

Public Debt, Debt Servicing and Economic Growth

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Abstract

Purpose: This paper aims to investigate the relationship between Ghana's external debt level, debt servicing, and economic growth, considering the context of Sub-Saharan Africa's ongoing struggle with managing substantial external debt. Additionally, the effects of the Structural Adjustment/Economic Recovery Program (SAP/ERP) of 1983 on economic growth are examined.

Design/Methodology/Approach: The study utilizes time series data from 1975 to 2021 to analyze Ghana's external debt dynamics and its impact on economic growth. The research employs the Augmented Dickey-Fuller test, PP test, and Autoregressive Distributed Lag (ARDL) regression method for analysis.

Findings: The findings reveal a weak negative association between Ghana's external debt stock to GDP ratio and savings as a percentage of GDP, alongside GDP per capita. Furthermore, the study identifies a positive yet statistically insignificant relationship between debt service and economic growth. Additionally, the model illustrates the substantial effects of the SAP/ERP of 1983 on the country's economic performance.

Originality: This study adds empirical evidence on the link between external debt, debt servicing, and economic growth in Ghana, focusing on the SAP/ERP context. Using robust statistical methods and a comprehensive time series dataset, it sheds light on managing external debt in low-income countries, enhancing understanding of economic challenges in Sub-Saharan Africa.

Keywords: Public debt, Debt servicing, External debt, Economic growth

Introduction

Public debt's impact on economic growth is a central topic in economics and policymaking. Governments often resort to borrowing to fund public spending, stimulate development, and address budget deficits. However, high levels of public debt, especially coupled with substantial debt servicing costs, can profoundly affect a nation's economic health. Reinhart and Rogoff (2011) highlight how widening current account deficits and debt servicing needs hinder sustainable development, leading to decreased growth, increased inflation, and reduced foreign investment, hindering progress towards development goals. Joy and Panda (2021) caution against excessive borrowing without prudent investment plans, which can lead to burdensome debt loads and interest payments, stifling economic activity. Debt servicing, encompassing interest and principal payments, can either boost or impede economic progress. As countries face increased expenditures and reduced capital inflows due to global economic crises, borrowing becomes more appealing (Ogbonna et al., 2019). However, excessive debt servicing can crowd out vital public investments, hampering long-term growth in infrastructure, education, and healthcare.

The neoclassical growth model, as proposed by Madow et al. (2021), justifies government borrowing to accumulate capital and increase output per capita, ultimately improving overall welfare. Yet, high debt servicing costs extend beyond government finances, impacting investor and consumer confidence and potentially dampening private investment and economic growth, even leading to financial instability.

Objective of the study

This paper aims to examine the relationship between public debt and economic growth in Ghana, focusing on debt servicing's pivotal role. Additionally, this paper explores the impact of the Structural Adjustment/Economic Recovery Program (SAP/ERP) on economic growth, an aspect often overlooked by researchers.

Method

The research employs the Augmented Dickey-Fuller test, PP test, and Autoregressive Distributed Lag (ARDL) regression method for analysis utilizing time series data from 1975 to 2021

Significance of the study

In the realm of economic policymaking, few issues resonate as profoundly as the complex interplay between public debt dynamics, economic growth trajectories, and the overarching impact of structural adjustment programs. For Ghana, a nation with a rich tapestry of economic reforms and developmental aspirations, delving into these intertwined dynamics holds immense significance. At the heart of this inquiry lies a fundamental quest to understand the nuanced relationship between public debt and economic growth, with a keen focus on debt servicing's pivotal role. As Ghana grapples with the imperative to finance development initiatives while maintaining fiscal prudence, unravelling the mechanisms through which public debt influences macroeconomic outcomes becomes paramount. Moreover, amidst Ghana's economic landscape lies a critical yet often overlooked aspect—the impact of Structural Adjustment/Economic Recovery Programs (SAP/ERP) on economic growth. These programs, often implemented in response to economic crises, carry profound implications for growth trajectories, structural reforms, and social welfare. However, the nuanced effects of SAP/ERP on Ghana's economic landscape remain underexplored, presenting a compelling avenue for inquiry.

Motivation of the study

the motivation underlying this research endeavour is twofold: first, to elucidate the dynamic interplay between public debt and economic growth in Ghana, with a specific emphasis on the role of debt servicing; and second, to shed light on the impact of SAP/ERP on economic growth dynamics, filling a crucial gap in the existing literature. By undertaking this inquiry, we aim to provide policymakers, scholars, and practitioners with actionable insights essential for charting a course towards sustainable economic development and resilience in Ghana.

Contribution

The investigation into the impact of Structural Adjustment/Economic Recovery Programs (SAP/ERP) on Ghana's economic growth represents a significant contribution, addressing a notable gap in the literature. By examining the effects of these programs on growth, the research will provide a comprehensive understanding of the broader implications of SAP/ERP implementation in Ghana, thereby enriching the

discourse on economic policy reforms in the region.

Literature Review

The influence of debt servicing extends across various economic sectors, capturing the interest of numerous academics and prompting numerous research endeavours. Empirical studies like Baba (2020), Musonda (2020), Saungweme and Odhiambo (2020b), Ibori and Akroh (2022), Otiko and Iheonkhan (2022), Salman and Ali (2022) have conducted studies to investigate this phenomenon.

Debt Servicing and Economic Growth

Baba (2020) examined the impact of foreign debt repayment on economic growth from 1965 to 2017. Employing an explanatory research approach, data from the World Bank, IMF, Central Bank of Kenya, and Kenya Bureau of Statistics were analyzed using EVIEWS version 7.2. Findings reveal a significant negative correlation between debt servicing and economic growth. This underscores the economic strain due to substantial government expenditure on debt servicing. The study underscores the importance of prudent fiscal management to curb escalating public debt levels.

Musonda (2020) analyzed the impact of public debt and debt payments on economic growth in emerging and developing economies. Multiple linear regression was used by the researcher to analyze the impact on growth. According to the findings of the study, which used the ANOVA test to analyze the variables, the independent factors have a significant impact on the economic growth of the nation. The findings of the multiple linear regression indicated that investment and saving positively affect economic growth, but public debt negatively affects economic growth.

Saungweme and Odhiambo (2020) explored Zambia's economic growth in relation to government debt repayment from 1970 to 2017. Employing autoregressive distributed lag (ARDL) bounds analysis, the study revealed a dynamic impact of debt servicing on economic growth. Short-term effects were negative, while long-term effects were neutral. This suggests debt servicing could hinder public investment. The study advocates for active fiscal consolidation by the Zambian government to prevent excessive budget overruns and reliance on new debt, emphasizing continual enhancement of debt management strategies to ensure a smoother debt redemption profile.

Saungweme and Odhiambo (2021) examined the effect of public debt servicing on South Africa's economic growth using time series data from 1970 to 2017. Employing autoregressive distributed lag analysis, they found no statistically significant relationship between debt payment and economic growth, whether in the short or long term. This suggests that if South Africa's economic growth remains robust, the government may manage debt servicing without substantial adverse impacts on overall growth.

Ibori and Akroh (2022) explored Nigeria's state debt and its impact on economic development using time series data from 1981 to 2017 sourced from the World Development Indicators (WDI). Employing the Autoregressive Distributed Lag (ARDL) method, the study revealed a steady increase in Nigeria's debt accumulation over time. While debt servicing doesn't appear to directly impede economic development, it does influence private investment. Perceptions of the government's debt management affect investor confidence and interest rates. The study suggests directing foreign debt towards profitable ventures to stimulate private investment and economic growth.

Awan and Qasim (2020) explored Pakistan's economic development in light of its foreign debt using time series data spanning 1980 to 2017 from various sources. The study assessed multiple variables including GDP, external debt, population growth, imports, exports, and capital creation. Employing ADF unit root test, Bound Test, ARDL Model, and Error Correction Model, findings revealed a negative impact of debt

payments, imports, foreign debt, and population on economic growth. This underscores the challenge of high debt servicing costs, limiting fiscal flexibility. Policy recommendations emphasize reducing reliance on external borrowing and prioritizing resource accumulation through tax revenue, export expansion, and productivity enhancement.

Muhammad and Abdullahi (2020) employed the Autoregressive Distributed Lag (ARDL) model to assess the influence of foreign loan repayments on Nigeria's economic growth using data from 1985 to 2018. Their analysis revealed a negative long-term impact, suggesting that increased foreign debt payments hinder economic development. This highlights the importance of aligning debt service with debt stock and utilizing borrowed funds for infrastructure development to mitigate adverse effects on economic growth. Nath (2020) investigated the relationship between debt service, exports, and GDP from 1970 to 2018. Analyzing these variables with cointegration, error correction, and Granger causality tests, the study found a positive and statistically significant long-term association between debt service and GDP. Moreover, exports and debt payments positively influenced GDP. Notably, the analysis highlighted that efficient debt servicing enhances government credibility, potentially leading to improved credit ratings, reduced credit risk premiums, and better access to international financial markets for borrowing.

External Debt and Economic Growth

Dey and Tareque (2020) investigated the influence of foreign debt on Bangladesh's economic growth using data spanning 1980 to 2017. Employing autoregressive distributed lag (ARDL) bounds testing to assess cointegration, the study scrutinized the relationship between debt and GDP, revealing a negative impact of external debt on economic growth. This suggests that Bangladesh's government may face higher borrowing costs due to negative external debt, potentially impeding access to financing for projects or refinancing existing debt.

Egbo and Ajibo (2020) examined Nigeria's foreign borrowing impact on economic growth from 2000 to 2017, using economic growth as the dependent variable and money supply and foreign debt as independent factors. Employing the Augmented Dickey-Fuller (ADF) unit root test and Johansen co-integration method, the study determined variables' stationarity and co-integration. Ordinary Least Square models were utilized for estimation, revealing a minor negative impact of foreign debt on economic growth. This underscores potential higher borrowing costs for the country, urging Nigeria to diversify funding sources to reduce reliance on foreign debt and stimulate economic development.

Getinet and Ersumo (2020) analyzed the influence of foreign debt on Ethiopian economic growth spanning 1983 to 2018. They utilized annual time series data and the Autoregressive Distributed Lag approach. Bound testing and Error Correction Model (ECM) gauged long-run cointegration and short-run dynamics. Dependent on GDP growth rate, independent variables encompassed foreign debt, debt service stock, trade openness, inflation, and state expenditures. Findings revealed significant negative impacts of foreign debt and debt service stock on both short- and long-term economic growth, underscoring potential crowding out of private-sector investment. The study emphasizes effective debt management to alleviate adverse effects on economic advancement.

Koyuncu and Demirhan (2020) investigated the correlation between Brazil's foreign debt and economic growth using annual time series data from 1970 to 2015. Independent variables included external debt to GDP, debt service stock to GDP, national spending to GDP, real exchange rate, and trade openness, with GDP representing economic growth. Employing the Autoregressive Distributed Lag (ARDL) bounds test, the study identified a long-term negative relationship between external debt and economic development.

This suggests that higher external debt burdens could render Brazil financially vulnerable, potentially impeding its ability to fulfill debt obligations.

Ajuh and Oyeau (2021) employed the vector autoregressive (VAR) method to scrutinize Nigeria's economic growth in relation to foreign debt from 1985 to 2018. Foreign debt and external debt service were independent variables, with GDP as the dependent variable. Findings revealed a significant negative impact of both foreign debt stock and external debt service on economic growth. This suggests a potential crowding out effect on private investment, hindering long-term growth. Effective debt utilization through strategic investment is recommended to mitigate excessive debt accumulation and foster economic development.

Ekor, Musa, and Damisah (2021) investigated Nigeria's foreign borrowing impact on economic growth, employing a dynamic version of the autoregressive distributed lag model. Their analysis revealed a long-term negative influence of foreign debt accumulation and repayment on Nigeria's economic growth. This suggests that increased debt servicing may divert funds from public investment, potentially impeding long-term growth and development. The study recommends government measures to curb foreign debt accumulation and urges the strategic utilization of borrowed funds for infrastructure development to mitigate adverse effects on economic growth.

Zafar, Zhilin, Chupradit, Nassani, Haffar, and Zia (2021) conducted empirical research to explore the interplay among foreign debt, economic development, human capital, and the tobacco industry. Focusing on Pakistan, the study aimed to assess the impact of foreign debt on economic development. Yearly time series data from 1981 to 2017 sourced from the World Bank's Global Development Indicators were analyzed using the Johansen co-integration test and vector error correction model. Results indicated a negative relationship between Pakistan's foreign debt and economic development, suggesting potential adverse effects on creditworthiness, access to external financing, and borrowing costs for the government. Mohsin, Ullah, Iqbal, Iqbal, and Taghizadeh (2021) investigated the relationship between foreign borrowing and economic growth in South Asia. Utilizing panel data from the World Bank Development Indicators covering 2000 to 2018, the study employed Ordinary Least Square (OLS), fixed effect, and Quantile regression methods. Analysis covered Bangladesh, Afghanistan, Bhutan, India, Pakistan, Nepal, Sri Lanka, and the Maldives. Results showed a mixed impact of external debt on economic growth, with foreign debt and debt payment affecting economic development by 39% and 31%, respectively. Moreover, gross capital creation and trade openness positively influenced economic growth. Threshold analysis suggested foreign debt as an impediment to economic development. The study recommends South Asian governments restrict foreign borrowing and enhance institutional quality to mitigate adverse impacts on economic development.

Makun (2021) scrutinized Fiji's foreign debt impact on economic growth using yearly time series data from 1980 to 2018. Employing the Autoregressive Distributed Lag (ARDL) model, the study revealed a negative long-term effect of linear foreign debt measures on economic growth. Nonlinear analysis indicated an uneven impact of external borrowing on development, with international debt exerting a greater detrimental effect than domestic debt as indebtedness rises. Threshold research highlighted that public debt hampers growth beyond a certain threshold, suggesting potential exchange rate instability and inflationary pressure. The study recommends government measures to eliminate wasteful spending and stabilize debt levels through enhanced fiscal management.

Dawood, Biqiong, Al-Asfour, and Nilofar (2021) investigated the impact of total foreign debt, state debt, and private external debt on economic growth in Asian emerging and transition countries from 1995 to

2019. Employing the fixed effect model to address cross-sectional dependence, heteroscedasticity, and autocorrelation, the study utilized robust estimators—feasible generalized least square estimator (FGLS) and Driscoll-Kraay standard error estimator (DSKE). Results revealed a significant positive effect of total foreign debt, while private international debt and governmental external debt negatively influenced economic growth. Recommendations include government focus on foreign commerce and investment, and raising awareness about saving habits.

Lakshmanasamy (2021) explored the connection between India's foreign debt and economic advancement using yearly time series data from 1980 to 2020. Employing the Error Correction Mechanism (ECM) estimate approach, the study evaluated external debt stock and payment as percentages of GDP and total foreign currency earnings, respectively. Results indicated a substantial positive long-term influence of foreign debt stock on economic development. However, external debt service showed a negative impact, potentially deterring private investment. Despite short-term disequilibrium, rapid resolution suggests positive prospects for India's foreign public debt management.

Evans (2022) explores the impact of inflation, unemployment, and foreign debt on economic development in Ghana. Using a time series of World Bank data from 1991 to 2021, GDP serves as the dependent variable, with external debt, inflation, and unemployment as independent factors. Stationarity, Johansen cointegration, and ordinary least square tests were employed. Findings indicate non-stationarity of foreign debt, GDP, and unemployment, with stable inflation. Cointegration reveals a positive long-term effect of foreign debt on economic growth, while inflation and unemployment negatively affect the economy. Utilizing external debt for social programs could enhance quality of life and foster sustainable economic growth.

Dauti and Voka (2022) empirically examined the relationship between economic development and foreign debt in Western Balkan (WB) nations, including Albania, Kosovo, North Macedonia, Bosnia and Herzegovina, Montenegro, and Serbia. Using panel data from 2000 to 2022, economic growth served as the dependent variable, with foreign debt as the independent variable and total investment, population growth, inflation, literacy rate, and trade openness as control variables. Employing Fixed Effect with Driscoll and Kraay standard errors, robust LSDV, and GMM estimates, the study revealed a growth-decreasing effect of external debt on countries like Albania, Kosovo, and North Macedonia, while showing a growth-enhancing impact on Bosnia and Herzegovina, Montenegro, and Serbia. The findings suggest that excessive borrowing may lead to macroeconomic imbalances, potentially undermining overall economic stability for these nations.

Zuhroh and Pristiva (2022) analyze the impact of foreign direct investment (FDI), exports, currency rate, and external debt on the economic development of South Asian nations using panel data from 2005 to 2019 sourced from the World Bank, Asian Development Bank, and UNCTAD STAT. Panel data regression analysis was employed to assess the influence of independent variables on economic development. Findings indicate significant positive contributions of exports and FDI to economic growth, while the exchange rate negatively affects growth. Notably, foreign debt exhibited a significant positive effect on economic growth, underscoring the importance of debt management in promoting economic development in South Asia.

Sandow, Oteng-Abayie, and Duodu (2022) examined the link between foreign debt and economic growth in 31 sub-Saharan African (SSA) nations from 2005 to 2017. They used external debt as the independent variable and economic growth as the dependent. The study also explored how variations in Public Sector Management (PSM) quality interacted with foreign debt to affect economic progress. Employing Panel

Smooth Transition Regression (PSTR) and System-generalized method of moment correlation (system-GMM), findings highlighted significant obstacles to SSA's economic advancement due to foreign debt, particularly without considering resource quality disparities. PSTR analysis revealed a nonlinear relationship between high foreign debt levels and economic development, identifying a 45% debt threshold for the region. Recommendations include enhancing public sector management efficiency and debt management capabilities.

Salman and Ali (2022) explored the nexus between economic growth and foreign debt using time series data from 1980 to 2020. Economic growth served as the dependent variable, with foreign debt, government development aid, and real interest rate as independent variables. The Error Correction Model facilitated analysis. Findings indicated an insignificant long-term relationship between foreign debt and economic progress, suggesting debt may address short-term instabilities rather than foster sustained economic growth over time.

Nwaobi, Okafor, and Ogbodo (2022) investigated the impact of public debt on Nigeria's economic development from 1990 to 2020 using period-specific time series data. Real gross domestic product represented economic growth, with domestic debt, foreign debt, exchange rate, inflation, and interest rate as independent variables. Employing an ex-post facto strategy and Ordinary Least Square (OLS) method, the study unveiled a significant positive correlation between foreign debt and economic growth. Moreover, it highlighted a one-way relationship between foreign debt and economic development, while domestic debt showed a substantial positive impact on economic growth. To avert potential debt entrapment, the report urged effective management of Nigeria's escalating debt profile.

John, Ukon, Okon, and Orok (2022) scrutinized the impact of foreign debt on Nigeria's economic development, employing time series data. Utilizing gross domestic product as a proxy for economic development, the study treated it as the dependent variable, while foreign debt and external debt servicing cost served as independent variables. Employing an ex-post facto research strategy alongside various Ordinary Least Square (OLS) techniques, findings indicated a minimal relationship between Nigeria's foreign debt and economic growth. Notably, the analysis underscored the significant influence of Nigeria's foreign debt repayment costs on economic growth. The study recommends prioritizing essential projects for external loan financing based on these findings.

Azretbergenova, Zhetibayev, and Yessymkhanova (2022) investigated the foreign debt and economic development relationship using BRIC nations as a case study. Employing panel data from 1990 to 2021 and panel cointegration methodology, the study utilized the panel cointegration test by Westerland (2007) to demonstrate long-term relationships. Additionally, the panel Fully Modified Ordinary Least Square (FMOLS) estimator was employed. Findings revealed a long-term relationship between foreign debt and economic progress in BRIC countries, with a regression coefficient of -0.1108. While China showed a positive relationship, Brazil, Russia, and India exhibited negative associations.

Le and Phan (2022) scrutinized the impact of foreign debt on the economic growth of 201 countries spanning from 1990 to 2020, utilizing World Bank panel data. Employing economic expansion and foreign debt as dependent and independent variables, respectively, the study adopted a conditional beta convergence framework. Findings revealed a negative effect of foreign debt on economic development, with no evidence of a nonlinear relationship. Interestingly, a U-shaped pattern emerged, indicating a negative impact of foreign debt on the convergence rate. As foreign debt levels rise, the rate of economic convergence increases until reaching a threshold, beyond which it decelerates.

Lau, de Alba, and Liew (2022) delved into the empirical relationship between external debt thresholds and economic development across 16 Asian nations from 1980 to 2016. Gross domestic product served as a proxy for economic growth, with foreign debt as the independent variable. Employing panel data, the study revealed a predominantly negative and significant impact of foreign debt on these nations' economies. Notably, ten nations exhibited debt-to-GDP ratios below 30%, three between 30% and 60%, two between 60% and 90%, with only Thailand surpassing 90%.

Summary

Examining the impact of external debt and its servicing on economic growth reveals a nuanced interplay. Prudent debt management is crucial; while well-utilized external borrowing can spur economic expansion, excessive debt or poor management poses risks like fiscal vulnerabilities and diminished growth prospects. Efficient debt servicing is equally vital, allowing governments to sustainably support growth initiatives. Long-term implications underscore the need for responsible debt practices, emphasizing sustainable growth over short-term gains. However, existing research lacks an exploration of the Structural Adjustment/Economic Recovery Program (SAP/ERP) impact on growth, a gap this study aims to address. Effective debt management, transparent governance, and sound fiscal policies remain pivotal in navigating the complexities of external debt's role in fostering sustainable economic growth.

Data and Methodology

This study analyzed 46 years of annualized data (1975-2021) to investigate the influence of debt servicing and external debt on economic growth and assess the impact of Structural Adjustment/Economic Recovery Programs (SAP/ERP) on growth. Secondary data from World Development Indicators (WDI) were utilized. Methods included descriptive statistics, regression, correlation, cointegration tests, and unit root tests (Augmented Dickey-Fuller and Philip Perron). Independent variables comprised external debt and debt servicing, with GDP/capita as the dependent variable for economic growth, alongside control variables like trade openness, inflation, savings, and financial development.

Variable Description and Source

Variable	Description	Source
Gross Domestic Product per Capita (GDP_C)	The yearly rate of increase in real GDP per capita (a proxy for economic growth)	World Development Indicators (WDI)
Trade Openness (TO)	The sum of imports and exports expressed as a percentage of GDP (a proxy for Trade Openness)	World Development Indicators (WDI)
Debt Service (DS)	Total debt service is the sum of principal repayments and interest paid in currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments (repurchases and charges) to the IMF.	World Development Indicators (WDI)
External Debt (ExD)	Total external debt is debt owed to nonresidents repayable in currency, goods, or services.	World Development Indicators (WDI)

Inflation (INF)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals	World Development Indicators (WDI)
Saving (SAV)	Gross savings are calculated as gross national income less total consumption, plus net transfers.	World Development Indicators (WDI)
Financial Development (FD)	Financial Development is measured as a share of domestic credit to the private sector as a percentage of GDP.	World Development Indicators (WDI)

Testing Procedure

Augmented Dickey-Fuller (ADF) Test

Ensuring variable stationarity is vital in time series regression analysis to prevent spurious regressions (Granger and Newbold, 1974). Gujarati and Porter (2009) caution against unreliable results from tests like F-test, chi-square, and t-test on non-stationary series. This study rigorously examines variable properties, utilizing ADF and PP tests for stationarity assessment and integration order determination. The ADF is modelled as follows

$$\Delta Y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^p \sigma_i \Delta y_{t-i} + \mu_t \dots \dots \dots 1$$

Where:

Δy_t is the first difference of the time series, y_{t-1} is the lagged value of the time series, t represents a trend term if included, α , β , γ , and $\delta \delta i$ are coefficients to be estimated and μ_t is the error term.

Cointegration Test

The Bound F-test assesses if variables are cointegrated, often after an Engle-Granger test. We begin by regressing one variable (y_1) on another (y_2) to derive residuals ($\hat{\mu}$):

$$y_{1t} = \alpha + \beta y_{2t} + \hat{\mu}_t \dots \dots \dots 2$$

After checking the residuals ($\hat{\mu}_t$) for stationarity using a unit root test like ADF, stationary residuals indicate potential cointegration between y_1 and y_2 . Upon confirmation, we calculate the Bound F-statistic to assess cointegration significance as follows:

$$F = \frac{(T - k - 1)}{k} \times \frac{SSR_1 - SSR_2}{SSR_2} \dots \dots \dots 3$$

Where:

T is the number of observations, k is the number of cointegrating relationships in the model (usually 1), SSR_1 is the sum of squared residuals from the unrestricted model and SSR_2 is the sum of squared residuals from the restricted model.

Model Specification

We utilized autoregressive distributed lag (ARDL) testing to explore the relationship between public debt service, external debt, and economic growth in Ghana. ARDL was preferred over alternative econometric methods due to its ability to capture short and long-run associations simultaneously, providing accurate t-

statistics and unbiased long-run estimates (Pesaran et al., 1999; Odhiambo, 2011). Moreover, it is less affected by outliers compared to other techniques, enhancing its reliability. Drawing on neoclassical, exogenous, and endogenous growth theories (Jorgensen, 1967; Solow, 1956; Lucas, 1988) and empirical studies (Spilioti and Vamvoukas, 2015), the study formulates the ARDL growth equation as follows:

$$\Delta y_t = \partial_0 + \sum_{i=1}^n \partial_{1i} \Delta y_{t-i} + \sum_{i=0}^n \partial_{2i} \Delta ExD_{t-i} + \sum_{i=0}^n \partial_{3i} \Delta PDS_{t-i} + \sum_{i=0}^n \partial_{4i} \Delta INF_{t-i} + \sum_{i=0}^n \partial_{5i} \Delta TO_{t-i} + \sum_{i=0}^n \partial_{6i} \Delta SAV_{t-i} + \sum_{i=0}^n \partial_{7i} \Delta FD_{t-i} + \delta_1 GDP_{t-1} + \delta_2 ExD_{t-1} + \delta_3 PDS_{t-1} + \delta_4 INF_{t-1} + \delta_5 TO_{t-1} + \delta_6 SAV_{t-1} + \delta_7 FD_{t-1} + \mu_{1t} \dots \dots \dots 4$$

Where y is the yearly rate of increase in real GDP per capita, ExD stands for External debt, PDS stands for Public debt servicing, INF stands for inflation, TOP stands for trade openness; SAV stands for savings; TO stands for Trade Openness, and FD stands for Financial Development., ∂_0 is a constant; $\partial_1 - \partial_8$ and $\delta_1 - \delta_8$ are the short-run and long-run regression coefficients, respectively; Δ is the operator of difference; n is the greatest length of lag; μ_{1t} is the error term, and t is the time period.

The error correction model (ECM) in an ARDL framework is expressed as follows when there is a long-run relationship between public debt service, external debt, and economic growth:

$$\Delta y_t = \partial_0 + \sum_{i=1}^n \partial_{1i} \Delta y_{t-i} + \sum_{i=0}^n \partial_{2i} \Delta ExD_{t-i} + \sum_{i=0}^n \partial_{3i} \Delta PDS_{t-i} + \sum_{i=0}^n \partial_{4i} \Delta INF_{t-i} + \sum_{i=0}^n \partial_{5i} \Delta TO_{t-i} + \sum_{i=0}^n \partial_{6i} \Delta SAV_{t-i} + \sum_{i=0}^n \partial_{7i} \Delta FD_{t-i} + \varphi_1 ECM_{t-i} + \mu_{2t} \dots \dots \dots 5$$

ω_1 represents the coefficient of regression while ECM_{t-1} represents one period-lagged error correction term. The ECM is estimated under the assumption that the error correction term (ECT) is non-causal and that the error correction term is persistent. The ECT is used to correct for the effects of shocks in the short-run, while the effect of shocks in the long-run is taken into account by including the persistent term.

Results and Analysis

Table 1: Summary Statistics

Variable	Obs.	Mean	Std.Dev.	Min	Max
GDP_PC	44	1.2617	4.4925	-14.5085	11.3155
OP	44	58.8970	29.4523	6.3203	116.0484
EXD_GDP	44	56.6868	32.5452	16.5170	135.3263
INF	44	29.3704	24.7173	7.1264	116.5036
PDS_X	44	10.6919	6.3564	2.0800	23.1745
SAV_GDP	44	7.7009	6.3023	-2.9634	24.1884
FIN_DV'T	44	8.6975	5.1669	1.5423	15.8820

Source: Author’s Construct (2023)

Table 1 presents descriptive statistics of the variables used in the analysis. The mean annual GDP per

capita growth is approximately 1.26%, with a standard deviation of 4.5% from the mean. The range spans from -14.51% to 11.32%. Trade openness averages around 58.9% of GDP annually, ranging from 6.3% to 116.0%, with a deviation of 29.4%. The average annual share of external debt to GDP is 56.7%, indicating that over half of Ghana’s wealth is owed to foreign creditors, with a deviation of 32.5% from the mean. Inflation averages 29.4% annually, ranging from 7.1% to 116.5%, with a deviation of 24.7%. Public debt service as a percentage of exports averages 10.7%, implying that over a tenth of Ghana’s export earnings service its maturing debts annually, with a deviation of 6.4% from the mean. The range spans from 2.1% to 23.2%. These statistics provide insights into the dynamics of Ghana's economic indicators and underscore the importance of prudent fiscal management and debt servicing to maintain economic stability and growth.

Table 2: Pairwise Correlation

Variable	GDP_PC	OP	EXD_GDP	INF	PDS_X	SAV_GDP	FIN_DV'T
GDP_PC	1.0000						
OP	0.4874**	1.0000					
EXD_GDP	0.0643	0.4896**	1.0000				
INF	-0.3306*	-0.5378**	-0.0659	1.0000			
PDS_X	-0.1437	-0.2195	0.4942**	0.0172	1.0000		
SAV_GDP	-0.0965	0.1401	-0.0118	-0.0588	-0.0772	1.0000	
FIN_DV'T	0.4753**	0.8193**	-0.0187	-0.5445**	-0.5855**	0.1805	1.0000

*Note: *, ** denotes 5% and 1% sig. levels respectively*

Source: Author’s Construct (2023)

Table 2 presents the pairwise correlation matrix, highlighting significant relationships. Trade openness shows a positive correlation with GDP per capita at the 5% level, indicating a direct co-movement between the variables. Similarly, external debt stock to GDP is positively associated with trade openness, suggesting synchronized movements. Inflation displays an inverse relationship with GDP per capita, trade openness, and financial development, implying opposite changes between variables. Public debt service positively correlates with external debt stock to GDP, indicating a concurrent increase or decrease. Financial development exhibits a stronger positive correlation with GDP per capita and trade openness, contrasting with its negative association with inflation and public debt service. While these correlations reveal interdependencies, causation cannot be inferred solely from these associations.

Table 3: Augmented Dickey-Fuller Unit Root Test

Level				First Difference			
Variable	Drift	Trend	None	Drift	Trend	None	
GDP_PC	-3.808**	--	--	--	--	--	
OP	1.267	-2.066	-1.267	-6.002**	--	--	
EXD_GDP	-1.644	-1.629	-1.644	-3.088**	--	--	
INF	-2.668**	--	--	--	--	--	
PDS_X	-1.507	-1.953	-1.507	-5.339**	--	--	
SAV_GDP	-1.062	-1.545	-1.062	-4.341**	--	--	

C	-0.817	-2.298	-0.817		-4.878**	--	--
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Note: *, ** denotes rejection of the Null at 5% and 1% sig. levels respectively

Source: Author's Construct (2023)

Table 4: Philips Perron Unit Root Test

Level			First Difference		
Variable	None	Trend		None	Trend
GDP_PC	-23.015**	--		--	--
OP	-3.009	-8.301		-40.327**	--
EXD_GDP	-4.206	-4.044		-33.411**	--
INF	-19.518**	--		--	--
PDS_X	-5.204	-6.762		-49.728**	--
SAV_GDP	-7.116	-9.410		-51.784**	--
FIN_DV'T	-1.701	-9.665		-46.919**	--

Note: *, ** denotes rejection of the Null at 5% and 1% sig. levels respectively

Source: Author's Construct (2023)

In this study, we conducted both the ADF and PP tests for unit root. Results are shown in tables 3 and 4 above. Findings suggest evidence of unit root presence in trade openness (OP), external debt to GDP ratio (EXD_GDP), public debt servicing as a percent of exports (PDS_X), savings as a percent of GDP (SAV_GDP), and financial development (SAV_GDP) represented by domestic credit to the private sector. However, GDP per capita and inflation are stationary at level. PP test results indicate GDP per capita and inflation are stationary at level, while the rest are stationary at first difference. These results confirm the ADF findings, indicating integrated series of different orders, both I(0) and I(1), fulfilling conditions for ARDL bond testing for long-run cointegration relationships. Unlike the Johansen test, which requires variables to be only I(1) and not I(2), the ARDL bond test is flexible, not mandating specific integration orders before testing. Consequently, the study proceeded with the Auto-regressive distributed lag bound test for long-run equilibrium relationships.

Table 5: Bound F Test Results for Cointegration

F-Statistic	Lag	Significance	Bound Critical Values	
Value	Length	Level	I(0)	I(1)
		1%	3.681	5.749
11.124	3	5%	2.620	4.220
		10%	2.185	3.589

Source: Author's Construct (2023)

The ARDL bound test hypothesis assesses the presence of Cointegration among variables against an alternative Cointegration. The maximum lag for the Cointegration test was chosen via the Schwartz information criterion. If the F-statistic is below the I(0) critical bond values, no long-run cointegrating relationship exists, estimating only short-run dynamic parameters. Values between I(0) and I(1) bounds render results inconclusive. However, if F exceeds I(1) bounds, a long-run relationship exists, necessitating error correction model estimation. Table 5 results indicate Cointegration among variables at 10%, 5%, and

1% significance levels, with an F-Statistic of 11.124 surpassing I(I) bound critical values. Consequently, the study rejects the null hypothesis, proceeding with error correction model estimation.

Table 6: Long Run Results of ARDL Model (3, 1, 0, 0, 0, 0, 0, 1, 2)

Regressors	Coef.	Std. Err.	T-Stats
OP	0.0499	0.0297	1.68
EXD_GDP	-0.0297*	0.0168	-1.77
INF	0.0493**	0.0171	2.89
PDS_X	0.0334	0.0800	0.42
SAV_GDP	-0.1266*	0.0651	-1.94
FIN_DV'T	-0.0264	0.1613	-0.16
D _t _SAP	5.9546**	1.3520	4.40
D _t _Oil	2.6135*	1.3163	1.99
C	-5.7997**	1.6705	-3.47
R ²	0.8293		
Adj. R ²	0.7269		
F-Stats	8.2784		
Prob. (F-Stats)	0.0000		
Serial Correlation LM Test	6.5210		
P Value of LM Test	0.0888		
IM-Test for Heteroscedasticity	41.000		
P Value of IM-Test	0.4265		
Obs.	41		

*Note: *, ** denotes 10% and 1% sig. levels respectively*

Source: Author's Construct (2023)

The inflation differential coefficient is statistically significant at the 1% level, contradicting Philips (1986), who suggested a positive short-term impact of inflation on economic growth. However, in this study, inflation demonstrates a non-detrimental long-term effect on GDP per capita, diverging from Philips' theory. A 1% inflation increase correlates with a 0.05% GDP per capita rise, all else constant. Additionally, a weak negative association emerges between the external debt-to-GDP ratio, savings percentage, and GDP per capita, indicating adverse impacts on economic growth in Ghana. Higher savings potentially lower consumption, negatively affecting GDP. A 1% increase in the external debt-to-GDP ratio results in a 0.03% GDP per capita decrease, while a similar rise in the savings-to-GDP ratio leads to a 0.03% decline, at the 10% significance level. Debt servicing exhibits a positive but insignificant relationship with economic growth, suggesting a theoretically favourable but weak actual influence. The time dummy variables of D_t_SAP and D (D_t_Oil (-1)) which capture the effects of SAP/ERP and the discovery and exploration of oil in commercial quantities respectively are significant. Moreover, the Structural Adjustment/Economic Recovery Program (SAP/ERP) of 1983 significantly influenced Ghana's GDP per capita, with a long-run estimate of 5.95. Implemented to attain fiscal stability and foster economic growth following natural disasters and socio-economic challenges, the program spurred GDP growth to an annual average of 4.8% (Baah Boateng and Aryeetey, 2007). The 2011 structural break, attributed to Ghana's oil discovery, substantially boosted long-term GDP per capita, with a statistically significant coefficient of

about 2.6 at the 10% level. In 2011, Ghana's GDP per capita surged to 11.32% from the prior year's approximately 5.25% due to oil exploration.

Conclusion and Recommendations

This paper delves into the intricate relationship between debt servicing, external debt, and economic growth, alongside assessing the impact of the Structural Adjustment/Economic Recovery Program (SAP/ERP) on economic growth. Employing the Augmented Dickey Fuller, PP test, and Autoregressive Distributed Lag (ARDL) regression, GDP per capita served as the dependent variable, while debt servicing and external debt were independent variables. The findings reveal a weak negative association between external debt-to-GDP ratio and GDP per capita, and a positive yet statistically insignificant link between debt service and economic growth. Strong evidence of SAP/ERP's effects underscores the need for cautious debt management and maintaining manageable debt levels for sustainable growth.

Policy Recommendations

1. Given the weak negative association between the external debt-to-GDP ratio, savings as a percentage of GDP, and GDP per capita, Ghana's government must prioritize policies to alleviate the external debt burden. This involves renegotiating terms with creditors, exploring debt restructuring, and enforcing fiscal discipline to curb further debt accumulation.
2. While the positive relationship between debt servicing and economic growth is statistically insignificant, monitoring debt service levels is crucial for sustainability. The government must manage repayments to prevent crowding out productive expenditures and ensure debt service doesn't burden the economy.
3. The robust evidence of SAP/ERP's impact underscores the importance of structural reforms. Policymakers should focus on deregulation, privatization, trade liberalization, and infrastructure and human capital investment to enhance economic efficiency and competitiveness.

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