BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

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THE IMPACTS OF EXTERNAL DEBT ON ECONOMIC GROWTH IN SUB SAHARAN AFRICAN COUNTRIES (2013-2022)

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE BACHELOR OF SCIENCE HONORS DEGREE IN ECONOMICS OF BINDURA UNIVERSITY OF SCIENCE EDUCATION FACULTY OF COMMERCE.

June 2024

APPROVAL FORM

The undersigned certify that they have supervised, read and recommend to the Bindura University of Science Education for acceptance of a research project entitled: **THE IMPACTS OF EXTERNAL DEBT ON ECONOMIC GROWTH IN SUB SAHARAN AFRICAN COUNTRIES (2013-2022)**, submitted by **B200421A** in partial fulfilment of the requirements for the **Bachelor of Science Honors Degree in Economics**.

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DISSERTATION TITLE: The impact of external debt on economic growth in Sub Saharan African countries (2013- 2022).

DEGREE TITLE: Bachelor of Science Honors degree in Economics.

YEAR DEGREE GRANTED: 2020

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The Abstract

The study looks into how external debt affects the economic expansion of nations in Sub-Saharan Africa. Many emerging economies have long been concerned about high levels of external debt, especially those in Sub-Saharan Africa (SSA), where debt loads have traditionally hampered economic growth. This study aims to investigate empirically, from 2013 to 2022, the link between GDP growth and external debt in a panel of 45 SSA countries. Hedges and Vevea's (1998) Random and Fixed Effects regression model is used in the study to examine the data. 45 SSA nations are included in the sample; these were chosen based on WDI data availability. The variables under control were external debt, interest rates, labor force growth, population expansion, corruption control, inflation, government spending, foreign direct investment, and exports. The annual GDP growth rate is the dependent variable.

The findings show that the impact of external debt on economic growth in SSA nations is statistically significant negative. Keeping all other things equal, an increase of one percentage point in the external debt to GDP ratio typically results in a 0.05 percentage point decline in the GDP growth rate. The results also indicate that while FDI inflows and tighter regulation of corruption typically raise GDP, high rates of inflation, excessive government spending, a big labor force, and limited trade openness are adverse to growth. These results suggest that an over-reliance on borrowing from outside sources may impede regional economic development. Strategies for managing public debt that reduce non-productive debt, increase the effectiveness of public investment, and encourage growth focused on exports should be given top priority by policymakers. Reducing debt vulnerabilities and promoting sustainable growth in the region would also need strengthening public financial management and domestic resource mobilization.

Acknowledgements

My sincere appreciation is extended to my supervisor, Dr. Kairiza, for his tireless efforts and invaluable advice in shaping this research project into the final product. Additionally, I would want to express my sincere gratitude to the Economics Department, particularly to Dr. Mutsvangwa.

My sincere gratitude also extends to my family, who have been an invaluable source of support and encouragement throughout this endeavor. I would especially like to thank my mother, Mrs. B Mauye, my lovely sister Caroline and my beloved brother Tafadzwa. Without their love and everyday encouragement, this journey would not have been possible. It is impossible to overstate the unwavering support I received from the Chamboko family and also Mr Chipise, who stood by me during difficult times and helped to bring peace to the situation through their wonderful collaboration and affection. I adore you all and thank you.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

For many developing nations, the debt crisis has emerged as a significant macroeconomic issue since the 1980s. With yearly increases averaging between 10 and 25 percentage points since 2013, public debt in Sub-Saharan Africa has surged to about 60 percent of GDP during the last ten years (Makunda, 2020). Subsequently, many research projects are undertaken in an effort to determine the origin, implications, and potential ways to resolve the situation.

As stated by R. Koepke (2019), the impacts of external borrowing on emerging economies are the main topic of discussion among financial analysts, economists, and policy officials. The Solow-type neoclassical growth model claims that debt service is negatively related to economic growth (Sulaiman, 2012). Conversely, some argue that external debt stock has a positive impact on economic growth (Mohsin, 2021). According to Schwehoff (2017), the majority of developing nations prioritize economic sustainability, hence they mobilize resources from a range of resources, such as loans from outside the country to invest in initiatives that will accelerate growth. All nations are primarily concerned with achieving sustainable economic growth, but developing economies are particularly vulnerable since they often have to deal with growing fiscal deficits primarily caused by increased debt payments, notably of external debt, and expanding current account deficits (Reinhart et al, 2012).

Atique and Malik (2012) claim that a larger portion of the public debt structure in developing nations is made up of external debt. Dependency on external borrowing is justified not only by the argument put forth by Paniza et al. (2010) that excessive domestic borrowing can cause financial instability and drive out the private sector, but also by Asiedu (2002) who contend on the determinants of foreign direct investment to developing countries, external capital is needed to for capital investment.

Development economists have historically relied on the Harrod-Domar growth model to illustrate the importance of borrowing from outside sources to close the savings-investment gap in emerging nations. According to Krugman (1988), debt servicing requirements lead to economic deception, which deters investment and slows down economic progress. Conversely, Eaton (1993) contends that foreign debt enhances growth by serving as a supplement to local savings and investment. Numerous theories have been proposed regarding the detrimental impact of external debt on the economic growth of developing nations.

1.1 Background

A gain in the amount of national output or income over time is referred to as economic growth. Global economic growth is a critical concern for all countries. As per the World Bank (2015), country's competence to reduce poverty and enhance the well-being of its citizens is significantly dependent on the sustainable growth of its economy. Concern over external debt and related assistance, particularly to Sub-Saharan nations, has grown. Africa's sub-Saharan areas are those that are located south of the Sahara desert (Ondari-Okemwa, 2007). Although it was recently widely believed that all countries benefited from foreign debt, empirical research indicates that less Sub-Saharan countries have benefited from external debt than wealthy ones.

Developing nations, on the other hand, borrow money to cover their annual budget deficits because they are unable to raise enough domestic revenue to cover their expenses. According to Ogunmuyiwa (2010), borrowing becomes the sole option accessible to the

government for financing infrastructure projects when tax revenue is constrained and it does not want to jeopardize macroeconomic stability by printing more money.

Public borrowing can take place in both domestic and international markets, but most nations rely on foreign borrowing to provide public goods because over-reliance on the home market can cause financial instability and drive out the private sector (Pannizza et al, 2010). The entire amount of governmental and private debt due to non-residents that can be repaid in foreign money, products, or services is referred to as external debt, according to the World Bank (World Bank, 2015). The entire amount owed by citizens and the government of one nation to citizens and/or governments of other countries is hence known as external debt. The total amount of principal repayments and interest paid in foreign money, products, or services is known as the total debt service (ibid). Regardless of the exchange rate between the involved currencies, the lender's home currency is used as the standard currency for debt payments. However, the borrower always repays the debt in his own currency when the participating countries use the same currency. The two main forms of expenditures that consume public debt are often higher consumption and/or higher investment, which are both beyond the capacity of domestic resources. Thus, it is anticipated that the spending patterns adopted by borrowing nations, particularly developing nations, will promote economic expansion and raise living standards in these areas.

When borrowed money is used for long-term initiatives that bring in money to pay off external loan, foreign loan can actually spur GDP expansion. Azam and Feng (2017) argued that the buildup of foreign debt is not always a sign of slow economic growth, while Were (2001) contends that the impediment to growth is the ignorance about the type, structure, and extent of the debt, together with the incapacity to fulfill the loan obligation. These considerations suggest that borrowing from outside sources does not always have a negative impact on economic growth.

Finding the processes via which economic growth is influenced by foreign debt, as has been a major focus of the majority of studies on the relationship between external debt and growth. For example, Anyanwu (1994) clarified that excessive debt buildup deters private investment due to concerns about future tax increases needed to pay off the debt. Furthermore, additional debt-related macroeconomic turbulences inside the domestic sector could potentially impede economic expansion.

The World Bank trend indicates an increased tendency in both GDP growth and external debt. Throughout the period (2013–2022), there appears to have been some positive link between the growth rates of GDP and external debt. Sub-Saharan African nations' economic growth and external debt levels appear to be somewhat correlated, which has led to a current discussion on the role that foreign loans play in the region's growth and development.

1.2 Problem Statement

While external debt helps maintain an economy's financial and economic liquidity and provides external cash to support international trade, it can also present some difficulties, making it challenging to determine the entire extent of its impact on economic growth. A significant amount of the external debt owed by Sub-Saharan Africa is tied to infrastructure initiatives meant to promote development and growth. However, the region's countries consistently struggle with debt service, in part because most of them have persistent hyperinflation and because they have failed to meet growth and development objectives through fraud or misappropriation of borrowed funds, that is, lack of transparency and accountability in debt management. Conditions for reducing debt service issues in debtor countries are appreciation growth and development within a robust and growing global economy; however, none of these were met in the 1980s (Abott, 1993). Due to the development loans' rising absorption of the finite foreign exchange resources in the settlement of debt service obligations, growth targets were not met (Dauda, 2007).

1.3 **Purpose of the Study**

• To gauge how external debt affects Sub-Saharan Africa's economic growth.
• To look into what influences Sub-Saharan Africa's economy.
• To give Sub-Saharan African policymakers counsel in accordance with the discovery.

1.4 Research Questions

The study could potentially address the following questions:

- What connection exists between the amount of external debt and the growth of economies in Sub-Saharan African nations?
- Which are the main ways that external debt affects the rate of economic growth in Sub-Saharan African nations?
- Based on the study's findings, what policy recommendations can be made?

1.5 Statement of the Hypothesis

It is challenging to predict in advance whether external debt will have a favorable or negative impact on economic growth. It could be beneficial if applied to raise societal welfare, or it could have a detrimental effect on economic growth due to the debt overhang and the debt crowding out effect, which deters investment and promotes capital flight. According to the study's hypothesis, a significant amount of debt will have a detrimental impact on economic growth due to the debt overhang and debt crowding out effect.

The purpose of the study is to look into how external debt affects Sub-Saharan Africa's economic growth. While there are three main objectives, each of which might be evaluated with a hypothesis, the primary objective determines the dependence of the second and third objectives. Because of this, the study's hypothesis, which is focused on the first goal, is as follows:

H_o: External Debt does not affect Economic Growth in SSA

H_a: External Debt does affect Economic Growth in SSA

1.6 Significance of the study

To the Researcher

Undergraduate students at Bindura University of Science Education must complete the research in order to receive a partial Bachelor of Science Honors Degree in Economics. The research also enhances the researcher's abilities, particularly in the areas of microeconomics and macroeconomics in SSA.

To Economy

The study assists decision-makers in developing strategies that address external debt both directly and indirectly. The utilization of study findings and recommendations is how this is accomplished.

To BUSE

It serves as the foundation for further research, which is anticipated to be sparked by the particular conclusions and suggestions made by this study.

1.7 Assumptions

• External debt can help countries finance investments in infrastructure, human capital, and technological breakthroughs, which can spur economic growth.
• On the other hand, external debt can impede economic growth by taking funds away from investments that might otherwise be productive and directing them toward debt servicing.
• The kind of debt taken on determines how it affects economic growth.

1.8 Delimitations of the study

The influence of external debt on Sub-Saharan Africa's economic growth is the main topic of the study. It is critical to clarify what external debt is and how it varies from other sources of funding. It is also necessary to take into account the historical background of the external debt accumulation of Sub-Saharan African nations. In order to fund development programs and infrastructure projects, many nations took on a lot of debt in the 1970s and 1980s. This demonstrates that external debt has existed in Sub-Saharan Africa for a considerable amount of time, enabling the conduct of this kind of study. The time frame for this research is 2013–2022.

1.9 Limitations of the study

One significant drawback is that many Sub-Saharan African nations lack trustworthy statistics on their external debt. These nations' governments frequently lack the ability to precisely track and report their external debt, which causes data inconsistencies and errors. To carry out the research, the investigator will, nevertheless, make use of trustworthy online data platforms.

An additional constraint pertains to the intricacy of the correlation between economic growth and external debt. High debt levels are known to hamper economic growth, although the precise mechanisms by which this happens are not always fully understood. The effect of external debt on economic growth can depend on a number of factors, including the loan's composition, sustainability, and cost of servicing.

1.10 Definition of terms

Economic Growth- a country's overall output growing over a given period of time, usually a year (Lipsey, 2011). Another way to put it is the inflation-adjusted market value of goods

and services produced over time by an economy. The traditional method of measuring it is to use the real growth of GDP percentage (Feldstein, 2017).

Arrears servicing- is the sum of money required over a predetermined period of time to pay off principal and interest on a loan, according to Yetman (2007).

External debt- is the portion of a nation's overall debt that came from borrowing from foreign lenders, such as governments, commercial banks, or international financial institutions. Individuals, businesses, or the government can all be debtors.

Debt crowding out- Oliver (2008) describes this phenomena as taking place when a market economy's remaining segments are significantly impacted by the government's increased participation in one of its sectors, either in the market's supply or demand chain.

Debt overhang- It is described as the situation where the projected repayment of a foreign loan is less than the debt's contractual value by Krugman (1988).

Sub Saharan Africa- is the section and areas of the African continent that are located south of the Sahara.

1.11 Conclusion

It is important to provide thorough thought and study to the complicated and diverse question of how external debt affects economic growth in Sub-Saharan Africa. According to the chapter, most of the SSA nations had debt that has grown at an unsustainable rate between 2013 and 2022. The IMF and World Bank were the two international creditors to which the countries had a high level of external debt. Research is needed to determine why governments depend on outside funding to fund non-investable regions given the rising national debt and poor economic performance. The researcher will give a presentation on the relationship between various factors that influenced economic growth in the countries of the Sahara, including population growth, interest rates, government spending, labor force participation, foreign direct investment, inflation growth, and exports of goods and

services. In order to properly analyze the relationship between external debt and economic growth in Sub-Saharan Africa, it is crucial to account for these aspects.

CHAPTER TWO

LITERATURE REVIEW

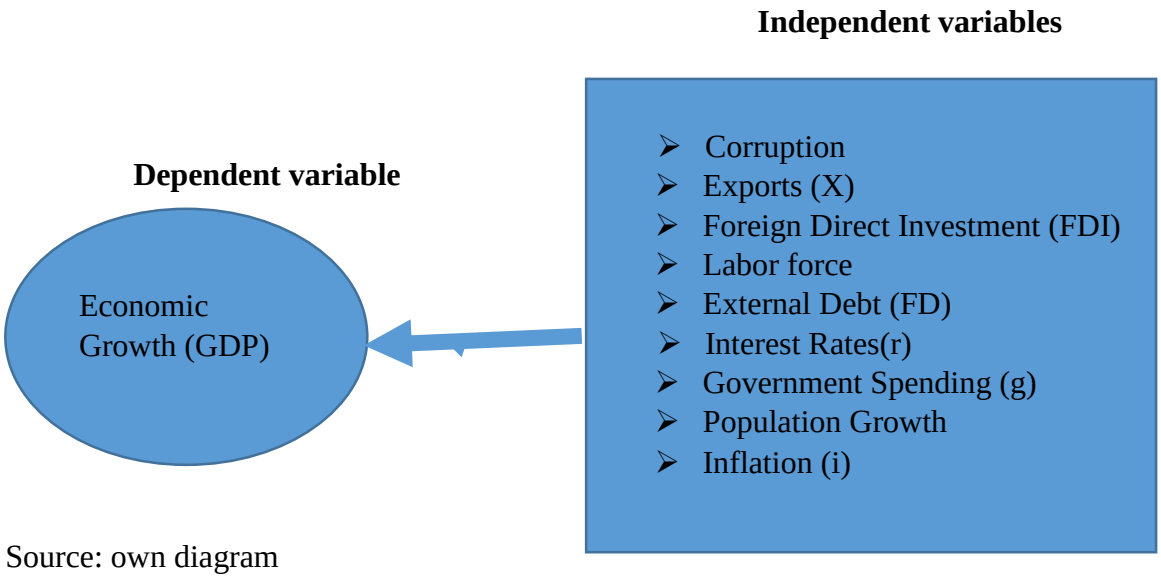
2.0 Introduction

The evolution of economic development theories, which combine both new and ancient ideas, will be a major topic of discussion in this chapter. The theories are covered first, surrounding the relationship between external loans and GDP increase, putting particular emphasis on basic theories of burden of debt, force out impact, and force in effect. The theory by Arthur Laffer on tax revenue is analyzed in the section's final segments in order to deliver perception apportioned by theories such were put forth before this study. Subsequent and final section delves into the empirical study, examining the goals, approaches, and conclusions that emerged from many studies investigating the topic in various nations within the region.

2.1 Conceptual Framework

A conceptual framework examines the connections between or relationships between a collection of ideas and a specific phenomenon (Svinicki, 2010). Economic growth is the dependent variable, and the independent variables—exports, labor force, foreign direct investment, population growth, corruption, external debt, government spending, inflation, and interest rates—are the independent variables that are examined in relation to it.

Figure 1 Conceptual Framework



Source: own diagram

The study will examine how the independent factors impact GDP-based measures of economic growth. In the countries of Sub-Saharan Africa, the effects of each independent variable on economic growth are distinct and have varied ramifications.

2.2 Theoretical Literature Review

The Basic Transfer Concept

The essential change concept is an inseparable topic in creative writing on debt and GDP growth. Todaro and Smith (2015) state that the foreign currency influx and drainage and their relationship to international debt constitute the fundamental convey for a single nation. This notion is essential to understanding how the debt-creating aspect of external funding becomes indebtedness. The main idea of the debtor country's resource input and outflow is explained by the theory in another way. This idea can be expressed mathematically as funds influx minus funds drained. Thus, this idea clarifies the total amount of foreign money that the borrowing nation take the count each year on global fund movement. After conducting a research, Todaro and Smith (2015) concluded that there existed a download correlation between GDP and foreign financing in highly overdrawn countries in SSA. The relationship is expressed below:

$$BT = dD - rD = (d - r)D$$

In which;

$BT = Basic\ Transfer$

$dD = Total\ debt\ outstanding$

$rD = Total\ annual\ interest\ payments$

$d = \ slope\ of\ debt\ levels$

$r = Interest\ rate\ on\ accumulated\ debt$

$D = Accrued\ External\ debt$

Concept above indicates and clarifies that when d > r, the basic transfer balance will be positive based on these two equations. In this instance, the borrowing nation will see economic growth as a result of receiving more foreign exchange from borrowing. When r > d, which is when the nation starts to lose foreign exchange, the basic transfer will be negative. Thus, by examining the variables that led to the rise or fall in d and r, the concept offers an important study of the relationship that exists amidst foreign loans and GDP growth. As mentioned by Todaro and Smith (2015), the concept predicated the observation that the rate of increase in debt will be high when D is small. Todaro and Smith (2015) highlighted in the same vein that it is admirable for nations to take this approach beforehand the phases of expansion.

Todaro and Smith (2015) state that there are five possible outcomes for the fundamental transfer balance of the nation. In scenario 1, the amount of debt that has accrued is very high, and as repayments increase dramatically, the rate of increase (d) inevitably declines. In the second case, borrowing from outside sources is done so on more favorable conditions, which raises the interest rate on the total amount of debt (r). The third scenario is a decline in the overall balance of payments brought on by declining export margins. The fourth scenario involves external shocks causing an economic collapse, such as the US dollar's appreciation, which affects the value of most foreign loans. The final scenario

involves a drop in investor confidence in the borrowing nation, which results in a decrease in capital inflows and foreign direct investment.

The above-described condition occasionally affects both basic transfer equations d and r values. As previously mentioned, a negative basic transfer indicates a capital outflow from less developed borrowing countries and is produced by a lower d and a higher r. All the steps in development from the buildup of foreign loans to arrears distress are clearly illustrated in Todaro and Smith's (2006) treatment of this issue.

Debt Overhang Theory

According to Krugman, Obstfeld, and Melitz (2017), a debt overhang occurs when a country's current face value of debt is more than the estimated present value of any future transfers. Debt lenders may nonetheless find it advantageous to roll over a debt in an overhang scenario in order to partially reclaim their claims and take future national resources. According to this hypothesis, as Krugman noted, these payments will somehow be connected to the state of the economy in such a way that any economic recovery in the debtor nation will go toward repaying the loan. This further suggests that the borrowing nation's future arrears payments may have an increasing impact on its level of output. The massive stock of public debt, according to Mashingaidze (2014), means that investors won't know what measures the government would take in terms of policy to service the debt.

Crowding In Theory

Keynesian economic theory states that higher government spending may stimulate higher private investment. However, involvement from the private sector will spur economic progress, and taxes allow the government to fulfill its obligations. Piana (2013) claims that the endeavor to lessen production expenditure per unit for businesses, the nation could have to boost funding from the private sector by taking on the full capital projects' and public service providers' roles. However, this would result in the government charging the private

sector high taxes to service the external debt, which would stunt the nation's economic growth.

Crowding Out Theory

The terms of trade of a nation that is excessively indebted deteriorate, foreign credit markets may close, and crowding out effects are typically caused by high real interest rates. Claessens et al. (1996) determined that the drop in investment was caused by a reduction in the nation's assets available to finance important economic activities and investments. A common outcome of adverse situations in global financial markets is a high interest rate in the country. The effect of credit rationing will arise from the inability of a non-performing debtor to get any external borrowing.

Debtor nations will thus concentrate on internal procedures, displacing private businesses. Given its size, if domestic financial markets are important, the government will set domestic rates. Consequently, this will raise both the cost of borrowing and the unit cost of manufacturing. Elmendorf and Mankin (2014) conducted a similar research and found that decreasing public debt can drive away private investments and fund budget deficits. Interest rates will rise unnecessarily as a result of the government's massive borrowing in the domestic market.

In addition, policymakers who concentrated on obligation crisis sought to find out if the issue existed as governance, solvency or liquidity in relation to the debt burden. According to Agenor and Montiel (2015), fluidity crisis is a temporary problem that nations encounter when trying to pay off their outstanding debts in accordance with the terms of the original contract. Conversely, a solvency crisis is a chronic issue that nations encounter when liabilities are greater than the capacity to repay.

2.3 Empirical Literature

The only other research that has focused solely on countries in the euro era to date is Checherita and Rother's (2010). Examining normal effect of public debt on GDP growth in twelve nations in Europe in the period of 40 years, starting in 1970 is the study's main goal. Using a cross-sectional sample, data from 12 European nations were collected between 1970 and 2011. The control variables in the OLS estimation equation were interest rate, debt, savings to investment rate, and population growth. The findings indicated that no one-dimensional collinear relationship exist between external debt and economic growth over a lengthy period of time, starting in 1970. Checherita and Rother (2010) discovered, among other important findings, that there is a negative and linear link amid economic expansion and yearly oscillations in public debt.

The title of Dereje and Joakim's (2013) article included some empirical data. This paper inspects the aftermath of foreign indebtedness on buoyancy of the economy in SSA following their independence. Using the excessive debt and debt crowding out effect theory, their research's objective was to settle how external loans affected GDP. Every year from 1991 to 2010, data for eight highly indebted nations were acquired. The rate of economic growth was explained using a cross-sectional regression model that took into account the population analysis, inflation, and ration of debt to export and investment. Finding actual effects of various debt-related factors on GDP growth was conducted using models with variable combinations. The main correlation amidst GDP and foreign borrowing is negative, according to the results of the subsequent models. Noteworthy study also showed that, in relation to economic growth, the ration of foreign debt to incremental capital output was reliably negligible. By demonstrating that the debt crowding out effect—rather than the debt overhang—was how foreign debt impacted GDP growth, Dereje and Joakim reached a more broadly applicable inferences. Significantly overdrawn countries are not paying off their total debt, according to the report.

Silva (2020) conducted an intriguing study examining the impact of both public and private external debt on economic growth in Portugal between 1999 and 2019. The study found that the only channels through which the effects of external debt are transmitted to economic growth are public investment and private investment. The results of additional research revealed that the main income account, total factor productivity, private GVA in volume per person, and private saving were significant and unaffected by external debt. The study also came to the conclusion that the inputs into the production function were not significantly impacted by external debt. According to Karagol (2019), there are national variations in the relationship, making generalizations of any kind challenging. Every instance needs to be evaluated independently in light of accepted ideas such as the debt overhang hypothesis and the Laffer curve.

The study conducted by Hameed et al. (2012) aimed to examine the correlation between Pakistan's economic development and its external debt. Using time series data of the GDP as the dependent variable and control variables, debt service, capital stock, and labor force from 1970 to 2003, their methodology was based on a production function model. The study looked at how these characteristics' influence on economic performance tend to change over time. Several cointegration approaches were used to determine the long-term relationships between the variables. According to their findings, debt service has a negative long-term impact on the gross domestic product. This is because it has a negative influence on labor and capital productivity. Granger causality was also calculated using a vector error correction model, which demonstrates that there is both short- and long-term negative causation between debt service and GDP.

2.4 Conclusion

Diverse perspectives on the variables influencing the current relationships are offered by theories concerning the relationship between economic growth and external debt. Several hypotheses suggest that debt appears to have a negative impact on economic growth, particularly over an extended period of time. Additionally, the credit rationing effect

summarizes the generalizations made by theories that contend that while debt has a short-term beneficial influence on the economy, its long-term effects—such as the crowding out effect and debt overhang—have a negative impact on economic growth. The next chapter will cover the methodology that was developed for this empirical analysis, which was made possible by this chapter. We will adapt and modify models from theories and other reviewed studies to fit the research approach of this study.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The theoretical framework and empirical model used in this study to examine the impact of external debt on economic growth in Sub-Saharan Africa are presented in this chapter. Additionally, it goes over the statistical techniques and required diagnostic tests for panel regression that are used to examine how external debt affects economic growth.

3.1 Research Design

The overarching plan selected to logically and cogently combine the various study components is referred to as the research design. Research design, according to Akhtar (2016), is a thorough plan or method for conducting the study that enables the researcher to convert the theoretical hypothesis into a working hypothesis. The accuracy of research outcomes is significantly influenced by the sort of research design selected for a study (Cresswell, 2014). Descriptive and explanatory research designs are the two categories of research designs. Universal relationships between variables with universal validity are predicted by descriptive research designs.

Developing casual explanations involves asking why certain questions, which an explanatory research methodology addresses. The study will primarily employ econometric tools to assess the relationship between the GDP growth of Sub-Saharan Africa and the effects of foreign direct investment, corruption, exports, external debt, labor force participation, inflation, and interest rates. Due to its utilization of secondary data, the study is primarily quantitative in nature. This study will employ quantitative approaches on panel

data in order to fulfill its aims, collect the necessary relevant data, and address its research issues.

3.2 Descriptive Research

Unprocessed data is compiled into a useful form via descriptive research (Cresswell, 2014). It is therefore appropriate for this study since it deals with transforming raw data into a more useable format that facilitates estimations and forecasts without altering the original characteristics of the data.

3.3 Methodology

The research will use the Huasman Test and the Random Effects Method to estimate the economic growth equation using GDP as the dependent variable in an attempt to determine the relationship between external debt and economic growth. Sub-Saharan Africa panel data covering the years 2013–2022 was used by the researcher. The best linear and unbiased estimator (BLUE) requirements are satisfied by the parameters produced using the OLS approach. In order to account for the effects of unidentified components, the OLS technique incorporates an error term into the model estimate.

3.4 Theoretical Model Specification

The Classical Cobb-Douglas production function, which was developed in the early months of 1947 by Charles Cobb and Paul Douglas, is the subject of this study. They argued that labor and capital determine output, hence the model is written in transcendental logarithmic (Translog) notation because regression issues are known to arise with the Cobb Douglas function. The Cobb Douglas production function is streamlined in the Trans log function. The following equation elaborate that Economic Growth (GDP) is a function of labor (L) and capital (K):

The following is the Cobb Douglas function of the equation:

$$GDP = f(L, K)$$

The following is the Cobb Douglas function of the equation:

$$GDP = \lambda L^{\alpha} K^{\beta}$$

Where:

$\lambda =$ total factor productivity

$\mathrm{L} =$ Percentage change in labour force

$\mathrm{K} =$ Percentage change in Gross Fixed Capital

$\mathrm{GDP} =$ Gross Domestic Product

3.5 Empirical Model

The econometric model developed from the production function, which states that factors like as government expenditure, interest rates, inflation, population growth, foreign direct investment, exports of goods and services, external debt, and corruption control all affect a nation's productivity. The mathematical model will be built on Omoju and Andesanya's (2012) technique for the economy of Sub-Saharan Africa. The following is the mathematical model:

$$logGDP_{it} = \beta_0 + \beta_1 logCRPN_{it} + \beta_2 logEX_{it} + \beta_3 logR_{it} + \beta_4 logED_{it} + \beta_5 logFDI_{it} + \beta_6 logPG_{it} + \beta_7 logLF_{it} + \beta_8 logI_{it} + \beta_9 logGS_{it} + \mu$$

Where:

GDP = measure of economic growth

$CRPN$ = control of corruption

EX = exports of goods and services

R = interest rates

ED = external debt

FDI = foreign direct investment

PG = population growth

LF = labor force

I = inflation

GS = government spending

GDP is the dependent variable, and the regression method that will be utilized for analysis is the ordinary least square. To keep the linear model intact, logs of the dependent and explanatory variables were made.
Below is the econometric model without logarithms:

$$GDP_{it} = \beta_0 + \beta_1 CRPN_{it} + \beta_2 EX_{it} + \beta_3 R_{it} + \beta_4 ED_{it} + \beta_5 FDI_{it} + \beta_6 PG_{it} + \beta_7 LF_{it} + \beta_8 I_{it} + \beta_9 GS_{it} + \mu$$

Where:

$\beta_0 =$ intercept of the relationship in the model/constant

$\beta_1 \; to \; \beta_9 =$ Coefficients of exogenous variable

$\mu =$ the error term

The priori expectation serves as the basis for deriving the variable signs. In this case, the direction of the link based on traditional economic theory determines how the explanatory factors and independent variables relate to each other.

Secondary data are previously gathered, referred to as historical, and do not require communication with respondents. The information may have been gathered in the past for purposes other than research. The World Bank Databank will provide statistics for Sub-Saharan Africa that are used in this study. The research also utilizes panel data spanning from 2013 to 2022. COVID-19 caused data from 2019 to 2021 to be skewed. In poor

countries, it is challenging to get reliable and accurate statistics (Mikesell and Zinser, 1973). As a result, this study's data is also impacted by the common data issue, which could have an impact on the findings.

3.6 Model Specification Test/ Measure of goodness of fit

In order to help the researcher determine which model best fits the supplied data, specification tests will be conducted. In this model, the F-test and R-squared will be utilized. The percentage of a dependent variable's variance that can be anticipated or explained by an independent variable is found using the R-squared (D Chicco, 2021). R-squared is a measure of fit, with 0 denoting a complete lack of fit and 1 denoting a perfect fit. Adding more independent variables to the model, which will raise the R-squared score, is a common issue when applying this test. The model's goodness of fit is evaluated using the F-test. R-squared assesses how well the estimates have explained the actual dependent variable (it is a measure of the strength of the model), whereas the F-test indicates whether independent variables are jointly significant in explaining the dependent variable (LJ Edwards, 2008).

3.7 Definition and Justification of the Variables

3.7.0 **Variable Description**

In order to provide some initial insight into the interactions between several important regression variables, a description of some model variables is provided below before diving into the empirical research of the impact of foreign debt on economic growth in Sub-Saharan Africa.

3.7.1 **Economic growth (GDP)**

The total amount spent on finished goods and services over a certain time period is referred to as economic growth (Lipsey and Crystal, 1999). The GDP variable in this study serves as a gauge for the economic activity of the Sub-Saharan African nations. GDP was suggested by Asiedu (2010) as a metric and illustration of economic growth. The labor force, foreign direct investment, interest rates, exports, government spending, population growth, external debt, inflation, and corruption control are all included as dependent variables that affect the variable under consideration.

3.7.2 **Labor force**

It is impossible to overstate the importance of effective labor resource endowment management for a nation's economic development and progress. Neoclassical growth theories, such as the Solow growth model, ardently support the importance of labor resources in economic growth. While examining the labor force, some factors to take into account are the number of employees, employment rate, and hours worked. The ILO's definition of the economically active population defines the working age population as individuals who are 15 years of age or older (Harasty, 2020).

3.7.3 **Export**

According to the Export Led-Growth Hypothesis, progress in export commodity production is a crucial sign of economic expansion. It is thought that increasing exports will help with better resource allocation, economies of scale, enhanced manufacturing processes brought about by knowledge transfer, job creation, and economic growth. Although it is still debatable empirically, studies like those by Hesse (2009), Mehdi (2012), and Ahmad (2017) discovered a favorable relationship between exports and economic growth. Exports are anticipated to increase foreign exchange profits and assist emerging nations with their external imbalances.

3.7.4 **External debt**

According to Musa (2013), a nation's entire debt to international creditors is known as its external debt. The International Monetary Fund, the World Bank, the African Development Bank, and other bilateral or multilateral organizations are typically the creditors. Debtors can be the government, businesses, or inhabitants of that nation. The amount of nominal public debt in SSA countries has more than tripled since 2010 to around $1.14 trillion by the end of 2022, reversing decades of development achievements. A nation's capacity to invest in vital sectors like infrastructure, healthcare, and education—all of which are vital for economic development—can be hampered by an excessive amount of external debt. The region's countries frequently depend on borrowing from outside to fund development initiatives, but improper debt management can result in a debt trap that stifles potential for future progress and the next generation. Economic growth can be significantly impacted by the terms and circumstances of loans as well as the structure of debt.

3.7.5 **Corruption**

Any dishonesty or criminal activity committed by someone in a position of authority with the intention of obtaining illegal benefits or abusing that position for personal gain is referred to as corruption. The researcher will evaluate how corruption affects GDP in Sub-Saharan Africa and whether or not corruption is under control in these nations. In Sub-Saharan Africa, corruption is referred to as the "red devil" due to the expenses it imposes, which impede investment and economic growth (Hoffman, 2021). Corruption can have a detrimental impact on a nation's economic performance as it is both a sign and an outcome of institutional weakness. According to the World Bank, corruption's causes and effects have grown dramatically over the past 20 years. "The single greatest impediment to economic and social development is corruption; it weakens the institutional foundation that supports economic growth and distorts the rule of law," according to the World Bank (2013).

3.7.6 **Interest rates**

The amount of interest owed each period expressed as a percentage of the amount borrowed, deposited, or lent is known as an interest rate (HA Alafif, 2023). Because Sub-Saharan Africa depends so heavily on outside funding, the relationship between interest rates and GDP in the region is particularly significant (Senadza, 2017). High interest rates can limit the amount of money that governments and companies in the area can invest in initiatives that can spur economic growth by discouraging international lenders and investors from lending to them. Conversely, lower interest rates can draw in foreign capital and stimulate the growth of domestic companies, boosting GDP and economic activity.

3.7.7 **Inflation**

According to Akobi (2021), inflation is a phenomena defined by a persistent rise in the average price level of goods and services in an economy over a period of time. High population growth and currency devaluation are two reasons that have made inflation a major problem for many countries in Sub-Saharan Africa. By decreasing consumer purchasing power, raising production costs for companies, and fostering market uncertainty, high inflation rates can be harmful to economic growth (Umaru, 2012).

In SSA, there are many different facets and a complex relationship between inflation and economic growth. On the one hand, moderate inflation can help the economy thrive by encouraging investment and spending, which raises output and demand. On the other hand, rising inflation can hinder economic growth by lowering real incomes, undermining savings, and skewing investment choices. Therefore, by implementing monetary and fiscal policies, policymakers in SSA must find a balance between promoting economic growth and limiting inflation (Nissanke, 2019).

3.7.8 **Government Spending**

In an effort to promote economic growth and development, the governments of many SSA nations have recently raised their expenditures on public services, social programs, and

infrastructure projects. Asogwa (2013) argues that excessive government spending can result in inflation, increased public debt, and the crowding out of private investment. Other studies, such as Keynesian economics, suggest that increased government spending can boost economic growth in the short term by creating jobs and stimulating demand.

A primary obstacle for Sub-Saharan African nations concerning economic growth and government expenditure is the matter of resource allocation effectiveness and efficiency. Government expenditure in the area is frequently tainted by corruption, inefficiency, and poor management, all of which can impede economic expansion (Diamond, 2008).

3.7.9 **Population growth**

According to Andreev (2021), population growth is the rise in the total number of people in the population during a given period of time. Due to its quickly growing population, SSA confronts particular difficulties with infrastructure development, resource distribution, and employment creation. This has an impact on the general development of the region in both positive and negative ways. On the one hand, an increasing population can boost economic expansion by expanding the market for products and services, increasing consumer demand, and encouraging entrepreneurship and innovation. Rapid population expansion, however, can also put a strain on available resources and cause social discontent, political instability, and environmental deterioration. According to Kararach (2014), a youth bulge and an increasing dependence ratio have been caused by high birth rates and limited access to family planning services in many of the region's countries, placing a significant burden on governments and impeding economic progress.

3.7.10 **Foreign Direct Investment**

When a firm or individual from one country makes an investment in a business interest in another, it's referred to as foreign direct investment. This can take the form of starting operations or buying assets in the other country (Lipsey, 1999). It offers SSA access to resources like cash, technology, and knowledge that would not be easily found at home. Additionally, FDI boosts exports, encourages the development of jobs, and upgrades the

region's infrastructure. By giving businesses the tools they need to grow and innovate, FDI can have a positive effect on economic growth by raising productivity and competitiveness. Foreign direct investment (FDI) carries certain potential dangers, including the exploitation of natural resources, environmental deterioration, and the displacement of local workers and enterprises. Governments in the area must foster a business-friendly climate that draws foreign investors while simultaneously defending the interests of local populations if they are to fully benefit from FDI and guarantee sustained economic progress.

3.8 Diagnostic tests

The reliability and robustness of the regression results obtained from the researcher's diagnostic tests will increase the validity of their conclusions. The tests that will be carried out are the unit root test, Hausman test, and random effect test.

3.8.0 **Unit Root Test**

Gujarati (2013) states that one statistical technique for figuring out whether a time series data collection is stationary or non-stationary is the unit root test. When a data series has a unit root, it may be a sign of a random walk process for the variable, which implies that there isn't long-term stability or cointegration between the variables. Researchers can identify the best modeling strategies and make sure their data analysis is reliable and accurate in capturing the underlying relationships in the data by carrying out a unit root test.

A thorough explanation of several unit root tests, including the Dickey-Fuller and Augmented Dickey-Fuller tests, is given by Gujarati (2013). According to Gujarati, a stochastic process is considered stable if its mean and variance remain constant throughout time and the covariance value between time periods is solely dependent on the separation between them rather than the moment at which the covariance is calculated.

3.8.1 **Hausman Test**

Hausman (1970) states that any hypothesis testing problem where two estimators are available, one of which, β ˆ, is efficient under the null hypothesis that there is inconsistent and the other, β ˜, is consistent under both hypotheses, possibly without achieving efficiency under any of them, can be tested using the testing principle. Hausman's test statistic construction was based on the intuitive assumption of q = β ˆ − β ˜. This difference will converge to zero under the null since both estimators are consistent under the null, but it will not converge under the alternative. Additionally, it is possible to take advantage of the fact that the difference and β ˆ are uncorrelated under the null hypothesis; in the absence of this, the estimator β ˆ might be enhanced, which would go against the efficiency assumption. The Hausman test can be defined easily as the following:

$$m = q'(\text{var}\hat{\beta}_{FE} - \text{var}\hat{\beta}_{RE})^{-1}q,$$

with $q = \hat{\beta}_{FE} - \hat{\beta}_{RE}$

Under RE, the matrix difference in brackets is positive as the RE estimator is efficient and any other estimator has a larger variance. The statistic m is distributed x^2 under the null of RE, with degrees of freedom determined by the dimension of β, K.

Hausman tests elect whether the most appropriate Fixed Effect or Random Effect model is used. If result:

H_0: Select RE ($p>0.05$)

H_1: Select FE ($p<0.05$)

3.8.2 **Random Effect (RE)**

The Random Effects model postulates the absence of any relationship between explanatory variables and unobserved time-invariant effects that are distinctive to a given country. The model assumes that even though the explanatory factors and country-specific time-

invariant are uncorrelated, the regression model needs to account for the influence of these unobserved variables. As a result, the RE model makes use of all available data, yields an unbiased parameter estimate, and has the minimum standard error; nonetheless, bias from the omitted variable would result from the unobserved country-specific time-invariant variable.

Panel data with potential interdependencies between time and individuals in terms of interference variables will be estimated using this model. The error components in the Random Effect model account for the variation in intercepts. The removal of heteroscedasticity is a benefit of employing the Random Effect model. This approach is also known as the Generalized Least Square (GLS) technique or the Error Component approach (ECM).

The Random Effect model differs from the Fixed Effect and Random Effect models in concept. In particular, this model uses the Maximum Likelihood or General Least Square principle instead of the Ordinary Least concept.

3.9 Data Source

The World Bank Databank website provided the information utilized in this study on exports, labor force participation, inflation, interest rates, population growth, external debt, government spending, GDP growth, foreign direct investment, and corruption control. The most recent statistics data on variable estimations were provided by this data source. Precautions were taken to evaluate the information's objectivity, accuracy, and dependability before selecting the secondary data for the study.

3.10 Data choices

The researcher selected secondary data because it offers the following benefits. Since there are numerous studies that confirm the research conclusions, it is helpful to increase their

credibility. Because population data gathered by the World Bank is more likely to produce reliable results than individual researchers on surveys based on relatively small samples, secondary data can produce results that are more accurate than primary data sources. There may be no need to gather data because it may be adequate to meet the researcher's data needs. Secondary data also lowers expenses and saves time compared to original data collection.

3.11 Data Collection

Compiling data on external debt for Sub-Saharan Africa is essential to comprehending the region's economic situation. Efficient data gathering can shed light on the debt loads these nations are facing and reveal patterns and trends that may have an influence on future economic expansion. Panel data from 2013 to 2022 that was taken from the World Bank Databank website will be used in this study's analysis.

3.12 Conclusion

A fundamental starting point for comprehending the complex dynamics of foreign debt in the region is the methodology chapter of the external debt research on SSA. Researchers can obtain a better understanding of the origins, effects, and potential remedies for the external debt problems that the SSA nations are currently confronting by utilizing a wide variety of research methods and approaches. To assist reduce the burden of external debt on SSA economies and advance sustainable development in the region, more study in this field is necessary in the future in order to establish evidence-based policies and initiatives. Data analysis and presentation were made possible by this chapter. Data are analyzed in Chapter 4 and are shown as tables.

CHAPTER IV

DATA PRESENTATION, ANALYSIS AND DISCUSSION

The work force, FDI, inflation growth, government spending, exports of goods and services, total external debt, interest rates, and population growth are the main topics of concern. It is necessary to conduct some empirical tests and use actual data to confirm that these variables are predictors of economic growth. The preferred tool will be the econometric views, often known as E-views. The data on the variables that were used came from the World Bank databank. The chapter includes a discussion of the data, the importance of the results, and the outcomes of the diagnostic test regression.

4.1 Background of descriptive statistics

A key area of statistics that deals with arranging, condensing, and meaningfully displaying data is called descriptive statistics. It offers a means of characterizing a dataset's fundamental characteristics, including the variance, standard deviation, range, mean, median, and mode. Researchers can better comprehend and analyze the data they work with thanks to these statistics. Making sense of big information and coming to conclusions about the Sub-Saharan African nations requires the use of descriptive statistics.

Table 1: Summary of explanatory variable excluding external debt

	Mean	Median	Minimum	Maximum	Std. Dev
Control of Corruption	-0.402	-0.472	-1.597	1.017	0.666
Exports	28.796	27.497	5.672	61.380	12.388
Foreign Direct Investment	2.539	2.053	-10.038	15.589	3.105
Government Expenditure	16.235	14.523	5.457	40.553	7.844
Inflation	11.434	4.209	-11.87	604.94	49.339
Interest Rates	7.068	6.287	-2.367	97.093	8.456
Labor Force	7013281	2685319	36260	3372541	9033327
Population Growth	2.104	2.299	-0.473	3.867	1.044

The table above depicts the descriptive statistics. The maximum and minimum values indicating the outliers of the data. On the measures of normality, all the variables are positively skewed except for population growth which is negatively skewed. Control of corruption, exports and population growth has a flat distribution with kurtosis below 3, while all the other variables has a peak distribution with kurtosis above 3. The sample has 217 observations, with some samples widely spread from the sample mean. The standard deviation measures the average distance of values from the mean and a higher standard deviation suggests greater variability in the data.

Table 2 Summary of dependent variable by-year

YEAR	Mean	Median	Minimum	Maximum	Std. Dev
2013	4.396	4.924	-36.392	21.079	7.429
2014	4.599	4.760	-1.407	10.257	2.645
2015	2.842	3.758	-20.491	10.392	5.188
2016	3.347	3.862	-8.685	10.820	3.744
2017	3.592	3.838	-5.595	10.300	3.298
2018	3.598	3.955	-2.681	8.536	2.656
2019	3.381	3.627	-6.332	9.462	3.139
2020	-2.062	-1.235	-20.805	6.059	5.058
2021	4.129	3.800	-2.668	11.870	3.112
2022	4.467	4.346	-0.953	17.117	3.291

Table 2 indicates that the mean value of GDP growth rate differs from year to year, with a negative minimum value to a positive maximum value in all the countries. For the year 2021 and 2022 the data was positively skewed, whilst from 2013-2022 GDP data was negatively skewed. The data was scattered around the sample in most years with a peaked distribution. The observations were ranging from 42-44 each year. As indicated by the mean and standard deviation values, the data was widely spread with high values of standard deviation.

Table 3 Summary of external debt by year

YEAR	Mean	Median	Minimum	Maximum	Std. Dev
2013	35.928	28.604	7.843	171.15	28.093
2014	37.330	29.272	7.532	196.52	31.561
2015	42.615	36.095	8.653	243.00	37.861
2016	49.265	35.153	10.446	366.03	56.122
2017	50.812	36.211	11.829	358.12	54.438
2018	50.381	37.839	11.624	342.18	52.110
2019	54.288	40.576	9.8745	358.73	55.187
2020	63.894	46.541	10.858	423.26	66.899
2021	60.893	45.139	11.144	406.38	62.216
2022	57.102	43.416	10.075	373.83	57.437

The observations on external debt are 41 in most countries with a 40 in 2022. The data is not too dispersed from the sample mean in each year, with a right skewed and peak distribution. A normally distributed data usually has skewness and kurtosis values of 0. The above data indicates that the values are significantly different from 0 and suggests that data is not normally distributed.

Table 4 Fixed Effects Estimates

Variable	Coefficient	Std. Error	t-Statistic	Probability
Control of Corruption	0.904	1.937	0.467	0.641
Exports	0.301	0.065	4.612	0.000
External Debt	-0.053	0.021	-2.489	0.014
Foreign Direct Investment	0.173	0.145	1.189	0.236
Government Expenditure	-0.171	0.159	-1.071	0.286
Inflation	-0.028	0.009	-3.277	0.001
Interest Rate	0.087	0.050	1.721	0.087
Labor Force	-2.210	3.690	-0.599	0.550
Population Growth	-2.263	1.778	-1.273	0.205

As indicated by table above, control of corruption, exports of goods and services, foreign direct investment and interest rates has a positive impact on GDP growth. This means one percent increase in the control of corruption results in 0.904 increase in economic growth using the fixed effects model. However, the other five variables has a negative impact on GDP growth as indicated by the negative coefficients. This implies that an increase in the rate of inflation by one percent results in decline in economic growth by 0.028. As explained by the coefficient estimates, representing the change in the dependent variable for a one-unit change in the independent variable.

Table 5 Random Effects Estimates

Variable	Coefficient	Std. Error	t-Statistic	Probability
Control of Corruption	1.480	0.570	2.595	0.010
Exports	0.066	0.027	2.445	0.015
External Debt	-0.048	0.011	-4.477	0.000
Foreign Direct Investment	0.149	0.095	1.566	0.119
Government Expenditure	-0.203	0.051	-3.967	0.000
Inflation	-0.014	0.006	-2.207	0.029
Interest Rate	0.031	0.038	0.823	0.412
Labor Force	-3.120	3.520	-0.089	0.929
Population Growth	0.649	0.333	1.951	0.052

The probabilities indicates that more than 3 variables has values less than 0.05, showing that the relationship was unlikely to have occurred by chance. Also, 5 variables of 9 shows a positive magnitude between the variables and the dependent variable. These have positive relationship with GDP growth meaning a percentage increase in those variables result in an increase in economic growth. The table shows that an increase in external debt by one dollar results in a decrease in economic growth by 0.048.

Summary

This chapter linked the findings from many scholars and presented, examined, and debated the study's results. The study's findings showed a negative correlation between population growth, the labor force, external debt, inflation, and government spending with economic

growth and a positive correlation between interest rates, foreign direct investment, exports, and corruption control. This indicates that from 2013 to 2022, Sub-Saharan African nations have difficulties controlling their debt loads. The overall fit of the model however should be assessed. Looking at the R-squared values which measures the proportion of variation in the dependent variable that is explained by the independent variables, the findings indicates that the dependent variable is moderately explained. This brings the researcher to the next chapter of research summary, conclusions and the recommendations.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The effects of external debt on economic growth in Sub-Saharan African nations are empirically analyzed in this research. This study uses a fixed-effects model with panel data to perform the empirical analysis. A panel dataset that spans a sample of Sub-Saharan African nations from 2013 to 2022 is used in the study. The data set contains variables for economic growth, external debt, and other pertinent control variables like interest rates and corruption control, among others. The World Bank's World Development Indicators are the source of the data.

Descriptive statistics of the variables in the dataset are the first step in the empirical study. In order to verify the authenticity of the data and look for endogeneity, appropriate diagnostic procedures like the Hausman test and the Unit root test are carried out. Next, relevant econometric approaches were used to estimate the fixed-effects and random-effects model. The model accounts for additional variables that might have an impact on economic growth and uses economic growth as the primary independent variable.

5.2 Conclusions

Statistics show that the proportion of external debt to GDP in Sub-Saharan African nations has increased. The region's external debt problem is mostly a governance one. Since the fiscal deficit in SSA nations is the outcome of an over-reliance on Keynesian economics, debt is unavoidable.

Much will be overlooked in the region if we limit our attention to econometric findings regarding the effects of external debt on economic growth. In addition to other aspects that cannot be examined by econometric analysis, institutional variables, debt sustainability, debt composition, laws and regulations, and governance quality must all be considered. In SSA, governance is important and goes beyond only considering creditors. Furthermore, why should the nations borrow money? Debt ought to boost the economy.

5.3 Recommendations

The entire area should actively participate in leading projects aimed at reducing debt in SSA. Initiatives to reduce corruption should receive special attention, particularly in nations with abundant natural resources. The Extractive Industry Transparency Initiative should be joined by resource-rich nations since its rules support good governance in participating nations. To make sure that initiatives like tax holidays are not counterproductive, more thought must go into the creation of incentives and policies within the mining industry.

In the region, accountability, monitoring, and transparency are required. Creation of a solid external debt management system as well as an institutional framework for managing debt. There must to be institutional autonomy and a multifaceted approach. Financial independence, meaning the central bank should be permitted to run, control, and oversee its budget and personal independence (security of tenure). The potential to sustain a stable level of inflation in the region is enhanced by the central banks and the Ministry of Finance's independence in assuring debt construction and management.

The governments of Northern and European nations should be reminded that the Sub-Saharan African nations are not only responsible for the debt issue; they must also contribute to its repayment. This indicates that debt relief is necessary, even though it typically encourages bad governance. In order to handle debt portfolio, debt monitoring, debt counsel, administration, and debt creation, the area needs a centralized debt management office.

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APPENDIX

Descriptive Statistics for Table 1

Date:
02/17/24
Time: 22:50
Sample: 1 450

	CONTROL_OF_CORRUPTION	EXPORTS	FOREIGN_DIRECT_INVESTMEN	GOVERNMENT_EXPENDITURE	INFLATION	INTEREST_RATE	LABOR_FORCE	POPULATION_GROWTH
Mean	-0.401801	28.79550	2.539210	16.23504	11.43387	7.068403	7013281.	2.104215
Median	-0.471662	27.49704	2.053581	14.52389	4.209106	6.287500	2685319.	2.299030
Maximum	1.016949	61.37976	15.58900	40.55353	604.9459	97.09333	33725417	3.867091
Minimum	-1.597468	5.671752	-10.03838	5.456823	-11.87632	-2.366667	36260.00	-0.473801
Std. Dev.	0.665912	12.38761	3.105085	7.843942	49.33902	8.456363	9033327.	1.044001
Skewness	0.276259	0.333246	0.218344	1.177746	9.382368	5.873914	1.375781	-0.582582
Kurtosis	2.285104	2.214034	6.671126	3.949467	103.3526	61.13207	3.548779	2.626656
Jarque-Bera	7.381172	9.601834	123.5802	58.31719	94239.10	31802.69	71.17824	13.53531
Probability	0.024957	0.008222	0.000000	0.000000	0.000000	0.000000	0.000000	0.001150
Sum	-87.19080	6248.623	551.0086	3523.003	2481.150	1533.844	1.52E+09	456.6146
Sum Sq. Dev.	95.78267	33145.82	2082.575	13289.92	525817.2	15446.18	1.76E+16	235.4266
Observations	217	217	217	217	217	217	217	217

Fixed Effects Test for Table 4

Dependent Variable: GDP_GROWTH

Method: Panel Least Squares

Date: 02/17/24 Time: 22:35

Sample: 1 450

Periods included: 10

Cross-sections included: 26

Total panel (unbalanced) observations: 207

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONTROL_OF_CORRUPTION	0.904433	1.937402	0.466828	0.6412
EXPORTS	0.301359	0.065339	4.612250	0.0000
EXTERNAL_DEBT	-0.053222	0.021377	-2.489704	0.0137
FOREIGN_DIRECT_INVESTMEN	0.172604	0.145146	1.189171	0.2360
GOVERNMENT_EXPENDITURE	-0.171157	0.159864	-1.070637	0.2858
INFLATION	-0.028330	0.008646	-3.276638	0.0013
INTEREST_RATE	0.086931	0.050499	1.721428	0.0870
LABOR_FORCE	-2.21E-07	3.69E-07	-0.598548	0.5503
POPULATION_GROWTH	-2.263392	1.778418	-1.272699	0.2048
C	6.065402	6.157924	0.984975	0.3260

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.360535	Mean dependent var	3.408311
Adjusted R-squared	0.234129	S.D. dependent var	4.578422
S.E. of regression	4.006763	Akaike info criterion	5.766784
Sum squared resid	2761.314	Schwarz criterion	6.330288
Log likelihood	-561.8622	Hannan-Quinn criter.	5.994660
F-statistic	2.852198	Durbin-Watson stat	2.269448
Prob(F-statistic)	0.000005		

Hausman Test for Table 5

Dependent Variable: GDP_GROWTH
Method: Panel EGLS (Cross-section random effects)
Date: 02/17/24 Time: 22:41
Sample: 1 450
Periods included: 10
Cross-sections included: 26
Total panel (unbalanced) observations: 207
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONTROL_OF_CORRUPTION	1.480007	0.570405	2.594661	0.0102
EXPORTS	0.066229	0.027088	2.444989	0.0154
EXTERNAL_DEBT	-0.047634	0.010641	-4.476585	0.0000
FOREIGN_DIRECT_INVESTMEN	0.148768	0.094990	1.566151	0.1189
GOVERNMENT_EXPENDITURE	-0.202712	0.051101	-3.966856	0.0001
INFLATION	-0.014189	0.006428	-2.207195	0.0285
INTEREST_RATE	0.031213	0.037929	0.822917	0.4116
LABOR_FORCE	-3.12E-09	3.52E-08	-0.088656	0.9294
POPULATION_GROWTH	0.648890	0.332533	1.951355	0.0524
C	5.768563	1.504747	3.833577	0.0002

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	4.006763	1.0000

Weighted Statistics

R-squared	0.206070	Mean dependent var	3.408311
Adjusted R-squared	0.169799	S.D. dependent var	4.578422
S.E. of regression	4.171645	Sum squared resid	3428.316
F-statistic	5.681424	Durbin-Watson stat	2.043418
Prob(F-statistic)	0.000001		

Unweighted Statistics

R-squared	0.206070	Mean dependent var	3.408311
Sum squared resid	3428.316	Durbin-Watson stat	2.043418

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