debt of the selected sub Saharan African countries.

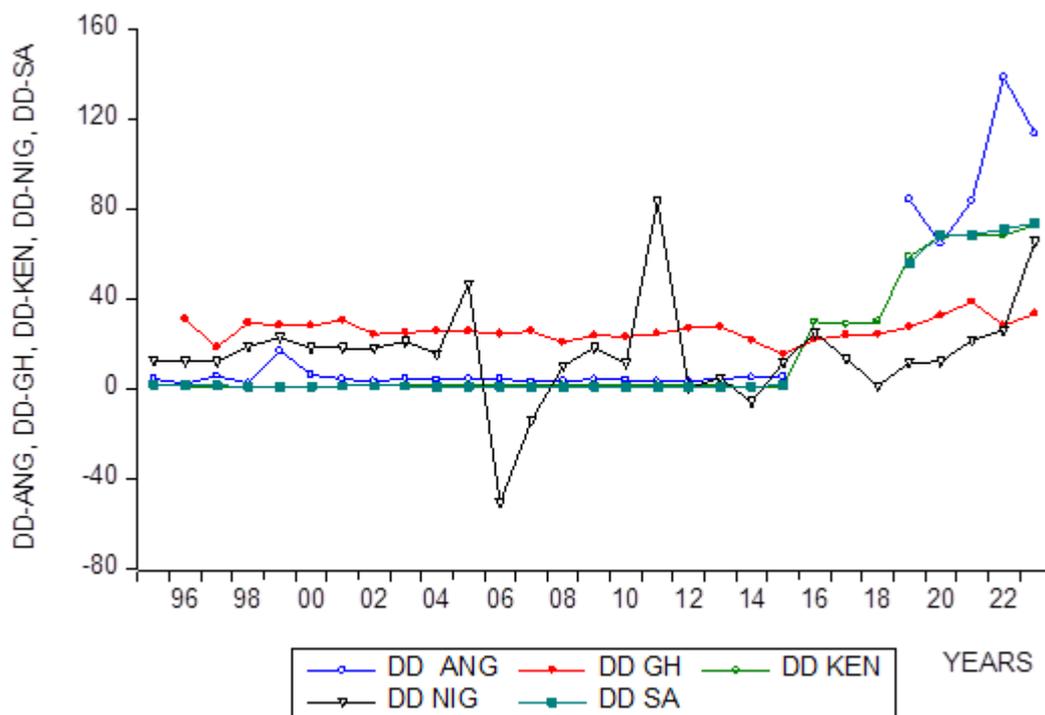


Figure 1 Domestic Debt in selected sub-Saharan African countries
Source: Computed by the researcher

From figure 1 above, Nigeria has experienced a significant increase in domestic debt from 1995 to date. Nigeria experienced a significant decline in its domestic debt in 2006, and several factors contributed to this trend. One of the primary reasons for this decline was the implementation of prudent fiscal policies by the government. These policies aimed to reduce borrowing and control spending, leading to a decrease in domestic debt. Thereafter between 2010 and 2013, Nigeria experienced a significant increase in its domestic debt levels. Furthermore, in 2020, Nigeria's domestic debt stood at approximately 21.4 trillion naira (\$55.6 billion USD), with the majority of it being federal government debt. This represented a significant increase from previous years, primarily due to the economic impact of the COVID-19 pandemic and a decline in oil prices, which had previously been a major source of government revenue.

In 2022, the Nigerian government began exploring options for debt restructuring and management to address the rising levels of domestic debt. This included negotiating with creditors to extend the repayment terms for existing loans and exploring alternative sources of financing, such as international loans and grants. The government also implemented measures to improve its debt management practices and reduce the risk of future debt accumulation. Despite these measures in 2023 domestic debt kept on increasing.

From the graph above Angola experienced a period of relatively low domestic debt from 1995-2013. Historically, oil exports have been a major source of income for the Angolan government. However, fluctuations in global oil prices have severely impacted the country's revenue stream. The decline in oil prices since 2014 has led to a substantial reduction in government income, forcing Angola to borrow domestically to finance its budget deficits till 2023.

Also, Ghana's domestic debt has exhibited significant volatility since 1995. The global financial crisis of 2008 also hit Ghana hard. The country saw a decline in export revenues, reduced remittances from abroad, and decreased foreign aid inflows. As a result, there was increased pressure on the local currency and a rise in public debt levels.

In 2014, Ghana encountered another economic downturn characterized by fiscal imbalances and external vulnerabilities. The country sought assistance from the IMF through an Extended Credit Facility arrangement to restore macroeconomic stability. In 2020, Ghana's domestic borrowing increased significantly due to various factors, including the COVID-19 pandemic and a decline in international commodity prices, particularly cocoa. In 2022, the Ghanaian government began exploring options for debt restructuring and management to address the rising levels of domestic debt till 2023.

However, Kenya's domestic debt has exhibited significant volatility since 1995. In 2011, the fluctuation in international interest rates influences borrowing costs amongst other effects. In 2017 Kenya heavily relied on

domestic borrowing to finance its budget deficit. However, over-reliance on domestic borrowing since 2018-2023 has caused adverse effects in the long run in the economy. This led to crowding out private sector investment, higher interest rates, inflationary pressures, and increased debt servicing costs. These consequences affected the sustainability of her economic growth.

From the graph above, from 1995-2016, South Africa experienced lack of significant volatility in domestic debt. This can be attributed to the country’s prudent fiscal management practices. In 2016, the country experienced an economic slowdown and recession that plagued the country, leading to decreased government revenue and increased borrowing requirements. Furthermore, between 2020-2023, the country experienced more increase in domestic debt. Specifically, The COVID-19 pandemic further exacerbated this situation, causing widespread job losses and business closures, which reduced tax revenues while increasing social welfare spending.

Despite these theoretical underpinnings, the impact of debt borrowing in sub-Saharan Africa has not been markedly significant. Sub-Saharan Africa (SSA) is an extremely diverse region, composed of low, lower-middle, upper-middle, and high-income countries; 22 of which are fragile or conflict-affected and 13 small states characterized by a small population, limited human capital, and a confined land area (World Bank Report 2023). Boasting rich natural resources and the world’s largest free trade area and a 1.2-billion-person market, the continent has the potential to forge a new development path, harnessing the potential of its resources and people (World Bank Report 2023).

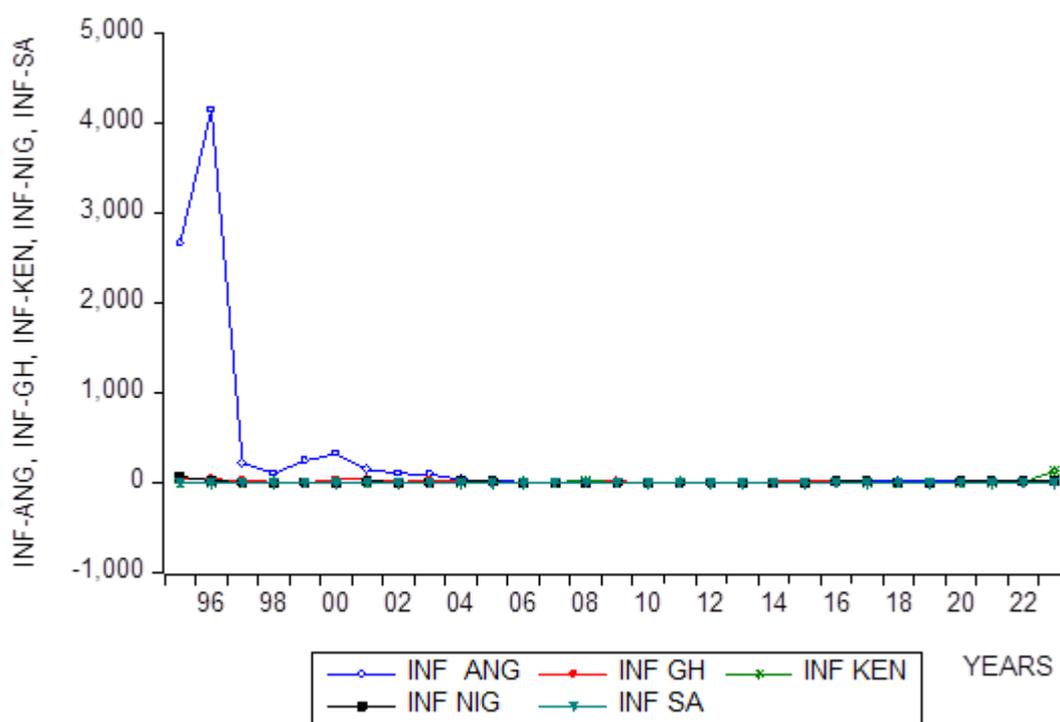


Figure 2: Inflation in Selected Sub-Saharan African Countries
Source: Computed by the researcher

From Figure 2, Angola's economy was still recovering from the devastating effects of the 27-year civil war that ended in 2002. During this time of 1995- 2000, the country's inflation rate was relatively high, averaging around 30-40% per annum. However, the end of the civil war in 2002 marked the beginning of a period of economic recovery and growth for Angola. The government implemented a range of economic reforms, including monetary and fiscal policies aimed at reducing inflation and promoting investment. Since 2000, Angola's inflation rate has improved significantly, averaging around 10-15% per annum.

From 2001-2020, Angola's inflation rate has improved significantly, averaging around 10-15% per annum. This has been achieved through a combination of sound monetary policy and fiscal discipline. From 2020-2023, Angola's inflation rate has remained relatively low, averaging around 10-15% per annum. This has been achieved through a combination of sound monetary policy and fiscal discipline, which has helped to maintain price stability and promote economic growth. During this period, Angola's economy has continued to grow and develop, with a number of key sectors emerging as drivers of growth. These include the services sector, which has become the largest contributor to GDP, as well as the manufacturing and mining sectors, which have also experienced significant growth.

From 1995-2000, South Africa experienced a period of economic growth and stability, which was marked by a relatively low inflation rate. During this time, the country's inflation rate remained under control, averaging around 4-5% per annum. This was achieved through a combination of sound monetary policy and fiscal discipline, which helped to maintain price stability and promote economic growth. prior to 1995, the South African economy underwent several structural changes, including the transition from apartheid to a democratic government in 1994. This transition helped to improve investor confidence and attract foreign direct investment, which fueled economic growth and job creation.

From 2001-2023, South Africa's inflation rate has generally remained under control, averaging around 4-6% per annum. This has been achieved through a combination of sound monetary policy and fiscal discipline, which has helped to maintain price stability and promote economic growth. From 1995-2000, Kenya's inflation rate was relatively high, averaging around 20-25% per annum. However, the period from 1995-2000 also saw some positive developments in the Kenyan economy, including the establishment of a new constitution and the implementation of economic reforms aimed at promoting investment and economic growth.

Since 2000, Kenya's inflation rate has improved significantly, averaging around 5-10% per annum. The country has also experienced rapid economic growth, driven by increased investment in infrastructure and other sectors, as well as a growing services sector. From 2001-2020, Kenya's inflation rate has improved significantly, averaging around 5-10% per annum. From 2020-2023, Kenya's inflation rate has remained relatively low, averaging around 5-10% per annum.

From 1995-2000, Ghana's inflation rate was relatively high, averaging around 20-25% per annum. This was due to a combination of factors, including high levels of government spending, a decline in the value of the Ghanaian cedi, and increased demand for goods and services. However, the period from 1995-2000 also saw some positive developments in the Ghanaian economy, including the establishment of a new constitution and the implementation of economic reforms aimed at promoting investment and economic growth. Since 2000, Ghana's inflation rate has improved significantly, averaging around 5-10% per annum. The country has also experienced rapid economic growth, driven by increased investment in infrastructure and other sectors, as well as a growing services sector. From 2001-2020, Ghana's inflation rate has improved significantly, averaging around 5-10% per annum.

From 2020-2023, Ghana's inflation rate has remained relatively low, averaging around 5-10% per annum. This means that the general price level of goods and services in Ghana has increased by a moderate amount during this period, but at a slower rate than in previous years.

From 1995-2000, Nigeria's inflation rate was relatively high, averaging around 20-25% per annum. However, the period from 1995-2000 also saw some positive developments in the Nigerian economy, including the establishment of a new constitution and the implementation of economic reforms aimed at promoting investment and economic growth. Since 2000, Nigeria's inflation rate has improved significantly, averaging around 5-10% per annum. From 2001-2020, Nigeria's inflation rate has improved significantly, averaging around 5-10% per annum. This has been achieved through a combination of sound monetary policy and fiscal discipline, which has helped to maintain price stability and promote economic growth. From 2020-2023, Nigeria's inflation rate has been increasing. This means that the general price level of goods and services in Nigeria has increased hence affecting the economy.

Nevertheless, the Sub-Saharan African region has witnessed a notable surge in the utilization of domestic debt instruments as a primary means of financing government expenditures and stimulating economic growth. However, amidst this trend, concerns arise regarding the potential implications of domestic debt on price stability and overall economic performance within the region. The nexus between domestic debt and inflation in Sub-Saharan countries presents a multifaceted problem that warrants thorough investigation and analysis.

The relationship between domestic debt and inflation remains poorly understood within the Sub-Saharan African context. The impact of domestic debt expansion on inflationary pressures, other macroeconomic variables, and overall price stability mechanisms requires comprehensive empirical analysis. Fluctuations in domestic debt levels may exert inflationary pressures through increased money supply or fiscal dominance effects, thereby undermining central bank efforts to maintain price stability. Moreover, the interaction between domestic debt dynamics and exchange rate movements can introduce additional complexities, particularly in economies characterized by high levels of external indebtedness or limited exchange rate flexibility.

This study aims to elucidate the intricate relationship between domestic debt and inflation in Nigeria, Ghana, Angola, South Africa and Kenya countries, spanning the period from 1995 to 2023. It seeks to unravel the nuanced relationships underlying these variables. Specifically, the research endeavors to discern both the long and short run effects of domestic debt on inflation in Nigeria, Ghana, Angola, South Africa and Kenya countries. By understanding the relationship between domestic debt and inflation is crucial for informing evidence-based policymaking in Sub-Saharan African countries. By elucidating the channels through which domestic debt influences inflationary pressures, exchange rate movements, and overall price stability mechanisms, policymakers can formulate more effective monetary and fiscal policies to mitigate inflationary risks, stabilize exchange rates,

and promote macroeconomic stability. Aside from this introductory section, Section 2 examines Theoretical and Related Empirical Literature, followed by Section 3, which outlines the Research Methodology. Section 4 presents the findings, while Section 5 encapsulates the Summary, Conclusions, and Recommendations.

II. Literature Review

Theoretical Literature

Domestic Theory

Classical theory: According to the Classicalists, extensive public borrowing substantially depletes savings and consequently diminishes a nation's capacity for investment. They vehemently opposed government fiscal deficits, contending that the resultant accumulation of debt is inherently harmful to the economy, even if all borrowings are sourced domestically. In their view, the government's efforts to repay the debt would entail increased taxation, triggering domestic capital flight, currency depreciation, and a slowdown in domestic production. This, they argued, occurs because resources are diverted from private sector development to non-productive activities, thereby exerting an adverse impact on economic growth.

The Classicalists maintained that the cycle of government borrowing and subsequent debt repayment fosters a vicious circle, wherein increased taxation stifles private investment, dampening economic activity and growth prospects. They emphasized the importance of prudent fiscal management and advocated for policies that prioritize fiscal discipline and debt reduction to safeguard against the deleterious effects of excessive public borrowing on long-term economic stability and prosperity.

Inflation Theory

The Quantity Theory of money or monetary theory of inflation **or m**

Proponents of the quantity theory of money are John Locke, David Hume, Irving Fisher and Alfred Marshall. Milton Friedman made a restatement of the theory in 1956 and made it into a cornerstone of monetarist thinking. The theory states that the general price level of goods and services is directly proportional to the amount of money in circulation (that is., the money supply), and that the causality runs from money to prices.

The theory is often stated in terms of the equation

$$MV = PY$$

Equation 2.1

where M is the money supply, V is the velocity of money, and PY is the nominal value of output or nominal GDP (P itself being a price index and Y the amount of real output). This equation is known as the quantity equation or the equation of exchange and is itself uncontroversial, as it can be seen as an accounting identity, residually defining velocity as the ratio of nominal output to the supply of money. Assuming additionally that Y is exogenous, being independently determined by other factors, that V is constant, and that M is exogenous and under the control of the central bank, the equation is turned into a theory which says that inflation (the change in P over time) can be controlled by setting the growth rate of M. However, all three assumptions are arguable and have been challenged over time. Output is generally believed to be affected by monetary policy at least temporarily, velocity has historically changed in unanticipated ways because of shifts in the money demand function, and some economists believe the money supply to be endogenously determined and hence not controlled by the monetary authorities.

Empirical Literature

Given the complex nature of the relationship between domestic debt and inflation, the literature that attempted to capture its essence, especially, empirical literature in sub-Saharan African countries, are scanty as most studies have largely focused on economic growth and mostly in developed countries. Hence few studies have been captured on the research problem which include:

(i) Nigeria

Bildirici and Ersin (2007), Islam and Kabir (2012), Odior and Arinze (2017), Iwedi (2020), Marshal (2020), Muhammad *et al.*, (2021).

(ii) Ghana

David and Emmanuel (2017). Ackah (2023).

(iii) Angola

Lopes da Veiga *et al.*, (2014) .

(iv) South Africa

Sangweni and Ngalawa, (2023)

(v) Kenya

Swamy (2015) and Kwon *et al.*, (2009)

III. Research Methodology

Research Design

This study is empirical in nature, using mainly secondary data. Therefore, an Ex-Post Facto design. This design was adopted because the study intends to use already established secondary data for the study. According to Salkind (2010), —Ex post facto study or after-the-fact research is a category of research design in which the investigation starts after the fact has occurred without interference from the researcher. Thus, the data for the study were collected from the official publication World Bank – World Development Indicators (WDI). The data were adopted for the estimation using basic mathematical, statistical and econometric tools, while sufficiently relying on relevant economic theories for reliable outcomes.

Population of the Study

The study focused on time series data for the period of 28 years and 140 observations on selected sub-Saharan Africa. Sub-Saharan Africa is made up of 48 countries, however, due to data unavailability, we were constrained to five countries, two from west Africa and one each from East Africa, Central Africa and the Southern Africa Republic. Furthermore, these countries were selected based on being oil producing countries, and natural resources.

Sample and Sampling Techniques

A purposive sampling technique was adopted to select two countries from one sub region and one (1) country each from the other three (3) regions of the SSAs. Thus, samples of five countries were used for the study.

Model Specification

To the best of our knowledge, there seems to be paucity literature that have developed a model that addresses domestic debt and inflation rate. However, the model specified in this study is based on the theoretical framework of this study. This study is primarily based on monetarist theory.

$$\text{Inflation rate} = \beta_0 + \beta_1 \cdot \text{Domestic Debt}_i + \beta_2 \cdot \text{Unemployment}_i + \beta_3 \cdot \text{Fiscal Deficit}_i + \beta_4 \cdot \text{Exchange Rate}_i + \beta_5 \cdot \text{Money Supply}_i + \beta_6 \cdot \text{Interest Rate}_i + u_i \quad \text{Equation 3.1}$$

$$\text{INF}_{it} = \alpha_0 + \alpha_1 \text{DD}_{it} + \alpha_2 \text{UNEMP}_{it} + \alpha_3 \text{FD}_{it} + \alpha_4 \text{EXR}_{it} + \alpha_5 \text{MS}_{it} + \alpha_6 \text{INTR}_{it} + u_{it} \quad \text{Equation 3.2}$$

Where:

INF_{it} : *Inflation Rate* is the dependent variable representing price stability at time t, period i.

DD_{it} *Domestic Debt* represents the level of domestic debt in period i.

UNEMP_{it} *Unemployment* represents the unemployment rate in period i.

FD_{it} *Fiscal Deficit* represents the fiscal deficit as a percentage of GDP in period i.

EXR_{it} *Exchange Rate* represents the exchange rate in period i.

MS_{it} *Money Supply* represents the money supply in period i.

INTR_{it} *Interest Rate* represents the interest rate in period i.

α_0 is the intercept term.

α_1 to α_6 are the coefficients of the independent variables.

This model allows us to analyze the impact of domestic debt and other important macroeconomic variables on inflation rate in selected Sub- Saharan countries. By estimating the coefficients (α_1 to α_6), we can assess the magnitude and significance of each variable's effect on economic growth while controlling for other factors.

Analytical technique

The analytical techniques employed for the purpose of this study is based on the specific objectives of the study. The study adopted the panel autoregressive distributed lag (ARDL) model. As noted by Muchapondwa and Pamhidzai (2011) emphasized the panel ARDL model as a new cointegration procedure. This is because, the panel ADRL model allows for the estimation of both the short-run and long-run relationships between the variables.

One of the major advantages of the panel ARDL approach is that it accommodates a different number of lags on each variable. The panel ARDL model, can be reliably used on short sample periods. In fact, Pesaran and Shin (1998) illustrate that even if the sample size is small, the long-run parameters are super-consistent while the short run parameters are \sqrt{T} consistent. Thus, equations (3.1 and 3.2) are formulated into a panel ARDL ($p, q1, q2, q3, q4, q5, q6$) equation where p represents the lags of the dependent variable and q represents the lags of the independent variables. The panel ARDL equation is represented as follows:

$$Y_{i,t} = a_i + \sum_{j=1}^p a_{1,ij} Y_{i,t-j} + \sum_{j=0}^{q1} a_{2,ij} dd_{t-j} + \sum_{j=0}^{q2} a_{3,ij} uemp_{t-j} + \sum_{j=0}^{q3} a_{4,ij} fd_{t-j} + \sum_{j=0}^{q4} a_{5,ij} exch_{t-j} + \sum_{j=0}^{q5} a_{6,ij} ms_{t-j} + \sum_{j=0}^{q6} a_{7,ij} intr_{t-j} + e_{it}$$

Equation 3.3

where $i = 1, 2, 3, \dots, N$ and $t = 1, 2, 3, \dots, T$, a_i represents the fixed effects, $a_1 - a_7$ is the lagged coefficients of the independent variables and the regressors and e_{it} is the error term which is assumed to be white noise and varies across countries and time. In a panel error correction (ECM) representation equation (3.3) is formulated as follows:

$$\Delta Y_{i,t} = a_i + \sum_{j=1}^p a_{1,ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q1} a_{2,ij} \Delta dd_{t-j} + \sum_{j=0}^{q2} a_{3,ij} \Delta uemp_{t-j} + \sum_{j=0}^{q3} a_{4,ij} \Delta fd_{t-j} + \sum_{j=0}^{q4} a_{5,ij} \Delta exch_{t-j} + \sum_{j=0}^{q5} a_{6,ij} \Delta ms_{t-j} + \sum_{j=0}^{q6} a_{3,ij} \Delta intr_{t-j} + \beta_1 i j Y_{i,t-1} + \beta_2 i j ddi_{t-1} + \beta_3 i j uempi_{t-1} + \beta_4 i j fdi_{t-1} + \beta_5 i j exchi_{t-1} + \beta_6 i j msi_{t-1} + \beta_7 i j intri_{t-1}$$

Equation 3.4

where Δ is the first difference of variables. Also, $a_1 - a_5$ are the short-run coefficients while $\beta_1 - \beta_5$ are the long-run coefficients. To estimate the short-run relationship, the short-term impact of debt on growth and price stability proxied by inflation is calculated by

$$\frac{\sum_{j=1}^{q1} a_{2,ij}}{1 - \sum_{j=0}^p a_{1,ij}}$$

Equation 3.5

for significant coefficients. Once, a long-run relationship is established between the dependent variables and the regressors, the panel ECM model (equation (3.3) can be expressed as follows:

$$\Delta Y_{i,t} = a_i + \sum_{j=1}^p a_{1,ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q1} a_{2,ij} \Delta dd_{t-j} + \sum_{j=0}^{q2} a_{3,ij} \Delta uemp_{t-j} + \sum_{j=0}^{q3} a_{4,ij} \Delta fd_{t-j} + \sum_{j=0}^{q4} a_{5,ij} \Delta exch_{t-j} + \sum_{j=0}^{q5} a_{6,ij} \Delta ms_{t-j} + \sum_{j=0}^{q6} a_{3,ij} \Delta intr_{t-j} + \theta i ECM_{i,t-1} + e_{it}$$

Equation 3.6

Where θ represents the coefficient of the ECM which measures the speed of adjustment that is made every year towards long-run equilibrium.

IV. Analysis Of Results

Data Presentation and Analysis

This study examines the relationship between domestic debt and inflation in selected sub-Saharan countries, amongst other issues. We began our empirical assessment with some preliminary checks beginning with the descriptive statistics and the pairwise correlation matrix. The outcomes are reported in the tables below.

Table 1: Descriptive Statistics for Pooled Countries

	GDP	DD	EXCH	FD	INF	INTR	MS	UEMP
Mean	4.27	18.82	89.54	400.13	51.77	21.42	34.82	10.32
Median	4.20	9.50	68.25	4.24	10.96	16.45	32.45	5.73
Maximum	15.33	138.71	638.70	6404.70	4145.11	217.88	87.76	28.84
Minimum	-5.96	1.10	0.13	-861.40	-50.35	3.71	-0.79	2.17
Std. Dev.	3.59	24.28	128.03	1214.63	351.19	24.15	17.42	7.73
Skewness	0.57	2.20	2.46	3.34	11.44	5.06	0.67	0.62
Kurtosis	4.58	8.57	9.40	13.81	133.74	35.39	3.17	1.95
Jarque-Bera	22.33	281.35	380.80	914.64	102764.90	6714.97	10.69	15.45
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	597.77	2522.10	12535.81	54417.56	7247.73	2998.75	4874.21	1444.50
Sum Sq. Dev.	1787.89	78431.90	2278505.00	199000000.00	17143157.00	81078.75	42165.72	8296.65
Observations	140.00	134.00	140.00	136.00	140.00	140.00	140.00	140.00

Source: Computed by the researcher

Table 1 shows the descriptive statistics showed a mean of 4.27 and median 4.20 for gross domestic product. Also, it showed a mean of 18.82 and median of 9.50 for domestic debt and a mean of 51.77 and median of 10.96 for inflation. Moreover, the statistics also showed that the data for exchange rate, fiscal deficit, interest rate and money supply are leptokurtic distribution because the kurtosis value is greater than three indicating a positive kurtosis, though positively and insignificantly skewed. This indicates a flatter than normal distribution and the variable has large tail. That is, it has longer and fatter tail, and its central peak higher and sharper. Moreover, the statistics also showed that the data for unemployment rate was platykurtic relative to normal, since their values for kurtosis is approximately less than 3. This suggests that the variables have short and thin tails, and their central peaks are lower and broader.

Table 2 Correlation Matrix for Pooled Countries

	DD	INF	GDP	INTR	FD	EXCH	MS	UEMP
DD	1.00	-0.06	-0.22	-0.15	-0.10	0.44	-0.06	0.05
INF	-0.06	1.00	0.23	0.75	-0.04	-0.07	-0.07	0.09
GDP	-0.22	0.23	1.00	0.29	0.16	-0.23	-0.30	-0.16
INTR	-0.15	0.75	0.29	1.00	-0.06	-0.09	-0.26	0.14
FD	-0.10	-0.04	0.16	-0.06	1.00	0.15	-0.20	-0.27
EXCH	0.44	-0.07	-0.23	-0.09	0.15	1.00	-0.31	-0.14
MS	-0.06	-0.07	-0.30	-0.26	-0.20	-0.31	1.00	0.53
UEMP	0.05	0.09	-0.16	0.14	-0.27	-0.14	0.53	1.00

Source: Computed by the researcher

Also, the correlation matrix showed that domestic debt correlated negatively with inflation rate, economic growth, interest rate and money supply.

On the other hand, the unit roots analyses for the two test statistics used – Levin, Lin and Chut and Im, Pesaran and Shin W-stat – showed similar outcomes with each other. The Im, Pesaran and Shin W-stat results showed stationarity at first difference I(1) only, except for GDP, exchange rate, money supply and inflation rate that were stationary at level I(0).

These outcomes further validated the use of Panel Autoregressive Distributed Lag (ARDL) cointegration technique in analyzing the data used for this study. The level of integration showed by the statistical significance further enhanced the level of certainty in the prediction that Panel Autoregressive Distributed Lag would yield reliable results from the analyses of the data used for this study.

Table 3 Cross-sectional dependence result

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	27.86045	10	0.0019
Pesaran scaled LM	2.875683		0.0040
Bias-corrected scaled LM	2.783091		0.0054
Pesaran CD	-3.989541		0.0001

Source: Computed by the researcher

Next was to check for cross-section dependence between the variables in the model through second-generation unit root tests. The purpose of a cross-sectional dependence (CSD) test in panel regression is to determine whether the residuals from a panel regression model exhibit cross-sectional dependence, meaning that the errors for one unit (e.g., country, firm, individual) are correlated with the errors of other units in the sample. Panel regression assumes independence across units, but in many cases, units may be correlated due to common shocks, spatial relationships, or other factors. If left unaddressed, CSD can lead to: inaccurate inference: standard errors may be biased, leading to incorrect conclusions about the significance of coefficients and inefficient estimation: Estimators may not be optimal, resulting in reduced precision. By testing for CSD, the study intends to: identify potential issues with the model and data and choose appropriate methods to account for CSD.

Therefore, the CD test, presented in the Table 3, shows that there is evidence of cross-dependence between the variables as the null hypothesis of no cross-dependence is strongly rejected. Hence, the unit root test in the Appendix 4 concluded that the variables are stationary at level and first difference. Therefore, they can be used to estimate an ARDL model. Given the strong support of the stationarity in all the variables, the second stage of the analysis is to test for cointegration between the dependent variable and the regressors.

The Johansen Fisher Panel Cointegration Test was used to test the hypothesis of no cointegration. The cointegration test presented in the Appendix 5 strongly reject the null hypothesis of no cointegration. Thus, there is evidence of a long-run relationship between the dependent and the explanatory variables. This suggests that an estimation of equation (3.5 and 3.7) will provide reliable short- and long-run results.

Table 4: ARDL long-run and error correction estimates on the effects of domestic debt and inflation rate

Dependent Variable: Inflation	
Regressors	Coefficient and prob Level
Coefficient	
Domestic debt	-0.029056 (0.2315)
Unemployment Rate	-0.016050(0.0571)
Fiscal deficit	3.546175(0.0001)
Exchange rate	-0.006260 (0.1911)
Money supply	-0.047382 (0.0780)
Interest rate	0.429399 (0.0001)
Error Correction Estimates	
Δ Domestic debt	-0.937545 (0.0487)
Δ Unemployment Rate	-19.71292 (0.2714)
Δ Fiscal deficit	1.072817 (0.0573)
Δ Exchange rate	2.134832 (0.4460)
Δ Money supply	0.375766(0.3958)
Δ Interest rate	1.414413 (0.4011)
ECM (-1)	-0.627047(0.0000)
R- square	0.628856
D.W	1.625627

Source: Computed by the researcher

As shown in the Table 5.7, the coefficient of domestic debt exhibits a long run relationship with inflation. This implies that a one percent increase in inflation will lead to a 0.02 percent decrease in domestic debt, though statistically insignificant. This is in consonance with the findings of Urungbodi and Odhiambo (2020). The result implies that in the long run, if domestic debt is not driving inflation, it could indicate that the central bank or government has effective control over inflation, possibly through strong monetary policies or other mechanisms that keep inflation in check despite increasing domestic debt.

Also, unemployment aligned with the apriori expectation; the result showed that a percentage increase in inflation will reduce unemployment rate of the selected sub-Saharan countries by about 0.01 percent and was significant at 5 percent level. This would mean that, there is a long-run inverse relationship between unemployment and inflation. As unemployment rate falls, the rate of inflation tends to rise, and vice versa. This relationship is based on the idea that when the labor market is tight, with low unemployment rates, workers have more bargaining power to demand higher wages. These higher wages, in turn can lead to increased production costs for businesses, which can then result in higher prices and inflation. Conversely, when the unemployment rate is high, workers have less bargaining power and wages tend to be lower. This can lead to lower production costs for businesses, which can then result in lower prices and deflation. In the same vein, *ceteris paribus*, a percent rise in the level of inflation will lead to a 3.54 increase in fiscal deficit This outcome agrees with *apriori* expectation. This implies that an increase in fiscal deficit can lead to an increase in inflation. This is because fiscal deficit represents the government’s borrowing, which can stimulate economic activity through increased spending. when the government spends more than it collects in taxes, it injects more money into the economy, which can lead to excess demand and ultimately, inflation. Furthermore, exchange rate reflected a negative and insignificant relationship with inflation, indicating that in the long-run a percent increase in inflation will lead to a 0.006 percent decrease in exchange rate. This implies that, a depreciation of the currency can help reduce inflation by making a country’s exports cheaper and more competitive in the global market, which can stimulate economic growth and reduce inflation pressure; *ceteris paribus*. Additionally, interest rate result showed that a percentage increase in inflation will lead to 0.42 percent increase in interest rate. This indicate the presence of cost-push inflation, where higher interest rates lead to increased production costs. For example, when borrowing costs rises, businesses face higher financing costs, which they may pass on to consumers in the form of higher prices. Similarly, higher interest rates could raise the cost of raw materials if financing for imports or production becomes more expensive, leading to inflationary pressures. Also, money supply result showed that a percentage increase in inflation will lead to 0.04 percent decrease in money supply in the long run.

Furthermore, as shown in the Table 5 above, the result showed in the short run estimation, domestic debt showed about 0.93 percent, though statistically significant. The implication is that a negative domestic debt in the short run implies that if the government borrows more domestically (increasing domestic debt), it could finance government spending without immediately increasing the money supply. If this borrowing does not result in monetary expansion (that, the central bank does not print money to finance the debt), it might not lead to inflationary pressures right away. Instead, higher government spending can boost aggregate demand, but the absence of an immediate increase in the money supply might dampen inflationary effects.

Also, the inverse relationship between unemployment and inflation depicts the Phillips Curve; When unemployment is low (indicating a tight labor market), wages tend to rise as firms compete for scarce labor. Higher wages lead to increased costs for businesses, which they often pass on to consumers in the form of higher

prices (inflation). Additionally, fiscal deficit, interest rate, money supply and exchange rate showed a positive estimation tune of about 0.306, 2.69, 0.04 and 0.389, respectively. The implication of the positive relationship between exchange rate and inflation is in line with the purchasing power parity theory. However, in the short run, for instance if any of the selected sub- Saharan African countries experiences a sudden increase in inflation, it may lead to a depreciation in the country's monetary policy. This depreciation can lead to an increase in import prices, which can further increase inflation. Similarly, the insignificant nature of money supply and inflation can be expounding further with the New Keynesian theory. The New Keynesian theory sheds light on that money supply and inflation might be insignificant in the short run due to some factors such as price stickiness, expectations management, supply shocks, and the transmission lags of monetary policy that can dampen the short-term responsiveness of inflation to changes in the money supply. In the same vein the implication of the insignificant relationship between interest rate and inflation can be explained using the Expectations-Augmented Phillips Curve. Although the short run fluctuation of inflation can attenuate interest rate as economic agents' expectations about future inflation, alongside supply-side shocks and policy transmission lags, can dampen the short-term responsiveness of inflation to changes in interest rates.

Other vitals reported in Table 4 are the post-estimation statistics. For example, the adjusted coefficient of determination (R^2) reflected a good fit for the model, showing that 62 percent, of the changes in the domestic debt of selected sub-Saharan countries are jointly explained by the variables in the model.

More so, Durbin-Watson statistic for the model were free from serial correlation. This indicates that there is no autocorrelation and that the model is well-specified.

V. Summary, Conclusion And Recommendation

This study investigated the relationship between domestic debt and inflation in selected sub-Saharan African countries using annual data spanning the period of 1995-2023. Specifically, the study sought to: analyze the long and short run effects of domestic debt on inflation in selected sub-Saharan African countries. Apart from the use of some pre-analysis test statistics like the Levin, Lin and Chu t^* and Im, Pesaran and Shin W-stat tests to assess the panel series properties of the variables, Panel ARDL was used to estimate the model as formulated in the work in tandem with the research objective and the related research question the findings from the study were meant to address. The study has revealed that there exists a negative relationship between domestic debt and inflation both in the long run and short run in the selected sub-Saharan African countries.

It is pertinent to note that given the evidences on the relationship between domestic debt and inflation in the selected Sub-Saharan African countries, domestic debt plays a crucial role in the general level of prices and price stability in countries in Sub-Sahara Africa. As such, it is necessary that researchers in related disciplines embark on research activities to further investigate the optimal levels of domestic debt. Indeed, determining the threshold level of domestic debts on inflation is an imperative for a deeper understanding of the domestic debt-inflation nexus.

This study concludes that it is expedient for the government of the selected sub-Saharan African countries to ensure that the increase in domestic debt must be associated with effective fiscal policies that can help stabilize prices.

Recommendations

Following the study's findings on the interaction between domestic debt and inflation in the selected sub-Saharan African countries the following specific recommendations are proposed for policy implementation:

- (1) Fiscal Discipline and Structural Reforms: Given the negative relationship between domestic debt and inflation observed in the study, governments in selected Sub-Saharan African countries should prioritize fiscal discipline to mitigate inflationary pressures. This includes:
 - i. Maintaining a Balanced Budget: Aim for a balanced or sustainable fiscal deficit to avoid excessive borrowing.
 - ii. Implementing Structural Reforms: Focus on reforms that enhance productivity and economic efficiency. Specific actions include:
 - a. investing in Infrastructure: Develop transport networks, energy systems, and telecommunications to improve economic efficiency.
 - b. enhancing education and technology: Invest in educational programs and technological advancements to boost productivity and innovation.
- (2) Effective Debt Management and Coordination: To minimize the inflationary impact of domestic debt in the long run:
 - a. Refinancing Debt: Seek to refinance existing debt at lower interest rates or extend maturities to alleviate immediate repayment pressures.
 - b. Central Bank and Fiscal Authority Coordination: Ensure central banks and fiscal authorities work together to align monetary and fiscal policies. This coordination helps manage inflation expectations and stabilize the economy.

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