BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

THE IMPACTS OF EXTERNAL DEBT ON ECONOMIC GROWTH IN SUB SAHARIAN AFRICA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE

REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE

IN ECONOMICS OF BINDURA UNIVERSITY OF SCIENCE EDUCATION.

FACULTY OF COMMERCE

JUNE 2022

RELEASE FORM

NAME OF STUDENT: SIMBARASHE W MARERWA

DISSERTATION TITLE THE IMPACTS OF EXTERNAL DEBT ON ECONOMIC GROWTH IN SUB SAHARIAN AFRICA

DEGREE TITLE: BACHELOR OF SCIENCE HONOURS DEGREE IN ECONOMICS

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DEDICATIONS

I dedicate this dissertation to my parents, Mr. D. Marerwa and Mrs. S. Marerwa, whose love and care for me made this study possible, as well as my brother, sisters, friends (Matifadza, Rachel, Clifford, Tinotenda, Paul, Smart, and Wisdom), and my supervisor, Dr. Kairiza, for imparting his knowledge to me; without his theoretical guidance, this dissertation would not have been completed.

ABSTRACT

Since the beginning of the debt crisis in the 1980s, experts have debated the influence of external debt on economic development. This research explores whether foreign debt has an impact on Sub-Saharan Africa's economic growth, with the primary goal of this study being to investigate the effects of external debt on economic growth in Sub-Saharan Africa. Theoretical postulates claim that foreign debt has a favourable influence on economic growth, while actual data is mixed. While some studies show that external trade benefits all nations involved, others claim that external debt benefits industrialised countries at the expense of developing countries. This research focuses on attributing to this argument. The influence of foreign debt on economic growth in Sub-Saharan Africa is investigated using the random effects model (REM) approach on time panel data using the E-views 7 statistical package software. The REM is used to analyse corruption, exports (X), foreign direct investment (FDI), labour force, and foreign debt (FD), with Gross Domestic Product as the dependent variable (GDP).Exports and FDI have a strong positive influence on economic growth in Sub-Saharan Africa, but corruption, labour force, and external debt have an unfavourable association with economic growth, according to the findings of this study. Exports have a key role in supporting economic growth in Sub-Saharan Africa, according to the findings of this study.

ACKNOWLEDGEMENTS

The past year of working on my thesis has not been without its hurdles and problems, but there have been those who have worked diligently to ensure that everything goes smoothly. No one travels through life alone, and I want to express my gratitude to my family for their continuous support during my pursuit of this degree. They've helped me get back on my feet when I've been down, and they've given me drive when I've lost faith in myself. Above all, they reassured me that nothing in life is a stumbling block since everything works out in the end, no matter how difficult things appear. I'd also want to thank my supervisor, Dr. Kairiza, for her unwavering efforts in ensuring that I get through all of the steps involved in the intricacy of this dissertation. My appreciation also extends to my fellow students, who assisted me in numerous ways that I am unable to explain in this paper; thank you all, my friends, and may God bless you for all of your efforts in assisting me in completing this thesis. Mai Mavedzenge, Wisdom Madzinga, Rachel kanyanyanya, Kudakwashe Sithole, Rejoice, and Shingirai Marerwa have all been instrumental in my success. Above all, I want to praise God for everything that He has done and will do in my life; it has not been by might or strength, nor has it been through my knowledge or doing, but through the grace of God. May God continue to be with me and lead me through the remaining steps of this degree programme as well as the rest of my life?

ABBREVIATIONS

ADF – Augmented Dicky Fuller

BLUE – Best Linear Unbiased Estimate

CRPN – Corruption

ECM----Error Component Model

FDI – Foreign Direct Investment

FDI—Foreign Direct Investment

GDP – Gross Domestic Product

GLS----- Generalized Least Square technique

LBL—Labour Force

REM-Random Effects Model

OLS – Ordinary Least Squares

X – Exports

ZIMSTAT – Zimbabwe National Statistics Agency

SSA-- Sub Saharian Africa

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CHAPTER 1

1.0 Introduction

The debt issue has been a severe macroeconomic challenge for many developing nations since the 1980s, according to (Dereje and Joakim 2013).From that, numerous thesis are done to discover the origin of the issue, its implications, and a possible remedy. The issue of external borrowing is a hot topic among financial analysts, economists, and policymakers, primarily because of its impact on emerging economies. According to neoclassical growth models, external debt and economic growth both correlate positively. Some argue, on the other hand, that the external loan overhang always reduces economic growth. Most developing countries prioritise economic growth and development, thus funds are raised from a variety of sources, including foreign borrowing, to invest in feasible initiatives that will help them achieve their goals. Sustainable economic development is a fundamental challenge for all countries, especially developing economies, which usually confront ballooning fiscal deficits due to increased debt service levels, particularly foreign debt servicing, and expanding current account deficits.Reinhart et al. (Reinhart et al., 2012). According to Atique and Malik, external debt accounts for a bigger share of public debt in emerging nations. (2012),too much domestic borrowing can lead to financial instability and the exclusion of the private sector as pointed out by Panizza et al., 2010, but developing countries in their early stages of development also need to borrow from abroad due to a lack of funds on capital for investment, as Todaro and Smith point out (2006). The Harrod-Domar growth model has been a major source of inspiration for development economists in recognising the importance of external borrowing in closing the savings-investment gap in developing nations. Debt servicing constraints, according to Krugman (1988), contribute to economic deception, which impedes investment and growth. Eaton, (1993) on the other hand, asserts that external debt complements domestic savings and investment, hence promoting growth .Several justifications have been put out regarding the negative effects of foreign debt on the growth of emerging countries.

1.1Background

. Economic growth is defined as an increase in the amount of national output or revenue over time. It is a critical issue for every country in the world. According to the World Bank (2015), economic growth is critical not just for improving people's living standards but also for reducing poverty levels in a country. The examination of external debt and related aid, particularly for Sub-Saharan African countries, has raised concerns. Recently, there has been widespread consensus that external debt benefits all countries, but empirical research have indicated that Sub-Saharan African countries have benefited from external debt less than rich countries. Developing countries, on the other hand, are not able to generate enough domestic revenue to pay their expenses and must borrow to overcome yearly budget deficits.

According to Ogunmuyiwa, borrowing is the only way to finance infrastructure projects when tax revenue is low and the government does not want to jeopardise macroeconomic stability by printing too much money (2010).Most governments employ offshore borrowing to sustain public services since relying entirely on domestic borrowing could result in financial instability and the exclusion of the private sector (Panizza et al., 2010).

External debt is any public or private debt owed to non-residents that can be repaid using foreign currency, goods, or services, according to the World Bank (World Bank, 2015). Therefore, the term "external debt" refers to the total sum of money that a nation's residents and/or government owe to citizens and/or governments outside. The term "entire debt service" describes the sum of all principal and interest payments made in foreign currency, goods, or services (ibid).Regardless of the exchange rate between the currencies involved, the usual currency for debt repayment is the nation of the lender. The borrower must repay the debt in his own currency, albeit, if both participating nations use the same currency. Normally, public debt is used to cover two types of expenditures: more investment and/or increased consumption, neither of which can be funded with domestic resources. As a result, borrowing nations, particularly emerging economies, are expected to follow similar spending patterns, supporting economic growth and increasing living standards.

External debt can assist enhance economic growth when borrowed money are invested in long-term initiatives that generate revenue to pay off the debt. External debt accumulation, according to Sulaiman and Azeez (2012), does not imply slow economic growth, however were (2001) propounded growth is hampered by a lack of adequate information about the type, structure, and scale of the loan, as well as the inability to pay debt obligations. External borrowing, according to these views, is not inherently harmful to economic growth. The majority of research on foreign debt and economic growth has concentrated on determining the mechanisms by which external debt influences economic growth. For example, Anyanwu (1994) noted that large debt increase discourages private investment because of the threat of greater taxes in the future to service the debt. In addition, other debt-related macroeconomic turmoil in the domestic sector could stifle growth in the economy.

1.2Statement of the Problem

It is challenging to determine the true impact of foreign debt on Economic Growth because it can create problems while also aiding an economy in maintaining economic and financial liquidity and making external money available to support international trade. The majority of Sub-Saharan Africa's external debt is related to infrastructure projects that promote growth and development. In the region, debt servicing issues do occur, mostly as a result of failure to reach growth and development targets brought on by fraud or the improper use of borrowed funds. For reducing concerns about debt repayment, a robust and expanding global economy, as well as significant growth and development in debtor countries, are necessary Debt payment costs ate up more and more of the limited foreign exchange resources available for development funding, causing growth objectives to be missed (Dauda, 2007).

1.3 Goals of the Study

• Determine the impact of external debt on Economic Growth in Sub-Saharan

Africa

• Research the factors that influence Economic Growth in Sub-Saharan Africa

• To provide policymakers in Sub-Saharan Africa with guidance based on the findings

1.4 Research Issues

The study's goal would be to address the following questions:

• What role does external debt have in Sub-Saharan Africa's Economic Growth?

• What elements are influencing Sub-Saharan Africa's Economic Growth?

•What policy recommendations can be drawn from the study's findings?

Hypothesis

It is difficult to forecast whether external debt will have a positive or adverse impact on economic growth. It may have a positive impact if used to benefit society; nevertheless, due to the debt overhang and debt crowding out effect, it may have an adverse impact on economic growth by discouraging investment and promoting capital flight. Through the debt overhang and debt crowding out effects, this study hypothesizes that a high amount of accumulated debt will have a detrimental impact on economic growth. The second and third objectives, as indicated above, are reliant on the study's main objective, which is to assess the influence of foreign debt on economic growth in Sub-Saharan Africa.

As a consequence, the hypothesis that will be examined in this study is the following:

Ho: In SSA, external debt has no impact on Economic Growth.

Ha: External debt has an impact on SSA's Economic Growth.

1.5 Importance of the research

To the Investigator

Undergraduate students must conduct research as part of their Bachelor of Science Honor's Degree in ECONOMICS at Bindura University of Science Education, and it also develops the researcher's skills.

To the economic system

The study aids policymakers in developing strategies that address foreign debt both directly and indirectly. This is accomplished by employing study findings and recommendations.

TO THE BUSE

It lays the groundwork for future research, and the specific findings and recommendations from this study are intended to pique the interest of future researchers.

1.6 The study's limitations

Due to Covid-19 travel restrictions, the researcher was unable to obtain original data from institutions; nonetheless, the researcher would perform the research using internet data platforms from reputable sources. The researcher's capacity to explore the link between foreign debt and economic development will also be limited by financial restrictions. Transportation expenditures and the cost of acquiring data bundles in order to reach additional online data bundle providers will cause financial challenges.

1.7 The study's boundaries

The study examines the effects of external debt on economic growth in Sub-Saharan Africa. This is based on the fact that external debt has existed for a long enough time in Sub-Saharan Africa to enable for such research to be

undertaken. From 1990 until 2020, this study will be **conducted.**

1.8 Definition of key terms

A gain in a country's total production over a period of time, generally a year, is characterised as economic growth (Lipsey,2011).Economic growth is the increase in the inflation-adjusted market value of goods and services generated by an economy over time. It's commonly stated as a percentage of actual GDP growth (IMF, 2012)

Debt service is the amount of money needed over a set period of time to pay off a debt's interest and principal. The overall amount a country owes to overseas creditors is known as external debt. Governments, corporations, and individuals of that country can all be debts.

According to Olivier (2008), debt crowding out is a phenomena that happens when increased government intervention in a market economy sector has a significant impact on the rest of the market, either on the supply or demand side of the market.

"A circumstance in which the expected payback on foreign debt falls short of the contractual value of the obligation," Krugman (1988) defined debt overhang.

1.9 Conclusion

From 1990 to 2020, debt in Sub-Saharan Africa rose rapidly to unsustainable levels, as seen in the preceding chapters. From 1990 through 2020, the following are the external debt patterns. The biggest external debt in Sub-Saharan Africa was more than $100 billion in 1988, while the lowest was US$17.74 billion in 2017. Countries in Sub-Saharan Africa owed multilateral creditors which include IMF and the World Bank a large amount of money. Given the growing debt and poor economic performance during the period under consideration (1990-2020), it's difficult to see why governments would want to continue relying on external financing. Furthermore, the researcher will discuss how numerous issues, such as corruption, Labour force, exports, external debt and foreign direct investment influenced the economic progress of Sub-Saharan Africa. As a result, while evaluating the link between external debt and economic growth, it's critical to account for these variables. Sub-

Saharan African

LITERATURE REVIEW

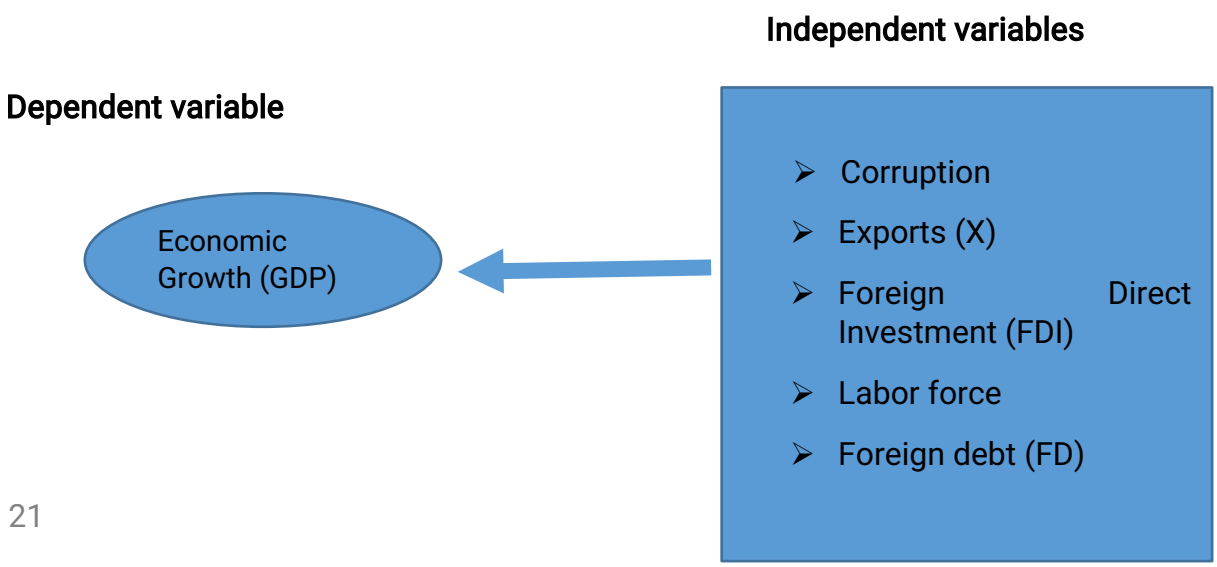
2.0 Introduction

This section will concentrate on the evolution of foreign debt and economic development ideas, which is a mix of new and old views. It is divided into two sections, with the first discussing theories connected to foreign debt and economic growth, with a focus on the major hypotheses of debt overhang, crowding out impact, and crowding in effect. The debt Laffer curve is discussed in the concluding sections of this section to provide insights offered by theory that existed before to this investigation. The second and last segment looks at empirical investigations, examining the objectives, methodology, and conclusions that have been revealed by many studies looking into the subject matter in various countries and areas.

2.1 Framework Conceptual

A conceptual framework investigates how a collection of ideas are linked or related to a certain phenomenon (Svinicki, 2010). It looks at how the dependent variable (economic growth) interacts with the independent variables (Exports, Corruption, Foreign Direct Investment, labour force and foreign

2.2 Conceptual Framework (Fig. 2)n debt).



Source: by the author

The research will look into how the independence has an impact on economic growth. GDP growth means that a gain in GDP is linked to an increase in growth rate, but what influences the increase of each component is extremely diverse. Exports, corruption, labor force, FDI, and foreign debt all have varying effects on economic growth, depending on whether the countries are developed or developing. Additionally, socio-political forces and events have a significant impact on economic growth.

2.3 Theoretical Literature Review

The basic transfer theory is a well-known idea in debt and growth literature. The net of foreign exchange inflows and outflows, as well as their link with external borrowing, is the basic transfer for one country, according to Todaro and Smith (2015). This idea is critical in understanding how external money' debt-creating attribute becomes indebtedness. In other words, the idea clarifies the basic premise of the debtor country's resource inflow and outflow. Capital intake minus capital outflow (net capital inflow) minus total interest payments on total debts is how this idea is calculated numerically.As a result, this idea describes how much foreign exchange a debtor country gains or loses each year as a result of international capital mobility. Todaro and Smith (2025) concluded from their investigation that there is adverse effects association between external debt and economic growth in indebted countries such as those in Sub-Saharan Africa.

Todaro and Smith (2015) provided an equation to demonstrate the concept.

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

Where; = Fundamental Transfer

r = cumulative debt interest rate

d is the rate of increase in the level of external debt.

rD = annual interest payments total

dD = total outstanding debt

D = total external debt

The fundamental transfer balance will be positive when d r is positive, according to the notion, which is based on these two equations. In this situation, the borrowing country will get more foreign exchange as a result of the borrowings, resulting in increased economic growth. The fundamental transfer will be negative when the country begins to lose foreign exchange, r >d.As a result, this concept makes it easier to investigate the link between external and economic growth by looking at the factors that cause d and r to rise or fall. The notion is based on the premise that when D is small, d would be large, according to Todaro and Smith (2015).Todaro and Smith (2015) concurred, calling it a respectable strategy for countries in their early stages of growth and development. Todaro and Smith (2015) says the country's fundamental transfer balance can be split into five situations. Scenario 1 occurs when a big amount of debt has accrued, causing d (rate of rise) to naturally decrease while repayments increase wildly. In the second case, External loans are obtained on more commercial conditions, resulting in a large r. (interest rate on accumulated debt).The third situation is when the overall balance of payments deteriorates due to a decrease in exporting margins. The fourth scenario happens when external shocks, such as a rise in the value of the US dollar, create an economic slowdown. Which is the currency in which the majority of external debt is held. Last but not least, when investor trust in the borrowing country erodes, resulting in lower direct investment. Both the basic transfer equations' levels of d and rare influenced by the scenario described above at times. As previously stated, a negative basic transfer is shown by a lower d and a larger r, signifying capital outflow from borrowing countries that are less developed. Todaro and Smith (2006) address this topic in detail, illustrating the steps of transition from external debt accumulation in the early stages of an economy's development to debt crisis.

Debt Overhang Theory

Krugman, Obstfeld, and Melitz (2017) define debt overhang as a scenario in which the expected present value of future nation transfers is less than the debt's current face value.In an overhang situation, it may still be advantageous for debt lenders to roll over the debt in order to reclaim some of their claims and extract some future country resources. support of this hypothesis, Krugman noted that these payments will be connected to economic performance in a situation where any revenue generated by the debtor country's economy will be used to service the debt. This also means that the borrowing country's debt service will become a larger part of the country's output in the future. Mashingaidze (2014) went on to say that because of the large level of public debt, investors will be unsure of the government's actions in terms of debt servicing plans.

Crowding in Theory

The crowding in hypothesis examines the impact of increasing debt levels, which are necessary since the government would borrow to fund capital expenditures. On the other hand, if the private sector participates, economic growth will be stimulated, and the government will be able to meet its responsibilities through taxes. According to Piana. S (2013), a country may need to increase private sector investment by assuming sole responsibility for capital projects and public service provisions in order to reduce the cost of production per unit for private firms. As an outcome, the government imposes high tax rates on the private sector to service the external debt, resulting in stifled growth in the economy.

Crowding out theory

As the trading circumstances of a highly indebted economy deteriorate and external loan markets become unavailable, excessive real interest costs typically result in crowding out consequences. The dip in investments was ascribed by Claessens et al. (1996) to a fall in the country's available assets

for supporting investments and critical economic functions. Foreign financial market situations that are unfavourable might result in a high local interest rate. Credit rationing will occur as a result of a non-performing debtor's inability to obtain external borrowings. As a result, debtor countries will concentrate on internal processes, squeezing out private sector companies. If it relies on domestic financial markets, the government, as a large organisation, will raise domestic rates. As a result, borrowing costs and production costs per unit will rise. Private investments can be pushed out by contracting public debt to pay budget deficits, according to a similar research by Elmendorf and Mankin (2014).Excessively high interest rates will come from the government's massive borrowing on domestic markets. Moreover, policymakers who were concerned about the debt overhang attempted to determine if the problem was one of solvency or one of liquidity. (Agenor and Montiel, 2015) A liquidity problem is a short-term issue that many countries confront in servicing upcoming debt based on the initial contract, i.e. when countries fail to settle outstanding obligations. A solvency crisis, on the other hand, is a long-term difficulty that countries face when their overall commitments exceed their ability to pay at any moment.

2.4 Empirical Literature

.Checherita and Rother (2010) appear to be the only study that focuses entirely on euro-zone countries at this time. The main purpose of the research is to examine the average impact of government debt on per-capita GDP growth in 12 euro-era countries during a 40-year period beginning in 1970.Data was obtained from 12 European countries using a cross sectional sample from 1970 to 2011.In an OLS estimation equation, debt, savings-to-investment ratio, expanding populations, and interest rate were all included as regression coefficients. The results of a panel regression for the twelve countries show that there is no linear relationship between the impacts of foreign public debt on GDP per capita across the twelve European countries over a long period of time, starting in 1970.

However, evidence of a convex association with a tipping point between 90% and 100% of GDP has been found. Many findings showed that increasing

foreign debt resulted in worse long-term Growth Rates at debt levels of 90-100 percent of GDP. Checherita and Rother (2010) found that annual fluctuations in the public debt ratio and the budget deficit to GDP ratio had a negative and linear association with GDP growth, among other factors. Changes in government debt have an influence on economic development through private savings, public investment, total production, and long-term interest rates, according to the research. Dereje and Joakim (2013) offered empirical evidence in the title of their article. The impact of external debt on Sub-Saharan Africa's economic growth since independence. Using debt crowding out and debt overhang theories, the study's major purpose was to figure out how external debt influences economic development. Data was collected on eight heavily indebted nations at annual intervals from 1991 to 2010.A cross-sectional regression model was used to characterise the pace of economic growth in terms of investment growth, debt to export ratio, inflation, and population growth rate. Eight models were created to assess the true impact of various components of debt on economic development, each with different factors added. The findings of the various models demonstrated a negative relationship between economic growth and external debt. Another interesting conclusion was that the association between external debt and gross national spending had no statistical significance with economic development. Dereje and Joakim came to a broader conclusion, suggesting that foreign debt had a debt crowding out impact on economic development rather than a debt overhang. In addition, the study revealed that heavily indebted countries are not servicing more than 95% of their overall debt.

Silva (2020) did a fascinating study from 1999 to 2019 on the influence of governmental and private foreign debt on economic development in Portugal.Only public and private investments were found as avenues for external debt impacts to be conveyed to economic growth. The primary income account, private saving, total factor productivity, private GVA in volume per person, and private GVA in volume per person were all shown to be meaningful and unaffected by external debt. External debt had no effect on the input to the production function, according to the study. According to Karagol (2019), the relationship differs from nation to country, making broad generalisations difficult. Existing ideas such as the Laffer curve and the debt overhang concept must be addressed separately in each scenario. Hameed et al. (2012) performed research to investigate the relationship between Pakistan's external debt and economic development. They employed a production-proven technique using time series data of GDP as the variable to measure and debt service, capital stock, and labour force as repressor's from 1970 to 2003.The study looked at the seemingly ever-changing influence these elements have on economic performance. To identify a long-term link between the variables, they employed a number of integration strategies. Their research found that debt servicing has a long-term adverse impact on GDP, which they attribute to its negative impacts on capital and labour productivity. Granger causality was also estimated using a vector corrective model, demonstrating that debt service to GDP has both short- and long-run negative causation.

2.5 Conclusion

There are many different points of view on the variables that have an impact on the links that exist between foreign debt and economic progress. Numerous hypotheses contend that debt has a negative impact on long-term economic Growth. The generalisations made by theories that debt fosters economic development in the near term but has negative impacts due to debt overhang and crowding out effects in the long run are also summarised by the credit rationing effect. The framework for the empirical analysis approach was established in this chapter, and it will be covered in the following chapter.

Models from theories and earlier research will be modified to fit the objectives of this study while also taking the research methodology into account.

CHAPTER 3

METHODOLOGY

3.0 Introduction

The theoretical framework and empirical model used in this study to evaluate the impact of foreign debt on economic growth in Sub-Saharan Africa are explained in this chapter. It also discusses the statistical methods and diagnostic tests that are employed when panel regression is used to look at the effects of foreign debt on economic growth.

3.1 Research Design

Research design is the overarching approach for combining the different components of the study in a clear and logical manner. According to Akhtar (2016), research design is a precise plan or procedure for conducting the study that allows the researcher to turn a theoretical hypothesis into an active hypothesis. The research design used in a study has a big influence on the accuracy of the findings (Cresswell, 2014). Descriptive and explanatory research designs are the two types of research designs available. The descriptive study design forecasts a universal link between variables with universal validity.

Explanatory study design provides solutions to the why issues that arise throughout the development of casual explanations. The research will primarily employ econometric tools to examine the impact of foreign direct investment, corruption, exports, external debt, and the labor force on the economic growth (GDP) of Sub-Saharan Africa. Because secondary data is used, the study is primarily quantitative. In order to collect the necessary

information, achieve the study's aims, and respond to the study's questions, quantitative methods on panel data will be employed in this investigation.

3.2 Descriptive Research

Descriptive research summaries raw data in a format that can be used (Cresswell, 2014). It is thus appropriate for this research because it entails transforming unprocessed data into a more useable format in order to facilitate predictions and estimations without affecting the data's character.

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3.3 Methodology

To estimate the influence of foreign debt on economic development, the Huasman Test, a Random effects technique for estimating economic growth equations using GDP as the dependent variable, will be utilised in this study.Panel data from Sub-Saharan Africa was utilised in the study, which covered the years 2017 to 2020.The best linear and unbiased estimator (BLUE) criterion are fulfilled by the OLS parameters.In the OLS method, the model estimate includes an error term to account for the impacts of undefined components.

3.4 Theoretical Model Specification

This study is based on the Classical Cobb-Douglas production function, which was invented by Charles Cobb and Paul Douglas in early 1947. Because the Cobb Douglas function is related with complexities when it comes to regression, they argued that output be a function of Labor and Capital. As a result, the model is specified in transcendental logarithmic (Tran slog). The Cobb Douglas production function is a simplified version of the trans log function.

Economic growth (GDP) is a function of labor (L) and capital (K), as seen in the equation below:

The Cobb Douglas function of the equation is like this

GDP=L K... (1)

The Cobb Douglas function of the equation the follows

$$GDP = \lambda L^{\alpha} K^{\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where:

λ =productivity of all factors

L=Change in the labour force as a percentage of the total population

K=Gross Fixed Capital Change in Percentage

GDP= stands for Gross Domestic Product.

3.5 Empirical Model

The production function evolved into an econometric model in which corruption, exports, external debt, foreign direct investment, and labour force affect a country's productivity level.Economic Development (GDP)

The mathematical model will be built on the Sub-Saharian Africa economic methodology proposed by Omoju and Andesanya (2012).

The following is the quantitative model:

$$GDP = (TT,FDI,ed\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

$$\log GDP = \beta_0 + \beta_1 FDI + \beta_2 + \beta_3 ED + \beta_4 LB + \beta_5 CRPN\mu\ldots\ldots\ldots\ldots\ldots(4)$$

Where:

GDP =measure of Economic Gowth

FDI =Foreign Direct Investment

X =measure of exports (summation of exports)

ED =external debt

LB =labaour force

CRPN = Corruption

The regression approach that will be utilized for analysis of the dependent variable, this model being economic growth represented by Gross Domestic Product denoted by GDP, is ordinary least square. The sum of exports from Sub-Saharan African countries, foreign direct investment, labor force, corruption, and external debt are all explanatory variables. Because the data was in American dollars, the explanatory and dependent variables were logged to bring the data to the same level.

Below is the econometric model:

$$GDP = f(FDI,X,ED,LF,CRPN) \quad \ldots\ldots(5$$

Below is the econometric model:

$$GDP = \beta_0 + \beta_1 FDI + \beta_2 X + \beta_3 ED + \beta_4 LB \beta_5 CRPN + \mu \quad \ldots\ldots(6)$$

Where:

β_0 =intercept of the relationship in the model/constant

$\beta_1 - \beta_5$ =Coefficients of exogenous variable

μ =the error term

The model can be presented in logarithmic form as follows:

$$logGDP = \beta_0 + \beta_1 logFDI + \beta_2 logX - \beta_3 logED + logLB - \beta_5 logCRPN + \mu \quad \ldots\ldots(7)$$

The variables' signs are calculated using the e priori expectation. When the direction of the relationship between the explanatory variables and the independent variables is determined by their relationship based on traditional economic theory, this is known as a causal relationship.

Secondary data is information gathered that has previously been gathered

and does not require interaction with participants. The information could have been gathered previously for purposes other than research. Exports (X), labour force (LB), external debt (ED), corruption (CRPN), and foreign direct investment (FDI) will all be used as control variables of the study. Panel data for Sub-Saharan Africa from 2017 to 2020 is also used in the study. Secondary data is referred to as past records because it has previously been compiled and does not include new information. Due to the outbreak of the Corona Virus, data collection from 2019 to 2020 proved challenging. According to Mikesell and Zinser (1973), it is difficult to get reliable and valid data in developing countries. As a result, the data in this study is likewise a victim of the common data problem, though it will not have a detrimental impact on the study's conclusions.

3.5 Model Specification Test/ Measure of goodness of fit

The goal of the specification tests is to help the researcher figure out which model best matches the data. The F-test and the R squared will be employed in this model. The R squared is the percentage of variance in the regress ant that can be explained by the repressors' squared is a number that goes from 0 to 1, with 0 representing perfect fit and 1 indicating severe lack of fit. The most common problem with this test is that the R squared value climbs when more repressors are added to the model. The F test is used to assess the data's overall significance. Both the F-test and the R squared provide the same findings

3.6 Variables Definition and Justification

3.6.0Description of a Variable

Before proceeding into the empirical examination of the impact of external debt on economic growth in Sub-Saharan Africa, a synopsis of some of the model's variables is provided below to provide some preliminary explanations for the connections between several major regression variables.

3.6.1 Economic growth (GDP)

Economic growth, according to Lipsey and Crystal, is the sum of all total expenditure on final items and services during a specific time period

(1999).GDP is the measure of economic activity in Sub-Saharan African nations utilised in this study.GDP is a metric and representation of economic growth, according to Asiedu (2010).The variable is also treated as a dependent variable in equation 4, as it is influenced by FDI, exports (X)

3.6.2 Labour Force (L)

Making the best possible use of a nation's labour resource endowment is essential for its economic development and prosperity. Neoclassical growth models, like the Solow growth model, strongly support the importance of labour resources in economic growth. Some of the factors considered when calculating the labour force include the number of employees, population growth rate, employment rate, and number of hours worked. In this study, the term "workers" or "labour force" will refer to all those aged 15 and older who fit the ILO's definition of an economically active population (see Iyoha, 1999).

3.6.3 Export

According to the Export Led-Expansion Hypothesis, rising export commodity output is a sign of economic expansion. The goal of export development is to promote better resource allocation, economies of scale, and technological advancements through technology transfer, job creation, and economic growth. Export has a favourable impact on economic growth, according to empirical research by Balassa (1985), Ram (1987), and Khalifa Al-Youssif (1997), but the relationship between export and growth is still debatable in the literature. Exports are anticipated to aid emerging nations in reducing the total sum that a nation owes to foreign creditors is referred to as its "external debt”? Debts of the nation may be held by its governments, businesses, and citizens alike.

3.6.5Corruption

Person in a position of authority may engage in corruption if they act dishonestly or illegally in order to obtain unfair benefits or abuse their position for their own benefit. The researcher will investigate if this has an influence on Sub-Saharan Africa's GDP.This was one of five variables that

had a percentage given to it, totalling 100.In Sub-Saharan Africa, corruption is regarded as the "red devil" because of Corruption is a symptom and effect of institutional failure, and it can harm a country's economic performance. The sources and consequences of corruption have risen considerably in the last two decades. According to the World Bank, corruption is "the single biggest impediment to economic and social progress" because it "undermines development by distorting the rule of law and weakening the institutional foundation on which economic growth is built" (World bank.org. 2013). 3.6.6 Debt and Dummy Interacted Variable (corruption)

To capture the impact of external debt on growth and corruption in Sub-Saharan African countries, the dummy variable for corruption will be interacted with foreign debts.

Money borrowed can be used to supplement their relatively low national income for the provision of basic public goods with low returns on investment, while the debtor spends the remainder in their own enterprises or in their own interests, which is corruption.

3.7Diagnostic tests

3.7.0 Unit Root Test

A stochastic process is said to be stationary, according to Gujarat (2003), if its mean and variance remain constant throughout time and the value of the covariance between two time periods solely depends on the distance between the two time periods, not on the moment at which the covariance is computed. A unit root test for confirming stationary variables and preventing erroneous regression is the Augmented Dicky-Fuller Regressions.

3.7.1 Hausman test

Hausman test, another statistical testing principle, is just a specific application of this fundamental idea in panel econometrics. It is, in fact, an application that Hausman suggested in his initial contribution. The Hausman principle can be used to any hypothesis testing problem that has two

estimators, the first of which is available β ˆ while the other estimator is efficient under the null hypothesis but inconclusive under the alternative, is efficient under the null hypothesis but inconclusive under the alternative. β ˜ under both assumptions, is consistent, possibly without achieving efficiency under either of them. Hausman had the brilliant idea of creating a test statistic based on the data. q = β ˆ − β ˜.This difference will converge to zero under the null due to the consistency of both estimators, however it will fail to converge under the alternative due to the inconsistency of both estimators. Furthermore, one can take use of the fact that the difference β ˆ uncorrelated under the null hypothesis; otherwise, the estimator β ˆ could be improved, contradicting the efficiency assumption.

The Hausman test can be explained 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 χ^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:

H0: Select RE (p> 0.05)

H1: Select FE (p <0.05)

3.7.2 Random Effect (REM)

According to the Random Effects model, there is no correlation between explanatory factors and unobserved country-specific time-invariant effects. Although there is no correlation between the country-specific time-invariant and explanatory variables, the model presupposes that the impact of such unobserved factors must be represented in the regression model. By utilising

all available data, the RE model produces unbiased parameter estimates and the smallest standard error, however the unobserved country-specific time-invariant variable would lead to bias from omitted variable With interconnected interference variables between individuals and over time, this model will estimate panel data. The error terms for each company in the Random Effect model deal with the mismatch between intercepts.

Heteroscedasticity is eliminated in the Random Effect model, which is a benefit. The random effect model differs from the common effect and fixed effect models in that it uses the Error Component Concept (ECM) or Generalized Least Square (GLS) and concept rather than the Ordinary Least Squares (OLS) principle. The general least squares roach is another name for this model.

3.7.3 Data Source

The data on exports, labour force, corruption, external debt, and FDI utilized in this analysis came from the World Bank's open data website. This data source supplied statistical data on variable estimates that was up to date. When selecting secondary data for the study, care was taken to assess the information's correctness, reliability, and objectivity

3.8 Data Choices

The researcher used secondary data because it has the following benefits: it helps to strengthen the credibility of the research findings because there are other studies to back them up. Secondary data sources can provide more reliable results than primary data sources because government-collected population data is more likely to produce accurate results than independent researchers conducting surveys with tiny samples. It may be sufficient to meet the researcher's data requirements, obviating the need for data collection. Furthermore, secondary data lowers expenses and minimizes the amount of time required to obtain main data.

3.9 Data Collection

The panel data for GDP, exports, FDI, external debt, labour force, and corruption for Sub-Saharan Africa will be downloaded from the World Bank Open Data website for this study's research.

3.10 Conclusion

This chapter has outlined the approach to be employed as well as the numerous procedures that must be completed before the results can be interpreted. The explanatory variables (exports, foreign direct investment, external debt, labour force, and corruption) were also justified. The previous chapter laid the groundwork for data visualization and analysis. The data is analysed in Chapter 4 and presented in tables. In order to undertake regression analysis, the research employed Econometric Views 7 software.

CHAPTER 4

4.0. Introduction

It would be illogical to assume that EXPORTS, EXTERNAL DEBT, FOREIGN DIRECT INVESTMENT (FDI), CORRUPTION, and LABOR FORCE are predictors of economic growth without conducting empirical testing using real data. The use of empirical tests to present and analyse data (exports, labour force, external debt, foreign direct investment (FDI), and corruption) is the main topic of this chapter. The findings will serve as the foundation for generating conclusions and determining the best course of action. The software econometric views (E-Views) will be utilized. The data for the variables was gathered from World Bank indicators. The data description, diagnostics test

regression results, and significance of the results are all included in this chapter.

4.1BACKGROUND DISCRPITIVE STATISTICS

Standard deviation, mean, maximum, minimum, and other measures of dispersion are among the descriptive statistics often used, as shown in the table below. The most common method for detecting outliers in a data collection is to utilize minimum and maximum measures. For each individual variable, there are 132 observations. Export corruption and FDI have the lowest standard deviations in the table, with 0.709, 1.141, and 6.96, respectively, suggesting that variability is at its lowest level, implying that these variables are most reliable in explaining differences in Gross Domestic Product (GDP). All variables have a normalcy of greater than 0.01 on the normality scale, indicating that they can be used to explain GDP. On our Jarque-Bera normalcy test, we can see.

TABLE 1

	CORRUPTION	EXPORTS	EXTERNAL_DEBT	FDI	LABOR FORCE
Mean	2.606	27.482	49.509	0.467	8.128
Median	2.500	27.307	39.871	0.234	5.478
Maximum	4.500	54.299	170.699	12.296	29.220
Minimum	1.000	0.436	9.466	2.10E	1.098
Std. Dev.	0.710	12.959	33.900	1.141	6.968
Skewness	0.184	0.002	1.425	8.691	1.439
Kurtosis	2.741	2.267	4.668	89.137	4.096
Jarque-Bera	1.112	2.952	59.974	42469.85	52.173
Probability	0.573	0.229	0.000	0.000	0.000
Sum	344.000	3627.573	6535.227	61.657	1072.951
Sum Sq.	66.0152	21998.99	150546.1	170.575	6360.729

Dev.					
Observations	132	132	132	132	132
Sum	344.000	3627.573	61.657	2.053	1072.951
Sum Sq. Dev.	66.015	31998.000	170.575	1.253	6360.729
Observations	132	132	132	132	132

The table below contain dependent variable

TABLE 2

	GDP
Mean	1.552
Median	1.913
Maximum	1.263
Minimum	1.888
Std. Dev.	3.093
Skewness	2.456
Kurtosis	7.945
Jarque-Bera	267.204
Probability	0.000
Sum	2.053
Sum Sq. Dev.	1.254
Observations	132

4.2 Correlation Analysis

The link between the dependent and independent variables is depicted by the coefficient of dertemination.The correlation matrix in the appendix displays the link between economic growth and all of the study's independent variables, indicating that GDP is positively connected with the bulk of them.

4.3Regression results

RANDOM EFFECTS MODEL

Panel list square without interaction dummy

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	6.653	6.443	1.031	0.304
CORRUPTION	-3.503	9.453	3.707	0.003
EXPORTS	7.652	4.902	0.156	0.876
EXTERNAL_DEBT	-2.342	1.912	1.222	0.224
FDI	2.333	1.852	0.126	0.899
LABOR FORCE	-2.033	3.502	-0.578	0.564

4.4REM model

TABBLE 4 with the interaction dummy

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.553	6.483	1.164	0.246
CORRUPTION	-3.033	9.322	3.246	0.002
EXPORTS	1.132	4.882	0.232	0.817
EXTERNAL_DEBT*CORRUPTION	-9.542	8.402	1.136	0.258
FDI	2.402	1.853	0.129	0.900
LABOR FORCE	-1.823	3.483	-0.523	0.602

Presentations of the results

Equation 1 without interaction dummy

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.863	1.183	3.277	0.001
CORRUPTION	-1.353	3.703	-0.364	0.016
EXPORTS	3.443	2.153	-1.599	0.012
EXTERNAL_DEBT	-1.683	7.702	-2.187	0.031
FDI	2.843	2.233	1.274	0.025
LABOR FORCE	-9.233	3.993	-2.312	0.022

Substituting co efficient

GDP=3.863-1.35ECORRUPTION+3.443EXPORTS+11-1.683EXTERNAL DEBT+2.843+FDI-9.233LABOR FORCE.

EQUATION 2 With interaction dummy

C	2.733	1.173	2.335	0.021
CORRUPTION	-5.503	4.103	-1.339	0.022
EXPORTS	3.323	2.173	1.534	0.017
EXTERNAL_DEBT*CORRUPTION	-6.632	3.052	-2.172	0.031
FDI	2.912	2.232	1.303	0.005
LABOR FORCE	-8.663	3.993	-2.169	0.031

SUBSTITUTIING COEFFICIENT

GDP=2.733-5.503CORRUPTION+3.323-6.632EXTERNAL_DEBT*CORRUPTION+2.912FDI -8.662 LABOR FORCE

The coefficient of corruption is -1.353, indicating a negative link with his confirms. Exports in Sub-Saharan Africa have a positive influence on economic growth, which is statistically significant at 5% and has a coefficient of 3.333, implying that a 1% increase in export production boosts economic growth. Furthermore, FDI has a favourable impact on economic growth, with a 2.913 percent rise in economic growth for every 1% increase in manufacturing production. Finally, labour force has a negative correlation with economic growth, and the interaction between corruption and foreign debt is also negatively correlated with economic growth, while foreign debt is also negatively correlated with economic growth with a value of Prob (F) of 0.0200 less than the critical value of 0.05, indicating that the full model is true.

4.5 Summary

The findings of the study, which were connected from different researchers, were presented, reviewed, and debated in this chapter. This research discovered a positive link between exports, foreign direct investment, and economic development, as well as a negative link between labour force, corruption, and foreign debt. The link was observed in a sample of 33 countries in Sub-Saharan Africa during a four-year period.

CHAPTER 5

5.0. Introduction

This chapter discusses the study's summary, overall results, and areas for future investigation. The study's major goal was to look into the effects of external debt exports, corruption, foreign direct investment, and the labour force on economic growth in Sub-Saharan Africa. This chapter first provides an overview of the study's findings, followed by conclusions that reflect the research aims, and finally, recommendations and suggestions for further research.

5.1. Summary of the study

External debt has a detrimental relationship with economic progress, according to the conclusions of this study. Simply put, rising foreign debt has a negative influence on economic development. These findings backed up Humpage's (2000) theory that exports and economic growth have a positive relationship. Other factors to consider Economic growth was inversely related

to labour force, corruption, and external debt. These findings imply that the more these three variables are increased, the greater the economic depreciation. Furthermore, based on the findings, exports and foreign direct investment are statistically irrelevant in explaining economic growth variances.

5.2. Conclusions

The study concludes that exports are critical to the economy's strength. There positive association emerged because Sub Saharian Africa export has significant amount of capital goods and services, which contribute to output, particularly in agriculture and tourism. According to the research, the inverse relationship between labour force and economic growth implies that in Sub-Saharan Africa, more labour equals more economic growth, so the higher the number of people employed, the higher the economic growth, so a low labour force negatively affects production, resulting in lower output and lower GDP.According to the research, corruption has a detrimental association with economic growth in the sense that senior ministers misuse cash for their own interests or personal nosiness rather than the needs of citizens or the demands of the country, scaring away potential investors. Limited investment levels in Sub-Saharan Africa result in low output for export as well as meeting local demand.

5.3. Recommendations

The favourable association between FDI and economic growth does not imply that Sub-Saharan Africa must rely on foreign investors; rather, it must rely on domestic investors so that resources are not looted and externalization is reduced. They must provide a credit system for local investors so that they can obtain loans and invest, as well as impose some restrictions on foreigners to allow our own people to invest. Incentivizing local manufacturing firms-the government may provide long-term loans to manufacturing firms to help them succeed during difficult times and expand so that more people are employed, thereby reducing unemployment and poverty as well. The primary purpose of foreign debt in Sub-Saharan Africa is to encourage economic growth and development. Increased export income, which would be assisted by an export-led growth plan, might be used to

achieve this

To lessen their reliance on traditional export commodities, SSA countries must diversify their export items. In order to maximise export earnings and create employment opportunities to accommodate the expanding labour force, it is necessary to establish new industries and give local ones the freedom to develop and produce commodities in which their respective nations have a comparative advantage. These actions would also significantly advance the process of development.

Regulators need to provide a framework for their policies that works with the availability of dependable external funding. To increase investor confidence and decrease reliance on foreign debt, ensure macroeconomic stability (a sound fiscal position, a stable exchange rate, a low interest rate, low inflation, and so on), credibility of policy, and political stability. Government officials must implement strict rules, hire impartial individuals, and establish an organisation to deal with and investigate all forms of corruption because there is an inverse relationship between corruption and economic growth in Sub-Saharan Africa. Under no circumstances should this organisation be influenced.

5.4 Areas for further study

More research is needed to determine how technology affects economic growth. Technology is one aspect that influences the industrial sector, but because technology is difficult to define, this study has not yet been completed in Sub-Saharan Africa. Due to the high prices associated with

these machines, technological transfer in Sub-Saharan Africa is minimal, which has a detrimental impact on manufacturing sector production. The machinery in use is out of date and inefficient, resulting in lower efficiency when compared to other continents such as EUROPE and AMERICA.

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APPENDIX

HAUSMAN TEST FOR TABLE 3

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.133365	5	0.2935

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CORRUPTION	3332425348111.3488	3501447883485.4863	47791077163957606000000	0.4394
EXPORTS	26916262063.51107575	7646216781.121959	1269803964455845900000	0.0873
EXTERNAL_DEBT	20060743832.307397	23391221316.464978	28772560438589063000	0.5347
FDI	33015628534.4945131	23347898191.711713	28943042586586644000	0.0723
LABOR FORCE	-37560364435.553175	-202564014207.53328	36324854590639081000000	0.2077

HAUSMAN TEST FOR TABLE 4

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.
Cross-section random	6.278763	5

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)
CORRUPTION	2915217832404.7481	3025860763826.5913	1754041716776815300000
EXPORTS	30341014934.165319	11342523658.593830	1113792413125773900
EXTERNAL_DEBT*CORRUPTION	8569565415.646136	9539940833.288137	5211131944846426300
FDI	33397818702.982881	23957934439.748138	2788476041406971900
LABOR FORCE	51714138382.279588	-1819034115 26.08225	3444299735784495000000

DATA USED

ID	YEAR	country name	EXTERNAL DEBT	UNEMPLOYMENT	EXPORTS
1	2017	ANGOLA	51.62871083	7.407999992	29.00410005
1	2018		67.59520795	7.421000004	40.83628989
1	2019		78.68797929	7.421000004	39.3438257
1	2020		125.8827065	8.333000183	37.78816665
2	2017	BURUNDI	22.11426797	1.588999987	7.4447026
2	2018		21.87757189	1.587000012	9.401038141

2	2019		22.51518707	1.588999987	9.131191569
2	2020		21.9157127	1.707000017	4.984201658
3	2017	BENIN	22.11426797	1.644000053	27.20559478
3	2018		21.87757189	1.470000029	27.27423062
3	2019		22.51518707	1.470000029	29.63052719
3	2020		21.9157127	1.583999991	19.87247043
4	2017	BURKINA FASO	23.32391982	4.563000202	25.9159648
4	2018		21.56069438	4.690000057	26.45238564
4	2019		24.05579761	4.69299984	28.07890614
4	2020		26.97166557	4.894999981	27.61611212
5	2017	BOTSWANA	10.69186934	21.56599998	42.96473613
5	2018		10.49998656	22.07099915	44.53578693
5	2019		9.466339707	22.61000061	37.38315244
5	2020		10.58309309	24.93000031	31.07925477
6	2017	Cote d'Ivoire	26.87034103	3.269999981	24.92012188
6	2018		28.99984654	3.292999983	22.64068269
6	2019		34.78049776	3.318000078	23.77627756
6	2020		42.15920752	3.487999916	21.55155517
7	2017	Cameroon	28.42549275	3.599999905	18.35109858
7	2018		27.84787941	3.617000103	18.73625347
7	2019		33.09325135	3.638000011	19.85009075
7	2020		34.72909013	3.836999893	15.03506913
8	2017	Congo, Dem. Rep.	13.76046761	4.465000153	30.69015456
8	2018		10.80509964	4.451000214	34.11010433
8	2019		11.47395056	4.451000214	26.45894621
8	2020		12.93574499	5.265999794	28.60458745
9	2017	ethopia	32.19526197	2.299000025	7.629368622

9	2018		33.18834886	2.318000078	8.372675866
9	2019		29.76691729	2.325999975	7.939976609
9	2020		28.36145785	3.236999989	7.089634178
10	2017	Cabo Verde	104.8412753	12.23999977	45.92281296
10	2018		92.06717904	12.17000008	48.95264437
10	2019		93.93082035	12.21899986	50.64929202
10	2020		124.5555324	15.30599976	24.85098202
11	2017	Gabon	46.47103262	20.72100067	50.22675397
11	2018		43.23256513	20.74900055	54.29907649
11	2019		46.41135581	20.74200058	51.43107323
11	2020		52.51113762	21.97200012	47.6878746
12	2017	Ghana	38.67697204	4.21999979	33.87687443
12	2018		36.05680286	4.276000023	33.45489588
12	2019		40.80563938	4.315999985	37.44959942
12	2020		44.2562545	4.651000023	32.22045536
13	2017	Guinea	23.24680883	4.914000034	44.66029845
13	2018		22.61720552	4.982999802	40.20709553
13	2019		23.33691776	5.019999981	29.9609048
13	2020		29.11689016	6.103000164	53.14072237
14	2017	Gambia, The	44.7555908	9.484999657	16.78945539
14	2018		41.89900677	9.475999832	21.7264295
14	2019		39.97871502	9.498000145	18.85171846
14	2020		42.22116107	11.08100033	7.998160774
15	2017	Guinea-Bissau	31.41505076	5.986000061	27.77397262
15	2018		35.82403806	5.981999874	25.27609497
15	2019		41.57894074	6.035999775	20.28794966
15	2020		55.34350075	6.736999989	14.38704388
16	2017	Kenya	33.44161676	3.513000011	12.73665994
16	2018		34.59236797	4.249000072	12.54197533
16	2019		35.31354897	5.010000229	11.4080204
16	2020		38.45294598	5.729000092	9.677991949

17	2017	Lesotho	35.71285736	8.647999763	46.03836454
17	2018		31.54269818	8.623999596	49.62688036
17	2019		34.78565875	8.678999901	46.24225835
17	2020		50.14912852	9.901000023	47.13846363
18	2017	Mali	28.7830807	7.409999847	22.21409394
18	2018		27.9658267	7.427999973	24.5223744
18	2019		30.61900005	7.441999912	25.70529113
18	2020		36.30648049	7.696000099	29.23943538
19	2017	Mozambique	123.3605943	3.450999975	33.54531717
19	2018		128.3731046	3.45600009	38.57905103
19	2019		133.2804559	3.46600008	44.87000288
19	2020		154.4051908	3.809999943	40.76273421
20	2017	Mauritania	78.19616423	10.34000015	34.50567753
20	2018		71.42610617	10.38500023	34.27623669
20	2019		68.90093842	10.39299965	39.18475991
20	2020		73.13165077	11.27000046	39.77502119
21	2017	Mauritius	108.7456226	6.75	42.45178816
21	2018		101.4665176	6.429999828	40.96343734
21	2019		115.0430189	6.329999924	38.47033842
21	2020		155.6638483	7.407000065	30.00404941
22	2017	Nigeria	12.56816028	8.390000343	13.1715621
22	2018		14.30650137	8.456000328	15.49688918
22	2019		13.85329809	8.529999733	14.22092679
22	2020		16.94284744	9.713999748	8.829529544
23	2017	Namibia	48.24373066	5.647999763	33.62080463
23	2018		46.19393622	5.605000019	35.88256521
23	2019		46.03625451	5.623000145	36.44026708

23	2020		53.03307412	6.356999874	33.37477526
24	2017	Rwanda	56.64231118	1.136999965	20.52838528
24	2018		61.13562514	1.110999942	21.10059751
24	2019		65.09735741	1.09800005	21.80876647
24	2020		81.14466826	1.485000014	19.03028807
25	2017	Sudan	54.75483576	17.53300095	0.664361796
25	2018		73.85099813	17.57999992	0.611168056
25	2019		90.74247634	17.65399933	0.630574147
25	2020		115.5929924	19.64900017	0.435765182
26	2017	Senegal	48.11622247	3.690000057	21.93008315
26	2018		56.32112836	3.275000095	22.94909148
26	2019		66.83346953	2.859999895	24.3102657
26	2020		71.69028086	3.622999907	20.59957565
27	2017	Eswatini	15.91651401	22.75300026	43.51310787
27	2018		11.76771581	22.79199982	40.4420426
27	2019		15.59090398	22.83699989	45.64936191
27	2020		21.43325667	25.50900078	45.02390217
28	2017	Togo	25.71349885	3.74000001	25.27023832
28	2018		24.11237844	3.729000092	23.94347526
28	2019		27.75369646	3.719000101	23.06158195
28	2020		33.54398146	3.944999933	21.82953103
29	2017	Tanzania	41.10489889	2.177000046	15.14027774
29	2018		39.76395479	2.20600009	14.73914343
29	2019		39.03159302	2.221999884	16.00786388
29	2020		41.2504512	2.528000116	14.29548765
30	2017	Uganda	38.8819899	1.932000041	16.66112942
30	2018		38.48400351	1.922999978	15.08705306
30	2019		40.56995961	1.924999952	17.10905802
30	2020		46.53501289	2.767999887	15.41479854
31	2017	South Africa	47.16460841	27.04000092	27.34007578
31	2018		44.23644735	26.90999985	27.48858813

31	2019		49.00373935	28.46999931	27.34218049
31	2020		51.77591116	29.21999931	27.77801144
32	2017	Zambia	92.83179043	11.63000011	34.99285776
32	2018		90.81824473	12.01000023	37.95740455
32	2019		121.0537733	12.52000046	34.6361926
32	2020		170.6992027	12.84799957	46.79016538
33	2017	ZIMBABWE	72.41563304	4.784999847	19.6589048
33	2018		70.8590181	4.796000004	28.04975708
33	2019		64.79737969	4.833000183	31.25104041
33	2020		73.02174001	5.350999832	37.20223492