UNIVERSITE ABDERRAHMANE MIRA DE BEJAIA

جامعة بجاية
Tasdawit n Bgayet
Université de Béjaïa

Faculté des Sciences Economiques, Commerciales et des Sciences de Gestion
Département des Sciences Economiques

MEMOIRE

En vue de l'obtention du diplôme de

MASTER EN SCIENCES ECONOMIQUES

Option : Economie Quantitative

L'INTITULE DU MEMOIRE

DETERMINANTS OF ECONOMIC GROWTH IN THE SUB-SAHARAN COUNTRIES FOR THE PERIOD 1990-2019:

AN ECONOMETRIC ANALYSIS

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Date de soutenance : 19/06/2023

Jury :

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Année universitaire : 2022/2023

DEDICATIONS

I dedicate this work with profound love to my dear late parents, may their souls continue to rest in peace, for their unconditional love, to my siblings for their support, to my relatives for their trust in me and to my friends, Classmates and teachers for their invaluable contributions to my studies.

Clementina

With great love, I dedicate this research work to myself for believing in me, for the hard work and perseverance showcased during the whole study period. I also highlight the immeasurable support of my beloved mother, Nakidde Milly for her undivided availability throughout this journey.

Rebecca

ACKNOWLEDGEMENTS

This thesis has been nothing but a climax of perseverance, support, invaluable guidance and intellectual growth, thus we would like to express our deepest gratitude to all those that contributed to its realization.

First and foremost, we are grateful to the Almighty God for the gift of life, for the opportunity, strength and wisdom He gave us for the successful completion of this work.

Next, we extend our heartfelt gratitude and appreciation to our supervisor, Dr. Bouznit Mohammed, for his excellent supervision, the unwavering guidance and support he gave us throughout the writing of this thesis. His enduring patience, time and intellectual assistance have been instrumental in shaping and improving the quality of this work.

Thirdly we are immensely grateful to our precious lecturers at the University of Bejaia, for their continuous support, mentorship and the knowledge they imparted on us throughout our academic journey. Their passion for knowledge, rigorous instructions and intellectual discussions have enriched our understanding and shaped our academic and personal growth.

To our families and friends, we owe immeasurable gratitude for their unconditional love, outstanding support and belief in us during our studies. Their help, prayers and words of encouragement have been of great help to us, we are indebted to them.

Finally, we thank the countless researchers, scholars and authors whose work laid the groundwork for our study. The wealth of the knowledge we discovered in the literature has broadened our perspectives and inspired us to delve deeper for more understanding of our topic.

LIST OF ABREVIATIONS

AfDB: African Development Bank
BOT: Balance of trade
CEMAC: Communauté Economique et Monetaire de l'Afrique Central
CMA: Common Monetary Area
DRC: Democratic Republic of Congo
FEM: Fixed Effects Model
FGLS: Feasible Generalized Least Squares model
GDP: Gross Domestic Product
GMM: Generalized Methods of Moments
GNI: Gross National Income
GNP: Gross National Product
HDI: Human Development Index
IMF: International Monetary Fund
JSTOR: Journal Storage
LEXP1: Logarithm of Exports (EXP1)
LGDPC : Logarithm of GDP per capita
LGFCF_C: Logarithm of Gross Fixed Capital Formation per capita
LH: Logarithm of Human capital (H)
LHWP: Lesotho Highlands Water Project
LIC: Low Income Countries
LIMP1: Logarithm of Imports
MIC: Middle Income Countries
OECD: Organization for Economic Co-operation and development
OPEC: Organization of the Petroleum Exporting Countries
PPP: Purchasing Power Parity
PWT: Penn World Table
REM: Random Effects Model
SACCOs: Savings and credit cooperative organizations
SACU: Southern African Customs Union
SAPs: structural adjustment programs
SSA: Sub-Saharan Africa

SSCs: Sub-Saharan Countries

UN: United Nations

UNCDF: United Nations Capital Development Formation

UNCTAD: United Nations Conference on Trade And Development

UNDP: United Nations Development Program

WAEMU: West African Economic and Monetary Union

WDI: World Development Indicators

SUMMARY

GENERAL INTRODUCTION

General Introduction

BACKGROUND

In a world full of complexities, inherent uncertainties, divided between great wealth and still crippling poverty and a world facing unprecedented environmental challenges. The ultimate goal of every society is not only to strive for prosperity but to lead powerful and resilient sustained wealth and well improved lives as well. This is the case even for the poorest societies regardless of the little they may possess, as George Bernard Shaw says "To have what you want is wealth, but doing it without wealth is power." The societies fight for their freedom from poverty that has crippled them for a very long time and the only hope of escaping this is through sustainable development.

One very crucial aspect of sustainable development is economic well-being and prosperity. On average, there have been very remarkable gains in economic well-being achieved through decades of economic growth. Therefore this is a phenomenon that is of paramount importance for those countries that are still poor today as we know that economic growth is the most powerful tool for reducing poverty and maintaining better standards of living. Perhaps their greatest goal is to achieve economic growth so that they can narrow the gaps in between them and those richer countries.

Time immemorial, humans have always yearned for continual growth and advancement of the areas where they lived. They kept on searching for better means of practicing their economic activities like agriculture, commerce, in order to attain wealth and live better lives. Economic growth as a term refers to the continual change in the structure of spending and production in a country.

Economic growth has been a serious concern throughout the ages till date in that many economists, governments and Non-Governmental Organizations like the UN, UNDP, OECD, UNCDF, World bank etc, are still interested in it such that most if not all their goals and agendas revolve around it. However, this phenomenon is on a low rate more so in less developed countries of which majority of these are found in SSA.

Sub-Saharan Africa is a vast and diverse region comprising of 48 countries with a combined population of over one billion people. Despite being rich in natural resources, the region has struggled with development for many years. According to the World Bank, (2020) World Development Indicators Report, the growth rate is still relatively low compared to

other regions, and the region is still faced with a wide range of economic challenges, including poverty, inequality, high unemployment rates, and low productivity.

In recent times, however, some Sub-Saharan African countries have experienced a surge in economic growth, with some even reaching [1]double-digit growth rates. As a result, this whole matter has led to a renewed interest in studying and figuring out what indeed are the factors determining economic growth in this region.

There are numerous economic growth theories constructed and these theories discuss the different factors believed to have contribution to the economic growth of a country. However these factors seem to be of low impact in some countries compared to others. Henceforth, it has been cumbersome to understand the factors that indeed drive the long-term economic growth, thus leading to more theories being developed in order to understand this phenomenon.

For a country to rise economically, socially, it should have witnessed development that is fostered by a number of factors of which economic growth is the major factor. There are different factors that affect this cause but the major ones include; Human capital [Barro91], capital formation (investments) [Artelaris et al., 2007] technology, and trade openness. However, there are still those random factors that can bring out a sudden setback in the country's economy, like natural hazards for example earthquakes, sudden Wars, climate changes, epidemics etc, that are least looked at especially in the regressions but also might greatly affect the growth of a country.

Therefore, in order to unleash the region's economic potential and the improvement of the standard of living for its people, it is necessary for us to investigate the relationship between these factors and economic growth and to understand the degree at which they affect economic growth in Sub-Saharan countries.

Purpose and contribution of the study

The purpose of this study is to empirically examine the determinants of economic growth in Sub-Saharan countries during the period 1990-2019 through an economic analysis. By investigating a comprehensive set of variables that capture both domestic and external factors, this research aims to shed light on the key drivers and barriers of economic growth in the

1According to the World Bankreports;from 2010-2019, countries like Ethiopia, Rwanda, Tanzania, Ghana, Senegal have doubled their annual growth rates than in their previous decade. https://www.worldbank.org/en:region/afr

region. The study's contribution lies in its potential to provide policymakers, researchers, and the stakeholders with valuable insights into the specific factors that have influenced economic growth in SSCs over the past three decades, thus informing evidence-based policy decisions and fostering sustainable development in these countries. In the end we will also find out why countries having similar opportunities and factors don't grow evenly.

PROBLEM STATEMENT

Africa, often dubbed as a "hopeless continent," [Economist, 2000] faces numerous challenges such as wars, famine, corruption, political instability, and epidemic diseases, hindering its progress. Despite the awareness and concerted efforts of leaders to rescue the region, through structural adjustment programs, regional economic integration initiatives like SACU, WAEMU, CEMAC, CMA[2] etc, enterprise liberalization and various development projects, Sub-Saharan part of Africa continues to remain a fragile region with fragmented national markets, lagging behind among other regions of the world.

Although there was a glimpse of hope in the early 2000s when Africa showcased promising economic growth, poverty, inequality, and high unemployment rates still persist and daunting[3].So we wonder why, despite their endeavors, Sub-Saharan countries continue to lag behind among other regions?

Well, basing ourselves on the available publications, many scholars have focused on analyzing the impacts of one or two factors which might not fully answer the key determinants of economic growth. For example; Decomposition of exports and imports and economic growth (Olawale O.2017), Foreign direct investment, regulations and growth(S Adams, EEO Opoku, 2015), Political Instability and economic growth (AK FOSU 1992) among others.

The problem with this is that different countries have different variables that are significant to their growth. Some factors are less significant while others are more significant in contributing to sustainable growth in a particular country. Besides, different countries have different opportunities and resources thus studying and analyzing one or two factor means not fully exploiting the collective determinants that vary across all Sub-Saharan countries. Our main focus is to analyze different determinants of economic growth at once and how they impact each other once applied or implemented simultaneously.

2 Martina Metzger.(2008)," Regional cooperation and intergration in Sub-Saharan Africa" pg.2
3 https://world101.cfr.org/rotw/africa/economics consulted on 10/05/2023

General introduction

There exist numerous factors that contribute to economic growth among countries. Nevertheless, some countries develop at an insignificant rate despite the fact that they possess the variables that positively impact the country's growth yet others grow steadily and fast with the same variables. This is the case for Sub-Saharan countries' growth. This perplexity leads us to a pivotal inquiry that forms the fundamental essence of our research: **What are the key determinants of economic growth in the Sub-Saharan Countries?**

In addition, this central question is then accompanied by the following secondary questions:

- Why for so long has SSA been lagging in development compared to other regions despite the potentials it's possessing, what does its economic growth evolution say?
- Which are the main sectors contributing to the GDP growth?
- On which variables should the policy makers concentrate more for effective policy implementation that create a more conducive environment for sustainable and inclusive economic growth in these countries?

Research hypotheses:

H1: Education level has a positive impact on the economic growth of the country

H2: There exists a positive relationship between physical capital and economic growth

H3: Importation of goods and services has a negative or a positive effect on economic growth

H4: Exportation of goods and services has a positive impact on economic growth.

Methodology announcement:

Our methodology is based on documentary analysis, descriptive analysis and econometric analysis in order to carry out this study and verify all of the hypotheses that have been proposed.

The documentary analysis involves assessing all the existing written documents, such as articles, books, theses, and many other academic databases such as JSTOR, Google Scholar, PubMed, Research Gate and many more. We use the theoretical approach, to understand and analyze the different theories of economic growth and the factors affecting economic growth depending on each theory's view. We also employed existing empirical studies in order to identify the factors affecting economic growth specifically in the Sub-Saharan countries.

From these studies were able to formulate our hypotheses with the potential factors affecting growth.

The descriptive analysis helped us to describe, demonstrate with graphs and patterns the economic state of the countries. This permitted us to conduct an economic growth evolution analysis of Sub-Saharan region and the few member countries, give their general overview in order to have a better judgment of their economic performance. We inspected a panel of nine countries over a period of 1990-2019. Our interest in this part is also to give description of the studied variables and their descriptive statistics.

For our empirical part, econometric analysis was used. In this part of the study, we identify the data to be used in our panel modeling which is based on the quantitative approach. We use the secondary data from World Bank (World Development Indicators) and Penn World Table, version 10.01.Panel data modeling techniques helped to specify the proper model to be used for the analysis. Then the data processing is done using the Stata 17 software.

Structure of the study:

In order to investigate the determinants of economic growth in the Sub-Saharan countries, our study consists of three chapters.

Chapter one focuses on the sources of economic growth, it explores the notion of economic growth and delves into the theoretical and empirical literature review on the topic in order to provide a comprehensive understanding of the underlying factors and mechanisms driving economic growth.

Chapter two focus on the evolution of economic growth in the Sub-Saharan countries. This chapter provides an overview of the region and the selected SSCs, and then examines the evolution of economic growth of the selected countries from 2001 to 2020 through descriptive analysis of GDP annual growth rates. Thus exploring the sectors and factors influencing the economic growth in the same countries.

Chapter three is the methodology and econometric analysis; it outlines the methodology used in the study, including data sources, variables and measurements. It also present the econometric models employed for the analysis and interpretation of the empirical results.

CHAPTER 1: SOURCES OF THE ECONOMIC GROWTH: THEORETICAL AND EMPIRICAL LITERATURE REVIEW

Chapter 1: Sources of the economic growth: Theoretical and Empirical literature review

Introduction

Economic growth is an important goal for many countries, as it is associated with higher standards of living and employment opportunities. This chapter serves as a foundation of this study, it explores the general view of this notion and where it emanates (the sources) as a subject that has preoccupied economists for decades. It entails the factors, the measures, the cycle and the various different theories that attempts to explain this concept. It aims to provide a thorough understanding of the factors driving economic growth by examining the existing theories and empirical studies.

1: Notion of the economic growth

1.1: Definition

Many manuscripts, books and economists have tried to define economic growth according to the way they view and understand it. As per the Oxford dictionary; Economic growth is the increase in the production of goods and services per head of population over a stated period of time.

According to Huart J.M , "Economic growth is a quantitative process that results in the increase, over a long period of time, of an indicator that represents a country's wealth, most often the volume of gross domestic product (GDP), or gross national product (GNP)"[4]

According to [Paul Krugman, Robin Wells], it is defined as the growing ability of the economy to produce goods and services.

After studying all these definitions we conclude that economic growth concerns about the increase in the volume and quality of goods and services produced by the country's citizens over a certain period of time, usually measured in terms of GDP or GNP. It explains the country's capacity to grow its total output and subsequently leads to advanced standard of living, as principle n°8 of economics says, a country's standard of living depends on its ability to produce goods and services[5].

Economic growth is an important indicator of a country's economic wealth and is often used as a measure of progress and development. It is also accompanied by increase in levels

4 Jean-Mark Huart (2003). Croissance et développement . pg.12

5 N.GREGORY MANKIW (2010) Principles of Macroeconomics ,Seventh edition : pg .13

of employment and increased income. It is significant to note that economic growth is not the same as economic development. Economic development refers to a broader set of changes in a society, including improvements in health, education and other aspects of human well-being while economic growth is just an important component of economic development and is not sufficient on its own to guarantee social progress. Therefore it is important to study the factors that influence this phenomenon as it has been defined.

1.2: Factors of economic growth

There is a wide range of studies that have investigated the factors that explain economic growth worldwide and these vary sometimes with countries, also the classifications of these factors differ amongst different economists. For instance, [Krugman, P,Wells R], considers that there are two sources of economic growth, being Increase in factors of production[6] and Technological progress while others like Robert Solow in his influential paper, "A Contribution to the Theory of Economic Growth" (1956), has classified the factors independently such that factors of production are not grouped together, including technology. Therefore despite the classification, the emphases are always on the same factors. Accumulations of physical capital, Human capital and technological progress, Trade and globalization and natural resources are the most fundamental determinants of economic growth identified.

- **Human capital**

  This mainly concerns the skills and knowledge of workers. Investment in education, training and research enables workers to acquire appropriate skills which in turn increase the productivity. Investment in education and health is essential for promoting long-term growth.

- **Physical capital**

  This includes all that the firms can use during production for example equipments, machinery, and infrastructure among others. Investment in physical capital can boost economic growth by increasing the productivity and efficiency. The more factories and machines, the more businesses produces, and as a result total quantity and quality of output increases in an economy. According to a report by the OECD, physical capital is a key driver of economic growth, accounting for up to 50% of output in some countries.(OECD,2018, Pg 29)

6 These are resources used to produce goods and services, but are not used up in production, they are land, labor, physical capital and human capital.

- **Technology**

  Technology means innovation and invention of new machines, new methods and techniques of production. Advanced technology boosts efficiency and level of productivity in the country and this is important for sustainable economic growth.

- **Trade and Globalization**

  International trade is the purchase and sale of goods and services by companies in different countries while Globalization is the integration of national economies in to a global economic system, and this has had a remarkable growth in trade between countries.[7]

  Trade and globalization can open up new markets and create opportunities for businesses to expand, which can lead to economic growth. A study by the IMF found that trade openness has a positive effect on economic growth, both in developed and in developing countries.

- **Natural resources**

  These are the resources that are found on Earth, and that exists independent of human intervention, common examples are soil, water, minerals, fossil fuels, air, forest, etc.

  We have two types of natural resources:

  1. **Renewable resources**: These are the resources that are available in infinite quantity and can be used repeatedly. Example: Forest, wind, water, etc.

  2. **Non-Renewable resources**: These are the resources that are limited in abundance due to their non-renewable nature and whose availability may run out in the future. Examples include fossil fuels, minerals, etc.

  Natural resources even though they are disputable amongst economists, where others have identified some potential problems associated with dependence on them, including the “resource curse” where countries with abundant natural resources experience slower economic growth and higher levels of corruption and political instability, natural resources can be important factor affecting economic growth, for example they can be used to produce goods and services, such as minerals used in construction, oil used in transportation. In addition to that, they can generate revenue for governments through taxation or royalties which can be used to fund public services and infrastructure.

7 Esteban Ortiz-Ospina, Diana Beltekian and Max Roser (2018) - "Trade and Globalization". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/trade-and-globalization' [Online Resource] (consulted on 24/04/2023)

1.3: The measures of economic growth

There has always been some difficulty on how to measure economic growth over the years. Growth is influenced by changes in factors affecting it and these vary according to different countries rendering some hardships in the means of measuring economic growth.

However, the following are the possible measures of economic growth adapted by most countries in the world. It is important to have a common measure of growth so as to help different Institutions, governments, policy makers to point out the different determinants to focus on in order to achieve sustainable growth.

- **Gross National Product (GDP)**: This is the total value of all goods and services produced within a country's borders in a given period, usually a year. However to eliminate the effects of differences in population between countries we use GDP per capita as a measure of the average aggregate output per person.
- **GDP Per Capita**, This is GDP divided by the country's population to estimate the average income/output per person. It is the most widely used measure of economic growth as it is used by international organizations like World Bank, IMF. It measures the real income in comparison with the survey income taking into consideration the government expenditures. This measure can be used to understand inequality among countries in the world since it's comparable across borders. The limitation of this measure is that it only takes in account formal activities in the economies, for example it excludes non-markets activities such as unpaid household, volunteer work or illegal transactions.

- **Gross National Product (GNP):** This is the total value of the goods and services produced by the country's citizens, whether they are within territory or outside the country. GNP is a measure of a country's economic performance, particularly in the case of countries with significant international trade or investment activities. One of its limitations is that it does not account for the distribution of income, for example a country with few wealthy citizens or businesses earning a significant amount of income from abroad could have high GNP, but the benefits of that income may not be equally distributed throughout the population.

- **Purchasing Power Parity (PPP):** It measures the ratio of incomes in relation to the prices of goods and services purchased. It can be used to measure the purchasing

power of different country currencies. It also compares the standards of living among countries.

- **Gross National Income (GNI)**. It measures the total income earned by a country's citizens and businesses regardless of their position. It is a broader measure than GDP as it includes income on the territory and abroad.
- **Human Development Index (HDI)** This is a composite measure of economic and social development that takes into account three factors namely; education, life expectancy and per capita income[8]

1.4: The economic growth cycle

The economic growth cycle refers to the cyclical nature of economic activity, where the economy moves through period of expansion and contraction. By examining this we can better understand the causes and consequences of economic fluctuations and also this will bring a better comprehension about some concepts we are to use later in this work e.g. recession. Economic growth cycle or business cycle typically consists of four phases:

1. Expansion: This phase is characterized by rising GDP, low unemployment, increasing consumer spending, and an overall feeling of optimism and growth in the economy.

2. Peak: This phase is the top of the business cycle where the economy has reached its maximum growth rate. In this phase, GDP growth slows down, and inflation may start to rise due to high demand.

3. Contraction (Recession): This phase is characterized by declining GDP, rising unemployment, and decreasing consumer spending. Businesses cut back on investments and may lay off workers in response to declining demand.

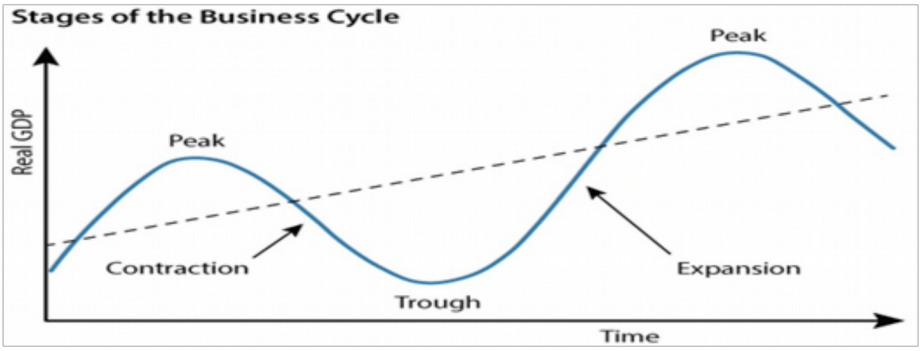
4. Trough: This is the bottom of the business cycle where the economy has reached its minimum growth rate. In this phase, the economy may be in recession or depression.

After the trough, the cycle starts over again with a new period of expansion. It is important to note that these phases are not always distinct, and the timing and duration of each phase can vary. The length of each phase can depend on a variety of factors, such as government policies, global economic conditions, and technological advancements.

8www.ourworldindata.org. consulted on 9/03/23, Principles of economics 2e, Economics and the Economy, Timothy Taylor, 2011

Figure

: Economic growth cycle**.**



Source : https://research.stlouisfed.org/publications/page1-econ/2023/03/01/all-about-the-business-cycle-where-do-recessions-come-from? Consulted on 24/04/2023

2: Theories of Economic growth

There exists quiet a number of arguments, thoughts and theories about the main cause of economic growth up to date. These theories were invented by numerous economists like Adam Smith, David Ricardo, Karl Marx, and many others, some agreed on similar factors while others disagreed. Among the existing theories, our study will revolve around the theoretical understanding of the predominant two categories of theories namely; the exogenous and endogenous growth theories.

2.1: The exogenous growth theories

These theories suggest that economic growth is driven by external factors, meaning factors that are not controlled such as capital accumulation, population growth, division of labor, natural resources and technological progress.

a) The Classical Growth theory.

This theory is discussed by different great economists, Adam Smith, David Ricardo and Robert Malthus, in the eighteenth and nineteenth centuries. The overall view of this theory is the steadiness of the growth rate, that any change in GDP is temporary therefore it would return to its state eventually. They believed that when GDP increases, there will be an increase in population, however the increase in population would be detrimental to GDP due to high demand on limited resources, as a result GDP would go back to its state. They see no good in overpopulation for the society in consideration to the scarce resources that are to satisfy their unlimited needs.

Adam Smith [1723-1790]

Adam Smith's classical growth theory is one of the earliest and most influential theories of Economic growth according to him; economic growth is driven by the accumulation of Capital and the division of labor, which increases the productivity of labor and lead to higher output and incomes. Smith argued that the division of labor allows workers to specialize in specific tasks, which increases their efficiency and productivity. He also emphasized the importance of investment in physical capital, such as machinery and infrastructure, which can increase the efficiency of production.

Adam Smith in his book known as “An Inquiry into the Nature and Causes of the Wealth of Nations", emphasizes the importance of increasing the supply of productive resources, such as land, labor, and capital, in driving economic growth.

The increasing output in the industry leads to increased demand in labor which provokes an increase in population to fit the existing demand. This in returns raises the employment rate and also creates a market for the manufactured goods which necessitates division of labor and this greatly affects positively the labor productivity. The surplus of the manufactured goods can be exported which boosts the growth of economies. Therefore, faster capital accumulation is linked to faster employment growth rate and hence faster growth in standards of living.

In conclusion, according to Smith, economic growth was driven by three main factors:

i) The accumulation of capital, which could be invested in new machinery and equipment to increase productivity;

ii) The growth of population, which would increase the supply of labor and expand the market for goods and services;

iii) The expansion of trade, which would allow for the exchange of goods between countries and promote economic growth. Smith also believed in the importance of free markets and competition in promoting economic growth. He pointed out that a laissez-faire economic system, in which the government played a minimal role in the economy, would allow for greater economic efficiency and innovation[9].

David Ricardo [1772-1823]

9The classical theory of economic growth by Walter Eltis, page 68, Economic development and planning pg.21

In his Book of 1817 he published The Principles of Political Economy and Taxation. He believes in the contribution of capital accumulation to economic growth but he introduced the concept of the Law of diminishing returns. He believed that capitalist economies would end up in a stationary state with no capital accumulation since these economies were based on activities like agriculture which had no increasing returns but rather diminishing returns in the long-run[10].

Thomas Robert Malthus. [1766-1834]

According to him, population plays an important role in growth. The need for economic growth evokes the demand for labor to attain a high level of productivity. This in returns leads to an increase in labor wages which incites pro-creation hence a high population growth to match the existing demand for labor[11].

However, there exist some critics to this theory. An increase in labor wages/incomes does not necessarily result into an increase in population but can lead to purchasing of luxury goods, capital goods etc. the theory does not talk about technological progress which is a crucial factor in advancing countries.

b) The neoclassical growth theory

This theory is also known as the Solow-Swan model, is a macroeconomic theory that seeks to explain long-term economic growth through changes in the supply and productivity of factors of production. It was developed by Robert Solow and Trevor Swan in the 1956.

The Solow-Swan model is based on the neoclassical theory of production, this theory focuses on the main three factors that impact economic growth, being labor, capital and technology (a factor that was ignored by the former theories). According to the model, economic growth can be explained by changes in the supply and productivity of these factors.

The model also assumes that there are diminishing returns to capital, meaning that as the stock of capital increases, the marginal product of capital decreases. In other words, each additional unit of capital added to the economy will generate less output than the previous unit since the output per worker increases with the output per capita but at a decreasing rate. Hence the need for technology since there would be a point where labor and capital can be set to remain steady (at equilibrium).

10 Economic development and planning pg.26
11 Economic development and planning pg.26

To explain economic growth, the Solow-Swan model suggests that technological progress is the key driver of long-term economic growth. Technological progress is considered an exogenous factor, as it is largely outside of the control of the economy. However, the model also suggests that the level of investment in the economy can influence the rate of technological progress and thus, economic growth. The model has been widely used in macroeconomic analysis and has helped to inform economic policy decisions around the world[12].

2.2: Endogenous growth theories

This theory on the other hand suggests that economic growth is determined by internal factors such as human capital, research and development, innovation and knowledge. The Endogenous Growth Theory suggests that technological progress and innovation can be endogenously generated within an economy, rather than relying solely on external factors such as trade or foreign investment.

One of the key features of the Endogenous Growth Theory is the concept of increasing returns to scale. This refers to situations where the more an economy produces, the lower the cost of production becomes, leading to further increases in output and growth. This is in contrast to the neoclassical growth theory, which assumes that there are diminishing returns to scale.

Another important aspect of the Endogenous Growth Theory is the role of knowledge Spill over. This refers to situations where the knowledge and ideas generated by one individual or firm can spill over to other individuals or firms in the same industry or economy. For example, a firm that invests heavily in research and development may produce new knowledge that can be used by other firms in the same industry, leading to further innovation and growth.

In addition, the Endogenous Growth Theory suggests that government policies can play an important role in promoting long-term economic growth by investing in education and training, research and development, and infrastructure. By doing so, governments can help to create an environment that is conducive to the generation and diffusion of knowledge and innovation.

12 Economic development and planning pg.52

Endogenous Growth Theory provides a more comprehensive and dynamic understanding of the factors that drive long-term economic growth. By emphasizing the role of internal factors, such as knowledge and innovation, it suggests that growth can be self-sustaining and endogenously generated within an economy, rather than relying solely on external factors.

a) Paul Michael Romer's Model [1986]

Paul Romer's theory of economic growth, which was first presented in his 1986 paper "Increasing Returns and Long-Run Growth," represented a major departure from traditional neoclassical growth theory. Whereas neoclassical growth theory emphasized the role of diminishing returns to capital, Romer's theory argued that increasing returns to scale could be an important driver of long-term economic growth.

Romer's theory was based on the idea that knowledge or ideas are a key determinant of long-term economic growth. According to his model, new ideas are produced by combining existing knowledge in new and innovative ways, and these ideas can be used to create new products and processes that increase productivity and output. Importantly, these ideas are non-rivalrous, meaning that they can be used by multiple agents simultaneously without diminishing their value.

Romer's model showed that in a world where ideas are non-rivalrous, increasing returns to scale can arise naturally, leading to self-sustaining growth. This is in contrast to traditional neoclassical growth models, which assume diminishing returns to capital and predict that economies will converge to a steady-state level of output over time.

Romer's theory has important implications for economic policy, particularly in terms of promoting innovation and education. By emphasizing the importance of knowledge creation and technological progress, Romer's theory suggests that policies aimed at fostering innovation and education can have significant long-term benefits for economic growth and development. Since the development of his original theory, Romer has continued to work on the economics of ideas and innovation, and has made significant contributions to the field of endogenous growth theory. In 2018, he was awarded the Nobel Prize in Economics for his work on the economics of ideas.

b) Robert Lucas Jr's Model [1988]

Robert Lucas's theory of economic growth, which was first presented in his 1988 paper "On the Mechanics of Economic Development," built on the idea of endogenous technological change developed by Paul Romer and other endogenous growth theorists.

Lucas's theory emphasized the role of human capital, or the knowledge, skills, and abilities of individuals, in driving economic growth. According to his model, economic growth is driven by the accumulation of human capital, which can be achieved through investments in education and training.

In Lucas's model, human capital is a factor of production that can be invested in just like physical capital (such as machinery or buildings). However, unlike physical capital, which is subject to diminishing returns, human capital is subject to increasing returns. This means that the more human capital an economy accumulates, the more productive each unit of human capital becomes, leading to sustained economic growth.

Lucas's theory also emphasized the importance of incentives in driving innovation and knowledge creation. According to his model, individuals and firms are motivated to invest in human capital and engage in research and development by the potential rewards they can receive, such as higher wages or profits. Lucas's theory represents an important contribution to endogenous growth theory, as it emphasized the importance of human capital and innovation in driving long-term economic growth. His insights have been used to guide policies aimed at promoting education and training, as well as research and development, as means of fostering economic growth and development.

c) Robert Barro's Model [1991]

Robert Barro's theory of economic growth, which was presented in his 1991 paper "Economic Growth in a Cross Section of Countries," is another important contribution to the field of endogenous growth theory. Barro's theory emphasized the role of human capital and institutional quality in driving economic growth.

Barro's theory suggested that economic growth is driven by the accumulation of human capital, which can be achieved through investments in education and training. However, Barro also emphasized the importance of institutional quality, which refers to the quality of a

country's political and economic institutions, in determining the effectiveness of these investments.

According to Barro's model, countries with better institutions, such as those with more stable political systems and better protection of property rights, are more likely to experience sustained economic growth, because they are better able to provide the necessary incentives for individuals and firms to invest in human capital and engage in research and development.

Barro's theory also suggested that the relationship between economic growth and human capital is not linear, but rather exhibits diminishing returns. In other words, as an economy accumulates more human capital, the marginal benefit of each additional unit of human capital decreases, and the cost of investing in additional human capital increases. This implies that policies aimed at promoting education and training may have diminishing returns, and that the optimal level of investment in human capital will depend on the level of institutional quality in a country.

In conclusion Barro's theory represented an important contribution to endogenous growth theory, as it emphasized the role of institutional quality in determining the effectiveness of policies aimed at promoting economic growth and development. His insights have been used to guide policies aimed at promoting better institutions, as well as education and training, as means of fostering sustained economic growth and development.

3: Empirical literature review

There is plenty of studies done concerning this phenomenon, economic growth, an elevated interest from many researchers to know the factors that actually drives it, especially when there is still this " club convergence phenomenon" Aghion et al. (1998) where other countries seems to be catching up to the growth rates of other developed countries yet some, specifically the ones in the Sub-Saharan Africa seems to diverge from their growth. It calls much of attention to really understand the reasons behind this fact, as a result we have decided to look at the previous studies undertaken over some of the variables to synthesize and present the findings of some of these studies in order to have a better understanding of them and their impact on growth.

Isaac K. Ofori et al (2022), in their study answering the question of what really drives economic growth in the SSA, they employed machine learning regularization techniques on 42 SSA countries from 1980 to 2019, and 113 potential covariates, they discovered that only

7 variables amongst the 113 were the main factors affecting growth, these are manufacturing value addition, urban population, financial development, government spending, macroeconomic management, economic globalization, and social inclusion.

With the use of fixed effects regression model, for a panel of 27 Sub-Saharan countries for the period 2006 - 2017, Faith Semmanda (2020) also explores the factors affecting growth in the Sub-Saharan Africa, and she discovers that population and life expectancy significantly affects economic growth.

An empirical study undertaken by Bbaale and Mutenyo (2011) , employ a panel of 35 Sub-Saharan countries over the period of 1988 to 2007, with the Generalized Methods of Moments (GMM) technique to examine the relationship between the economic growth and the exports components(agricultural and manufactured exports) and imports. The study found that it is the growth in agricultural exports and not manufactured exports, that is positively and significantly associated with per capita income growth in these 35 countries, while the other component remain insignificant. Also there is a positive relationship between imports in terms of capital goods , such that 1% growth in capital goods contributes to 0,03% in GDP per capita at the significance level of 1%. Similarly Upreti, Parash (2015) in a sample of 76 countries for the period 2010, 2005, 2000 and 1995 in their study investigate the factors affecting economic growth in the developing countries, using Ordinary Least Squares regression, they found that exports is one of the factors significant and positive related to GDP per capita growth such that 1 unit increase in the amount of exports led to 0.02% increase in growth.

RM Maina (2015), inspects the effect of import and export on economic growth, over the period 1960 to 2010, in Kenya, he also discovered the positive effect of both imports and exports on economic growth of Kenya. He employed the correlation analysis technique. Additionally the works of Olawale Oyebanjo (2017), on a study of 18 Sub-Saharan countries over the period of 1996 to 2015, to analyze the impact of exports and imports component on economic growth, fixed effects model confirms that both exports and imports contribute significantly to economic growth.

Human capital is another important determinant of economic growth. A study by Barro (1991) over a sample of 98 countries for a period of 1960-1985,found that human capital has a significant positive effect on economic growth. Similarly, a study by Mankiw et al. (1992) found that investment in human capital, particularly education, has a positive effect on

economic growth. Another study by Gylfason and Zoega (2002) found that education and training are positively associated with economic growth.

Physical capital formation is also viewed to be one of the most indispensable factor of economic growth, Artelaris 2007, Lichtenberg 1992, Ndambiri et al 2012 etc. An empirical study of J Gingras (2018) confirms this, on the study of the determinants of economic growth in Sub-Saharan African countries. With the help of random effect model, a panel data from 35 countries for the period of 2000-2015, it was found that physical capital formation, foreign aid, human capital and a vibrant export sector were positively related to the GDP growth.

A study on the determinants of economic growth in WAEMU countries (Mamane TARNO 2012) , concluded three main determinants being public expenditure, capital and human capital, with the use of fixed and random effects model on a panel of 7 countries from 1965- 2010.

Natural resources are often cited as a potential source of economic growth in Sub-Saharan African countries. However, the relationship between natural resources and economic growth is complex. A study by Sachs and Warner (1997) found that natural resources can have a negative effect on economic growth, particularly in countries with poor institutions. Similarly, a study by Collier and Goderis (2007) found that the effect of natural resources on economic growth is negative in the short term, but positive in the long term.

Conclusion

This chapter provides us with a general understanding of the notion of economic growth as a complex phenomenon influenced by a variety of factors. The theoretical frameworks of exogenous and endogenous growth theories provide insights into the drivers of growth, highlighting the importance of external factors like technological progress and internal factors such as knowledge and human capital. Empirical studies support the significance of human capital, infrastructure, technological innovation, trade, and globalization in fostering economic growth.

It does not only lay the groundwork for further analysis but can also help policymakers and economists to use of this knowledge to design strategies that promote sustainable and inclusive economic development, focusing on investments in education, infrastructure, innovation, and trade openness. By doing so, they can create an environment that nurtures long-term growth, job creation, poverty reduction, and improved living standards for

individuals and communities. Understanding the determinants of economic growth is vital for shaping policies that drive economic prosperity and societal well-being.

CHAPTER 2: ECONOMIC GROWTH IN SUB-SAHARAN COUNTRIES

Chapter 2: Economic growth in Sub-Saharan countries

Introduction

The present chapter examines the economic growth in Sub-Saharan countries and to do this we have divided our chapter in to two sections. In the first section, we present an overview of the region where we briefly observe the geographical exploration of the region, economic growth background synopsis over the whole region and a concise and summarized overview on the few chosen countries. Then section two is a mirror, allowing us to scrutinize closely the economic performance in Sub-Saharan countries, here we discuss the descriptive analysis of the economic growth evolution in the few chosen countries. This is done by first analyzing their GDP growth rates and sectors that contributes to the GDP using World Bank data for the period 2001-2020.

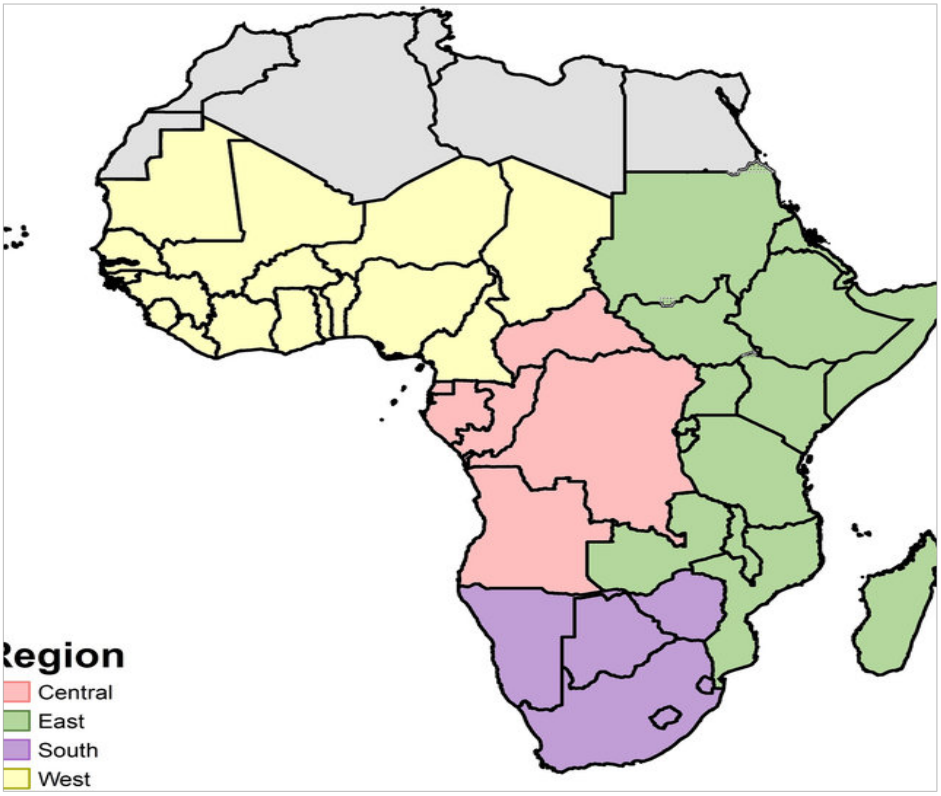
1: Overview on the studied countries

1.1: Geographical overview of the region

Sub-Saharan Africa (SSA) is a region covering most part of the African continent in the south of the Sahara Desert. It comprises about 48 countries according to World bank, that are further divided into four sub regions namely Western Africa, Central Africa, Eastern Africa and Southern Africa. The region had a population of about 1.1 billion by 2019 and it's expected to reach between 2 and 2.5 billion people by 2050 according the UN predictions. The region is vast and it has taken a greater part of Africa, with a surface area of 23 890 896.1 Km² as of 2020. Figure 1 below is a map of Africa, showing the four regions of the Sub-Saharan

Figure 1

: Sub-Saharan regions.



Source: Nature (Researchgate)

These are the countries found in this region according to the World Bank. We classified them in their respective regions.

Tableau 1

: Sub-Saharan Countries classified in four SSA sub regions**.**

Western Africa	Central Africa	Eastern Africa	Southern Africa
Benin Burkina Faso Cabo Verde Cote d'ivoire Gambia Ghana Guinea Guinea Bissau Liberia Mali Mauritania Niger Nigeria Senegal Sierra Leone Togo	Cameroon Central African Republic Chad Congo Equatorial Guinea Gabon Sao Tome and Principe	Burundi Comoros Democratic Republic of Congo Djibouti Eritrea Ethiopia Kenya Madagascar Rwanda Somalia South Sudan Sudan Uganda Tanzania	Angola Botswana Eswatini Lesotho Malawi Mauritius Mozambique Namibia South Africa Zambia Zimbabwe

Source : Prepared by authors using Microsoft word.

Most of these countries are less developed where by most of the people in this region live below the international poverty line of $1.25 and are faced with many challenges like endemics, lack of electricity, poor education, high rates of illiteracy, Lack of clean water, income inequality among many others. However, there are a few developing economies like Nigeria, South Africa, and Kenya among others (see appendix 02). SSA is endowed with a wide variety of minerals like Platinum, Gold, Copper, Diamond, and Uranium among others and this has boasted a lot the region's economy. The region also produces oil and depends so much on agriculture due to its favorable climates like Savannah, Tropical etc.

The climate in this region is distinctive and seasonal. The SSA lies in the tropics and as a result it generally tends to exhibit the characteristics of tropical and subtropical climatic zones, with the exception of the southern Africa. The high altitudes and plains and plateau contribute to the region's varying weather conditions[13].This region is the most vulnerable to climate change in the world, and its rising temperatures , rising sea levels and heavy rainfall leads to increased frequency and intensity of natural disasters, thus transforming the region's geography[14].

1.2: Background overview of economic growth in the region

Even though economic growth is not uniform across the sub regions and countries, we shall present in this part, a general estimated overview of the whole SSA growth so we can have a clear understanding of how has economy been and in comparison with other regions in the world. We should also note that the growth rates may vary slightly depending on the data source and for the fact that these organizations use slightly different classification of countries, be it World Bank, International Monetary Fund (IMF), African Development Bank (AfDB) etc.

The term "economic growth" has existed for many years, as far as before the scramble for Africa, with long-run growth traced back to the industrial revolution in Britain during the 1800s. Prior to this period, the world economy experienced slow growth rates, leading to stagnant living standards for centuries. For example according to economic historian Angus Maddison from the years 1000 to 1800, the real aggregate output around the world grew less than 0.2% per year[15].This was the period for economic stagnation and unchanging living standards, that prevailed for all those centuries.

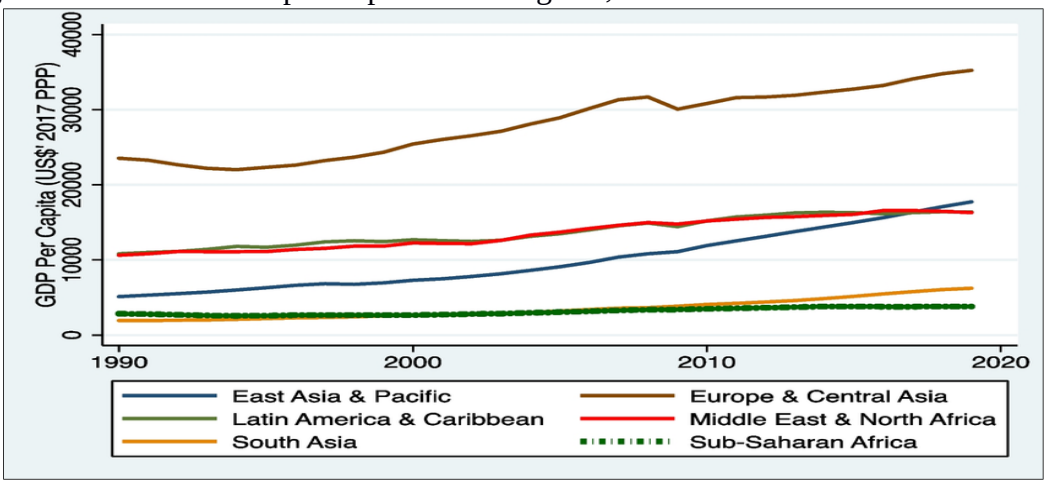
13 https://worldgeography.acb-clio.com consulted on 29/04/2023

14 October 2017 *World Economic Outlook, Chapter 3*

15 Paul Krugman, Robin Wells <<Macroeconomics>> 4th edition 2015,p.180

Nevertheless long-run economic growth has increased significantly since 1800, more particularly to these developed countries that kept a sustained upward trend like United States. Unfortunately, for Sub-Saharan that is not the case, the economy has grown gradually, with very slow pace, such that there is now a huge gap between this region and other regions that did not exist maybe two centuries ago. In addition to that, this region is a home today for many poorer countries in the world. Figure 2 below show this sluggish growth for the past three decades.

Figure 2 : Trend of GDP per Capita across regions, 1990-2019



Source: Constructed by Ofori, Asongu, Obeng using data from WDI

Economic growth is considered to be an important indicator of the overall health and well-being of an economy, as it can lead to higher levels of employment, increased standards of living, and improved access to goods and services for individuals and households.

It is difficult to make broad generalizations about economic growth in SSA before the period of colonialism, because of the region's vastness and the lack of data the region possess more especially for that era. However, it is known that many societies in SSA had well-established economies and trade networks based on agricultural and hand crafted commodities prior to the arrival of Europeans. For example, the trans-Saharan trade routes were an important source of economic activity in West Africa for many centuries, facilitating the exchange of goods such as gold, ivory, salt, and slaves. The East African coast was also a hub of trade, with ports such as Mombasa and Zanzibar serving as important centers of commerce.

Many societies in SSA were based on agriculture, and had developed sophisticated farming techniques and systems of land tenure. For example, the ancient kingdoms of Ghana

and Mali in West Africa were known for their production of agricultural commodities such as cotton, and for their use of advanced irrigation systems.

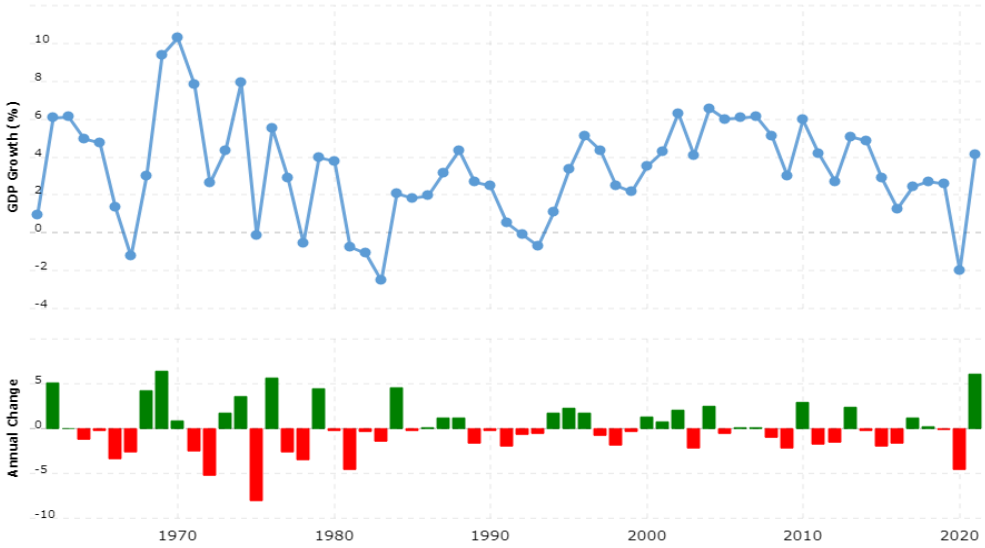
In addition, some societies in SSA had developed specialized skills and crafts, such as metalworking, weaving, and pottery, which were traded both within the region and beyond. The Kingdom of Benin in what is now Nigeria, for example, was known for its production of bronze sculptures, which were highly valued in the international trade networks of the time.

For as much as these countries tried to develop through the trade activities during that time, there are some factors that would have led to significant economic growth that were not invested into. For example the technological advancement during that time wasn't remarkable, this led to low productivity. The cross-border trade was difficult due to hostility among different tribes and poor transport means. There existed high rate of illiteracy than today which limited research and development which would have engendered great innovations.

The post-independence era was characterized by a range of economic policies and strategies aimed at promoting economic growth and development. Many countries in SSA pursued import-substitution industrialization policies, which aimed to develop domestic industries and reduce reliance on imports. However, these policies often led to inefficiencies and a lack of competitiveness, and were not always successful in promoting sustained economic growth.

The independence movements that swept across Africa in the mid-20th century marked a turning point in the region's economic development. Many newly independent African countries adopted economic policies aimed at promoting economic growth and development, such as import-substitution industrialization and the development of domestic industries. However, these policies often led to inefficiencies and a lack of competitiveness, and were not always successful in promoting sustained economic growth. SSA has been characterized by unstable growth, the highest peak it has ever reached was 10.29% in1970, and the lowest it has ever reached was -2.53% in 1983. Figure 3 below shows the GDP growth rate for the period 1960-2021

Figure 3 : Sub-Saharan Africa GDP growth rate 1960-2021



Source: World Bank ('https://www.macrotrends.net/countries/SSF/sub-saharan-africa-/gdp-growth-rate')

In the late 1960s to 1970, as shown from the graph, the GDP growth rate was at its peak, the oil boom led to a period of rapid economic growth in many African countries, as rising oil prices led to increased revenues for oil-producing nations. This led to a period of increased investment and development in the region, with many countries using their newfound wealth to fund infrastructure projects and social programs. However, the oil boom was short-lived, and many African economies struggled to adjust to the changing economic environment once oil prices began to fall.

In the 1980s and 1990s, many countries in SSA implemented structural adjustment programs (SAPs) in response to the economic crisis of the time. These programs aimed to reduce government intervention in the economy, liberalize trade and investment, and promote fiscal discipline. While SAPs helped to stabilize some economies in the short term, they also had negative impacts on social welfare and poverty reduction, and did not always lead to sustained economic growth.

In recent years, globalization has had a significant impact on the economic development of many countries in SSA. The region has become more integrated into the global economy, with increased trade and investment flows, increase in growth rate for 2004 of 6.56%[16]. However, globalization has also led to increased competition and volatility in many African economies, and has raised questions about the sustainability of growth in the region.

As of 2022, because of the global slowdown impacted by Covid-19 pandemic and Ukraine war, Sub-Saharan economic growth rate decelerated from 4.1% in 2021 to 3.6% and

16 https://www.macrotrends.net consulted on 27/04/2023

the predictions are that it is yet to slow down to 3.1% in 2023. This downgrade is accompanied by high inflation rates and high poverty rates in the countries in this region leaving people in a vulnerable situation. The region's performance is also dragged down by the widened public debt, the fiscal deficit increased to 5.2% as of 2022 from the estimated 4.8% in 2021.

Generally, the historical context of economic growth in SSA is complex and multifaceted, and has been shaped by a range of factors over time. Understanding this context is important for developing effective policies and strategies for promoting sustained economic growth and development in the region. Many countries in SSA have been Moving towards growth even way before colonialists came along with their impacts.

1.3: Overview of the chosen countries

Due to the region's vastness, we have chosen countries to study, from each sub region and from each World Bank country classification income group which is classified into four income groups; low, lower-middle, upper-middle and high income. Thus the sub-Saharan countries are also composed of three of these income groups. Among the countries, we have chosen ten to study for the GDP evolution analysis: Lesotho, Zambia, Malawi, Gabon, Democratic Republic of Congo, Cameroon, Uganda, Kenya, Nigeria and Mali.

Here are brief overviews of each country based on World Bank data:

1. Lesotho is a small country in southern Africa surrounded by South Africa, with a population of around 2.2 million and a GNI per capita of US$1,380 in 2020. It is a lower-middle income country where most of its population (three quarter) lives in rural areas. The economy is heavily reliant on the textile industry and agriculture, with challenges of high poverty rates, HIV/AIDS prevalence, and limited access to education and healthcare, and water scarcity.

2. Zambia: As of 2020, the population of Zambia, a landlocked nation in the Southern Africa, was about 18.9 million. With a GNI of US$1130 in 2020, it is categorized as a lower-middle income nation. The country's economy is dependent on copper mining, which generates around 70% of its export revenues. Zambia is one of the nations with the highest rates of global poverty and inequality.

3. Malawi: Malawi is a low-income country in southern Africa, heavily reliant on agriculture and with a GNI per capita of US$520 in 2020. It faces challenges related to poverty, health, education, and infrastructure.

4. Gabon: Gabon is an upper-middle-income country in Central Africa, with a relatively high GNI per capita of US$5,990 in 2020. The country has a relatively diversified economy, with oil and gas being its primary exports. Gabon faces challenges such as income inequality, a high prevalence of non-communicable diseases, and limited access to education and infrastructure in some areas.

5: Democratic Republic of Congo (DRC): The DRC is a low-income country in Central Africa, with a population of around 92 million and a GNI per capita of US$520 in 2020. The country's economy is primarily based on the extraction and export of natural resources, including minerals, oil, and timber. The DRC faces significant challenges related to poverty, health, education, and infrastructure, as well as ongoing conflict and political instability.

6. Cameroon: Cameroon is a lower-middle-income country in Central Africa; Its GNI per capita was US$1,410 in 2020. The country has a relatively diversified economy, with sectors such as agriculture, manufacturing, and services contributing to GDP. Cameroon faces challenges related to poverty, health, education, and infrastructure, as well as issues related to conflict and political stability.

7. Kenya: Kenya is a lower-middle-income country in East Africa, with a GNI per capita of US$1,510 as of 2020. The country has a diversified economy, with sectors such as agriculture, manufacturing, and services contributing to GDP. Kenya faces challenges related to poverty, health, education, and infrastructure, as well as environmental issues such as deforestation and water scarcity.

8. Uganda: Uganda is a low-income country in East Africa, with a predominantly agricultural economy and GNI per capita of US$830 in 2020. Its challenges include food insecurity, health, education, and infrastructure related as well as environmental issues such as deforestation and soil degradation.

9. Nigeria: Nigeria is a lower-middle-income country in West Africa, with a population of around 211 million and a GNI per capita of US$1,950 in 2020. The country has a diverse economy, with sectors such as oil and gas, agriculture, and services contributing to GDP. Nigeria faces challenges related to poverty, security, health, and education.

10. Mali: Mali is a low-income country in West Africa, with a population of around 20 million and a GNI per capita of US$520 in 2020. The country's economy is primarily based on agriculture, and it faces challenges related to poverty, security, health, and education, as well as environmental issues such as desertification and deforestation[17].

Tableau 2: Overview of the studied countries

Country	Population in 2020 in (millions)	Land area in (km^2)	Income group
Zambia	18,927,715	743,390	Lower-Middle Income
Lesotho	2,254 100	30,360	Lower-Middle Income
Malawi	19,377,061	118,484	Low-income
Gabon	2,292,573	267,668	Upper-Middle Income
Dem.Repub.Congo	92,853,164	2,345,409	Low-income
Cameroon	26,491,087	475,442	Lower-Middle income
Uganda	44,404,611	241,550	Low-Income
Kenya	51,985,780	580,367	Lower-Middle income
Nigeria	208,327,405	923,768	Lower-Middle income
Mali	21,224,040	1,240,192	Low-income

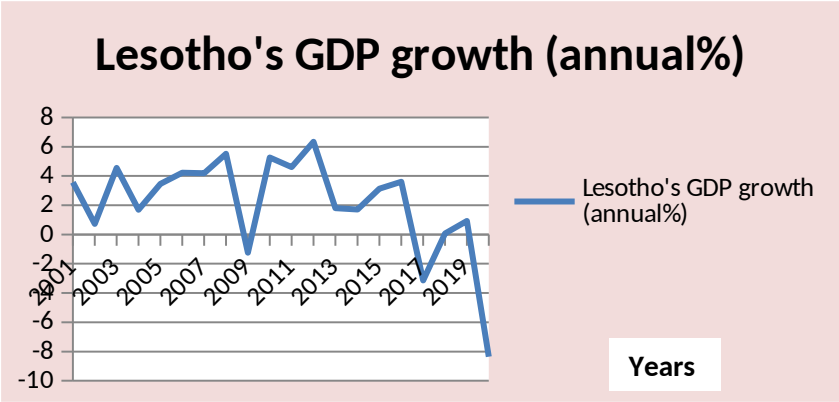
Source: Created by authors using the World Bank data and UN-World Population Prospects

2: Descriptive analysis of the economic growth evolution in Sub Saharan countries (GDP growth rates evolution analysis)

LESOTHO

Figure 4 : GDP growth evolution from 2001 to 2020

17 World Bank. (2021). World Development Indicators Database. Retrieved from https://databank.worldbank.org/source/world-development-indicators.



Source: Constructed by authors using World Bank Data

Lesotho is one of the former 2001 LIC that became MIC as of 2018.Lesotho's economy has experienced a mix of periods of strong growth and contraction over the past two decades as highlighted from figure 5 above. Between 2001 and 2020, Lesotho's economy grew at an average annual rate of approximately 2.6%. The current GDP in US$ passed from 825,706,961 in 2001 to 2.23 Billion in 2020, a creation of wealth of $1404,293,039 in two decades while the current GDP per capita (US$) passed from 413 in 2001 to 989.8 in 2020, a growth of 576.8 in 2020, more than a double in these within the two decades. As of 2011,GDP per capita counted 1,265.9, the highest it has ever been[18].

The main sectors that contributed to this growth were; the agricultural, textile manufacturing and mining sectors. The agriculture sector remains the largest employer in the country, employing approximately 80% of the workforce and contributing around 9% of GDP. The manufacturing sector which mainly focuses on textile production is the second largest employer, employing about 15% of the workforce and contributing around 22% of GDP. The mining sector which is at Letseng Diamonds is the third employer, contributing to approximately 8% of GDP.

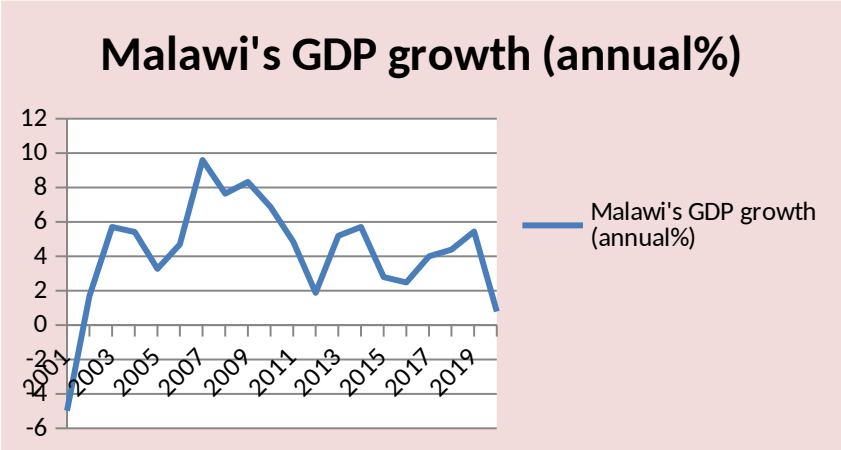
The slowdown in 2009 was due to the global economic crisis of 2008 as it can be seen from figure 4. However the country recovered after this period, started experiencing positive growth again due to the recovery of manufacturing sector, high demand for diamonds exports and infrastructure investments projects (LHWP).Nevertheless the economy fell into recession again since 2017, the economic growth decreased from an average contraction of 1.5per cent between 2015 and 2020. The downward trend in 2019 was due to the Covid-19 pandemic.

18 https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=LS consulted on 03/05/2023

The country suffers from the global economic crisis as it exports textiles to the US markets, for examples there has been decline of textiles exported to the US since the expiration of Multi-Fibre Agreement in December 2004.[19]

Malawi

Figure 5 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using data from World Bank

Malawi is one of the former LICs, that remained LIC that has experienced a mix of periods of growth and contraction over the past two decades. According to figure 6, between 2001 and 2020, Malawi's economy grew at an average annual rate of approximately 3.2%. The current GDP in US$ passed from 1,868,067,973 in 2001 to 7.39 billion in 2020, representing a creation of wealth of $5.52 billion over two decades. Meanwhile, the current GDP per capita (US$) passed from 212.2 in 2001 to 393.3 in 2020, an increment of 181.1 in 2020, almost double in these two decades.

The agriculture sector remains the largest employer in Malawi, employing approximately 80% of the workforce and contributing around 30% of GDP. The country's main crops are tobacco, tea, and sugarcane, but the country is also diversifying into non-traditional crops such as macadamia nuts and paprika. The manufacturing sector is the second largest employer, mainly producing tobacco, sugar, tea, and cotton textiles, and contributing around 12% of GDP. The service sector is the third largest employer, employing around 5% of the workforce and contributing around 53% of GDP.

The economic growth in Malawi was affected by various factors during the period of 2001 to 2020. The country experienced a strong growth period between 2004 and 2010, with an average annual growth rate of 7.5%, mainly driven by an increase in agricultural output

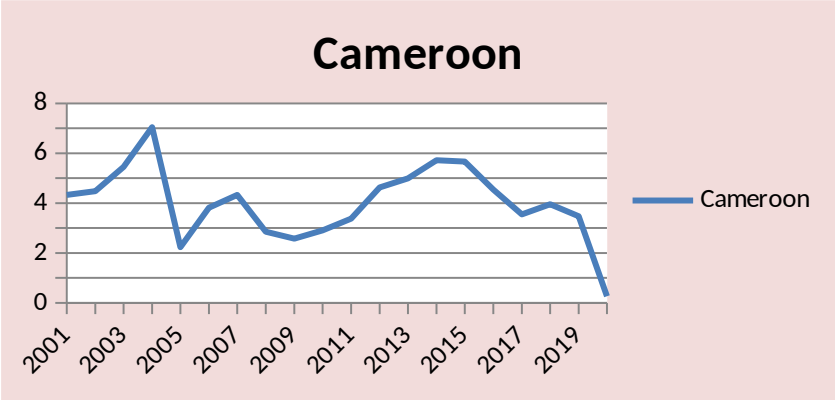
19 Bertelsmann Stiftung, BTI 2014- Lesotho Country Report. Pg 23

and a stable macroeconomic environment. However, this was followed by a period of contraction between 2011 and 2016 due to a combination of external and internal factors such as floods, droughts, and political instability. The economy recovered in 2017 with positive growth rates until 2019, but the Covid-19 pandemic led to a contraction of 0.6% in 2020.

In conclusion, Malawi's economic growth between 2001 and 2020 was driven by the agriculture and manufacturing sectors, with the service sector also contributing significantly. The country experienced both periods of strong growth and contraction, with external and internal factors playing a role in the fluctuations. Despite the challenges, Malawi's economy has grown at an average annual rate of 3.2%, creating significant wealth and improving the GDP per capita over the past two decades.

CAMEROON

Figure 6 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

Cameroon’s economy experienced moderate growth between 2001 and2020 but also faced several challenges that limited attaining full potential. The country experienced mixed growth of expansion and contraction. From 2001 to 2011, the country’s GDP grew at an average annual rate of 4.2% but it slowed to 4% in 2012 and 2012 before rebounding to 5.8% in 2014. Growth fell again to 4.5% in 2015 and 2.2% in 2016 before rebounding again to 3.8% in 2017. The country experienced a significant contraction in 2018, with a GDP growth falling to 3.7% due to socio-political tensions and security challenges in the country’s Anglophone regions caused by Boko Haram insurgencies. Growth then slowed to 3.6% in 2019 and to -1.8% in 2020 due to the COVID-19 pandemic. In 2008, the global financial crisis caused a decline in oil prices which retarded the country’s growth.

The sectors that contribute mostly to Cameroon’s growth are agriculture accounting for 16%, industry accounting for 34% and Services accounting for 50% of the country’s GDP.

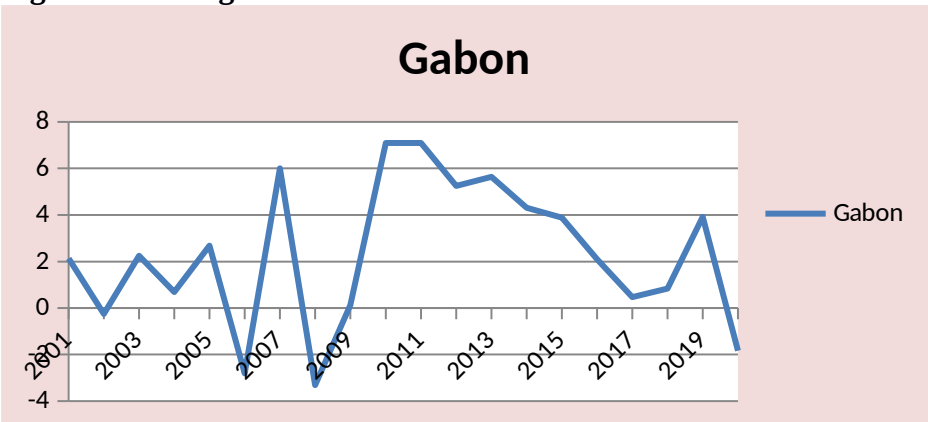
Agriculture employs about 55% of the population and contributes 35% of Cameroon's exports.

The industry sector which includes manufacturing, mining and construction is dominated by the oil sector which contributes 45% to the GDP. The service sector which includes transport, trade, communication, Financial and business services is the greatest booster of economic growth of Cameroon. Wholesale and retail trade is also a promising sector contributing about 20% of the country's GDP. Cameroon trades mainly with China, France and Nigeria.

The tourism sector remains underdeveloped contributing only 2% to the GDP. However the government is working to promote it through investments in infrastructure and the implementation of policies to attract more visitors.

GABON

Figure 7 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

According to available data, Gabon's economy highlighted periods of expansion and contraction between 2001 and 2020.The country's economy grew at an average annual rate of approximately 1.3% amid this period. The current GDP in US dollars passed from $5.02 billion in 2001 to $15.31 billion in 2020, making riches of $10.29 billion in two decades. The current GDP per capita (US$) passed from $3,844.6 in 2001 to $6,680.1 in 2020, an increase of $2,835.5 or approximately 73% over the two decades. Gabon has high GDP per capita that is ranked fifth in Africa and second in Central Africa behind Equatorial Guinea[20].

The main sectors supporting this growth were the oil and gas industry, which accounted for about 50% of GDP and 80% of exports, and the mining industry, which included

20 https://lalibreville.com/gabon-second-pays-pib-habitant-plus-eleve-afrique-centrale (consulted on 10 May 2023)

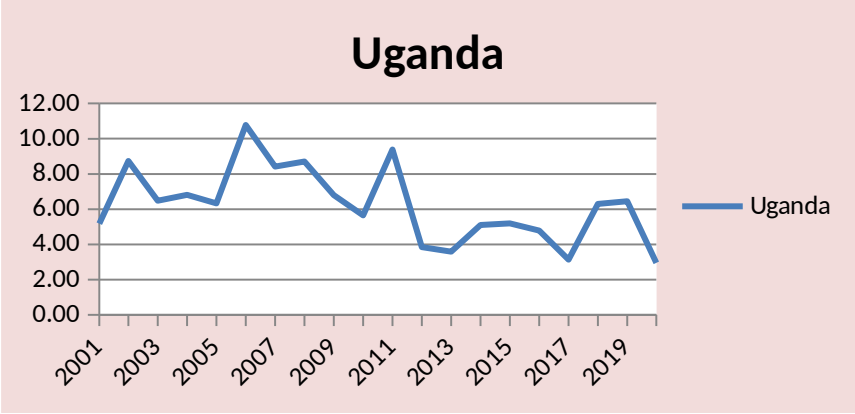
manganese, iron ore, gold, and uranium. Additionally, the trade sector played a significant role in Gabon's economy, accounting for approximately 20% of GDP and providing employment for a substantial number of Gabonese workers.

The country experienced significant growth in the 2000s, driven primarily by high oil prices. However, the global economic crisis of 2008-2009 had a severe impact on Gabon's economy, leading to a contraction in GDP growth as it can be seen in the graph. The country was also hit by a fall in oil prices in 2014, which caused a contraction in the economy. Since the middle of the period 2010-2019, Gabon has been vulnerable to unstable growth, due to fall in the price of crude oil. Gabon's government has taken steps to diversify the economy, with efforts aimed at boosting the tourism, agriculture, and forestry sectors.

In conclusion, Gabon's economy has been reliant on the oil and mining industries, with the trade sector also playing an important role. While the country has experienced periods of growth, it has also been vulnerable to external economic shocks and fluctuations in commodity prices. Diversifying the economy and investing in non-oil sectors will be crucial for sustained economic growth in Gabon.

Uganda

Figure 8 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

Uganda has experienced a consistent and significant economic growth over the past few decades, with an average rate of 6% per year since the mid-1990s, with the poverty rate dropping from 56% in 1992 to 21.4% in 2020. The economy expanded from a GDP of $7.4billion in 2001 to $34.4billion in 2020, reflection an annual growth rate of 7.3%.

One of the key drivers of Uganda's economic growth has been its agricultural sector, which employs about 70% of the population and accounts for 24% of the country's GDP. The sector has grown at an average rate of 208% annually from 2001 to 2020. One of the agricultural goods that have fetched foreign exchange revenues for Uganda has been coffee. However, the economy is also fostered by food crops, horticulture and other cash crops such as tea. Uganda's major exports are coffee, tea, and other agricultural products. The government has implemented policies aimed at increasing agricultural productivity, such as investing in irrigation systems, improving access to credit for farmers, and promoting the use of fertilizers and high-yielding crop varieties.

The industry has also been on an expansion being driven by manufacturing, and the growing activities. The industry grew at an average annual rate of 7.3% for the past two decades. Manufacturing has been the fastest growing sub-sector with 8.8% growth rate per year. The sector's contribution to the country's GDP has increased from 10.8% in 2001 to 26.1% in 2020.

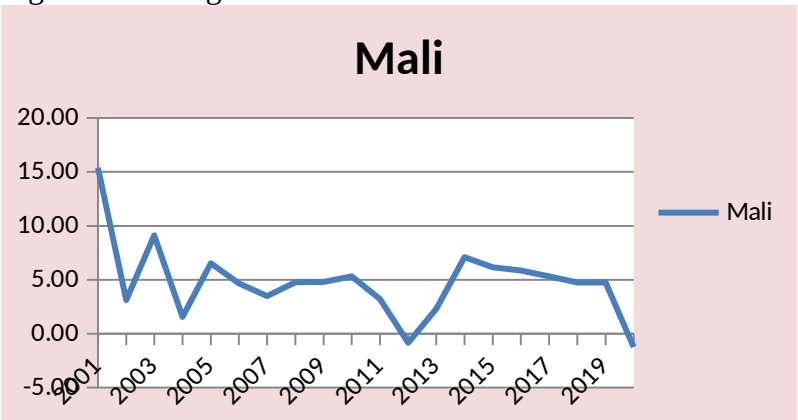
The service sector which includes tourism, transport, trade and communication, has also grown significantly with an annual growth rate of 7.0% from 2001 to 2020. Tourism has been one of the fast growing sub-sectors having an average growth rate of 8.7% annually. The sector has grown thanks to the country's natural attractions including snow caped mountain Rwenzori, national parks, and unique wildlife like the mountain Gorillas, the climbing lions among others

Other factors that have greatly contributed to Uganda's economic growth have been; private and public investment, Education and Skills (Human Capital development), Import substitution and export promotion and Urbanization. The country's investment in infrastructure, particularly in the transportation sector, upgrading roads, railways, and airports, has improved access to markets and reduced transportation costs for businesses.

Uganda has also benefited from its natural resources, particularly oil that was discovered in 2007. The discovery of these resources has attracted significant foreign investment and is expected to generate substantial revenue for the country in the coming years. However, despite the progress made, Uganda still faces significant economic challenges. The country has a high level of income inequality, with the richest 10% of the population earning 39 times more than the poorest 10%. Additionally, the country remains heavily reliant on agriculture, which is vulnerable to climate change and fluctuations in global commodity prices.

Mali

Figure 9 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

The graphic representation highlights the evolution of economic growth of Mali which is usually measured in GDP, so between 2001 and 2020, Mali's economy grew at an average annual rate of approximately 5.2%. It's current GDP in US dollars accounting to $3.8 billion in 2001 and $18.8 billion in 2020, according to World Bank. A difference of $14.9 billion which is a creation of wealth. Meanwhile the GDP per capita was also counted to $291 in 2001 and $912 in 2020 which is the growth of 213.5% within the two decades.

The agricultural, mining and trade sectors are the main sectors that have contributed to Mali's economic growth. The agricultural sector is the primary sector, which accounts nearly 39% of GDP while mining sector, particularly gold, has also been a major contributor to the economy, with significant foreign investment in recent years. The trade sector also plays an important role in Mali's economy, with the country being a member of several trade agreements and benefiting from export opportunities in neighboring countries. However, Mali's trade is heavily focused on a few key products, including gold, cotton, and livestock, which makes the economy vulnerable to fluctuations in global prices.

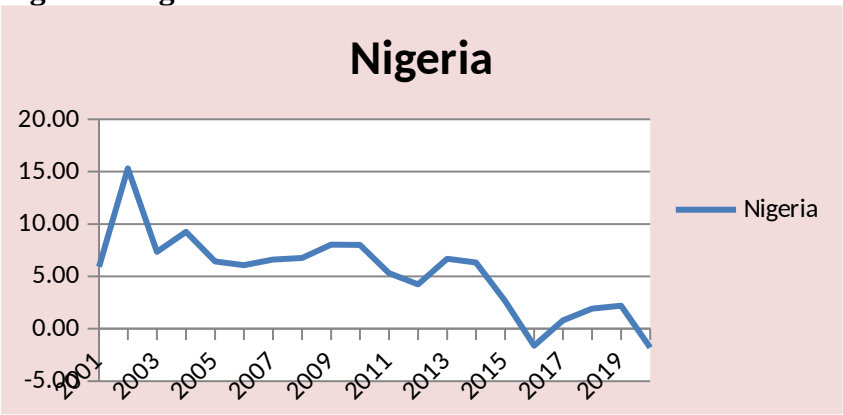
Mali's economy experienced strong growth in 2001, the increase in cotton production and favorable weather conditions boosted the country's export revenues, which led to such a high real GDP of 15.3%.However the severe drought befell the country in 2002 leading to a sharp decline in economic growth since the country relies heavily on agriculture. The economy regained in 2003 but there as subsequent decline again in 2004 due to some external and internal factors but it gradually regained its momentum with its growth averaging 5.7%.

However in 2012, Mali fell in to the recession with a steep decline in the GDP, the real GDP growth was -0.84%.This was due to a serious crisis with a coup d'état that Malian economy faced. The crisis led to a sharp decline in foreign direct investment that also exacerbated the overall deficit of the balance of payments. The economy recovered in 2013, with a real GDP of 2.3%, this was supported by 15% increase in the agricultural sector performance due to good weather. In 2014 the economy was at its peak once again of 7.2% after many years of economic deterioration since 2003.This steady growth has been held by a good production of Gold and cotton until the GDP decelerated again to -1.24 % in 2020 due to Covid-19 crisis.

This decline can be attributed also to a number of factors, including falling commodity prices, reduced foreign investment, and the impact of political instability on the economy.

Nigeria

Figure 10 : growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

Nigeria is one of the most populated countries with it's growth rate surpassing it's Economic growth rate leading to a decline in real per capita incomes. Between 2001 and 2020, Nigeria's economy has known levels of growth, contractions and depressions at different periods. Between 2001 and 2014, Nigeria became one of the fastest-growing economies in Africa with an average GDP annual growth rate of 7%.

The most significant expansion was of 2002 with a growth of 15.3% from 5.9% in 2001. The significant recessions happened in 2016 where growth declined to -1.6% from 2.7% in 2015 and a great decline of -1.8% in 2020 from 2.2% in 2019. This was due to the drastic fall of global oil prices combined with a low domestic oil production between 2014 and 2016 and also in 2020 on top of the COVID-19 pandemic which slowed down economic growth.

The sectors that contribute significantly to Nigeria's growth are services, agriculture and manufacturing. These sectors account for 60% of the nation's GDP and a source of employment to almost half of the total formal employment. However, the country's growth has been mainly fostered by the oil and gas sector. Oil and gas sector contributes about 14% to the country's GDP but accounts for 85% of Nigeria's exports, contributing about 95% of the foreign exchange earnings and accounts for 65% of the annual federal budget. This has immensely impacted the country's economic growth and development.

Between 2001 and 2010, Nigeria was one of the countries with the highest GDP growth worldwide and this growth is attributed to oil production before the oil price shock in 2016. Despite this setback, Nigeria set on increasing the oil production which helped in holding up the economic growth.

The sector contributes significantly to its Economic growth due to the rising oil prices and the country largely depends on it than any other sector. Nigeria is the second largest oil reserves in Africa after Libya .By 2021, Nigeria had 37.05 billion barrels of oil reserves, ranking second in Africa and 8th world wide as per OPEC Annual Statistical Bulletin 2022[21].

Manufacturing sector is another important sector accounting for approximately 10% of the GDP. The sector mainly blossoms due to cement production which is also a significant export of the country. However, the sector has been held back by a wide range of challenges including inadequate power supply, poor infrastructure and a difficult business environment. The agricultural sector is a sector that is not highly developed in Nigeria like other sectors such as services, industry. Nigeria's over dependency on oil and gas sector is the major cause for the continuing low performance of the agricultural sector on addition to other challenges like poor infrastructure, inefficient Land markets, limited access to finance etc.

In a period of two decades, the highest value added annual growth has been 55.6% in 2002 from 3.8% in 2001 after which the country registered a steep declined to 7% in 2003. From this year, the sector has not recovered, known a stable but low growth of less than 5% till2020. (Agriculture, forestry, and rushing, value added (annual % growth).

With such performance, the sector's contribution to the country's GDP has relatively been low since 2003 accounting for only 24% much as it contributes 40% of the total employment. However, the sector has particularly grown in the area of food crops such as cassava, maize

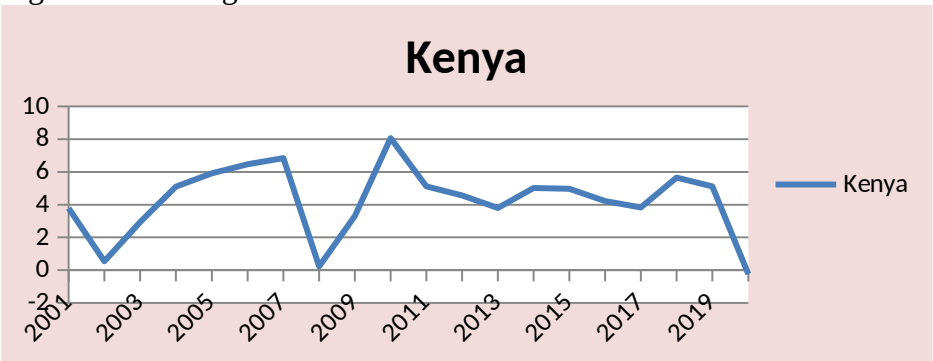
21 https://www.Opec.org/opec_web/en/publications/202.htm consulted 27/04/2023

and rice. The country faces a challenge of high rate of deforestation, ranking number one in the World and this greatly affects the climate rendering it unfavorable for agricultural activities.

The service sector is one of best performing sector and contributes the biggest percentage to the country's GDP, followed by industry and lastly agricultural sector. The sector includes IT, tourism, retail and wholesale trade, real estate, banking and insurance. There is interdependency between the service sector and other sectors. Telecommunications sector in particular has experienced rapid growth since the liberalization of the economy in 2001. Wholesale and retail trade has a source of employment for the country’s largest population and the growing middle class. The drop in oil prices in 2016 provoked the poor performance of the service sector too in the same year hence a low growth rate. From 2016 onwards, service sector has been driving growth representing 53% of the economy and growing at a rate of 2.2%.

Kenya

Figure 11 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

Kenya's economy experienced significant growth between 2001 and 2020, with the country becoming one of the fastest-growing economies in sub-Saharan Africa. The country experienced periods of rapid expansion and others of great contractions. Between 2001 to 2007, the country's GDP grew at an average annual expansion rate of .6%, and this growth increased to an average of 5.7% annually between 2010 and 2019. This growth slowed down to 0.6% in 2020 due to the COVID-19 pandemic.

The sectors that contribute the most to Kenya's growth are tourism, agriculture and livestock, wholesale and retail, trade, manufacturing, and financial services. These sectors contribute 57% of the country's GDP and a source of almost half of the total formal employment.

Tourism is a crucial contributor to Kenya's economy contributing 10% to the GDP and 9% of the formal employment. Between 2002 and 2007, the number of arrivals increased from 1million to 1.8millions which increased the sector's earnings from 513 million dollars in 2002 to 1.51billions in 2007. What aided this growth was strategized advertising techniques, improved security, etc. Tourism remains the leading foreign exchange earner in the country. However, the sector faces challenges like terrorism, global pandemics which lead to fluctuations in growth.

Just like most of the SSA countries, agriculture is the backbone of the country's economy contributing up to 24% of the GDP, contributing 65% of Kenya's exports and also accounting for 18% contribution to formal employment. Between 2001 and 2005, agriculture contributed an increment of 5.2% to the GDP, and agricultural exports contributed and increment of 8% hence responsible for the annual GDP increase rate between 2002 and 2007. The most exported agricultural goods are food corps, cash corps and horticulture goods.

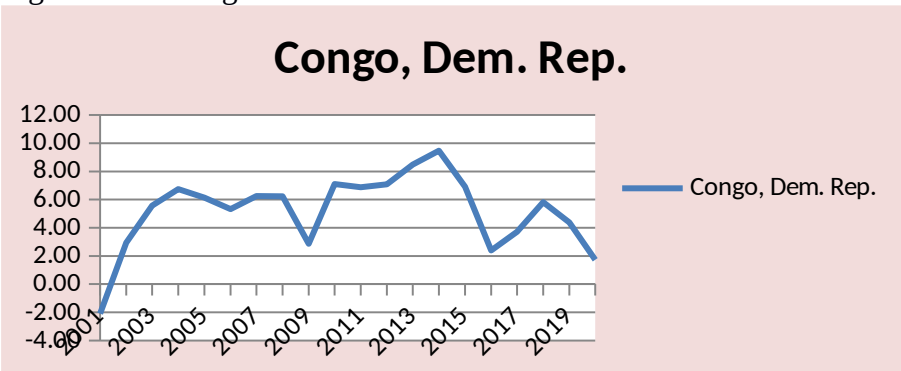
Since the 1990s, the wholesale and trade sector contributes to the GDP by 10% and accounts for 10% of the formal employment all thanks to the trade liberalization. The manufacturing sector is a sector that is still facing various barriers hence accounting for only contributes 10% with 6.9% value addition in growth. Since 2001, the sector registered its highest contribution as 13% and there after a continuing decline till 2020. Most manufactured products are basic and consumed locally thus contributing less to the exports. This hinders increase in foreign earnings, foreign direct investment and job creation. This is due to high input costs, low capital productivity, and unfavorable business environment. Business Process

Outsourcing. This is a new but promising sector in Kenya that is accounting for less than 0.01% of the GDP.

Finance sector which comprises of Banks, insurance companies, Savings and credit cooperative organizations (SACCOs), micro-finances, capital markets and other informal finance services. The sector contributes about 4% to the GDP and provides assets equivalent to 40% of the GDP. The sector is starting to grow by opening up branches in the neighboring countries like Tanzania, Uganda and Sudan. However, the sector is yet to grow due to existing challenges like high interest rates, high level of nonperforming loans in the whole banking sectors. This hinders investments and growth.

DRC

Figure 12 : GDP growth evolution from 2001 to 2020



Source: Constructed by authors using World Bank Data

Democratic Republic of Congo (DRC) has experienced a turbulent economic growth trajectory between 2001 and 2020 characterized with periods of rapid expansion, contraction and stagnation. From 2001 to 2008, the country's average annual growth rate was 5.5% which was mainly driven by the mining sector.

This growth declined significantly in 2009 due to the global financial crisis which caused a contraction in the country's GDP by 2.6% before the economy recovered between 2010 and 2014 with an average annual growth rate of 7.7%. This was due to increased investment in the mining sector and high commodity prices. However, this didn't last before it slowed down in 2015 to 2.4% due to a fall in commodity prices and political instabilities which do exist till date.

Furthermore, the country's economy got a setback in 2016 and 2017 when it was hit hard by the drop in copper prices which is the main export. Growth rejuvenated to 4.4% in 2018 as investment increased in the mining sector and also the increase in the commodity prices. Just

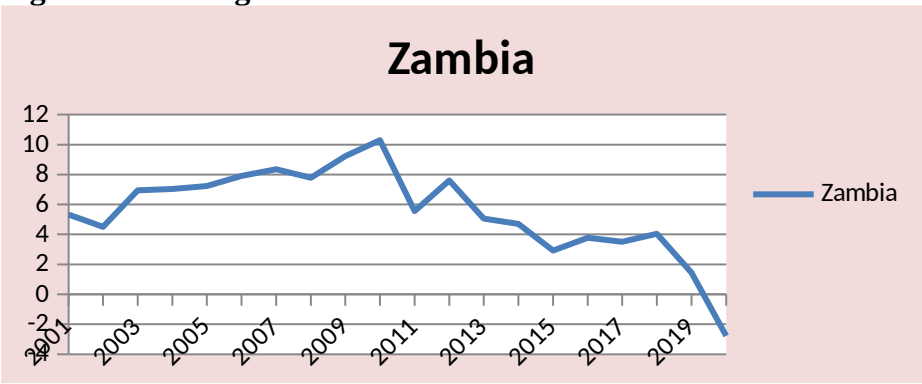
like most of the countries, growth contracted again in 2019 and 2020 by -1.7% due COVID-19 pandemic, Ebola epidemic, and also political instabilities.

DRC's economy mainly depends on the mining sector accounts for about 90% of the country's exports and 25% of the GDP. The agricultural sector is also significant to the country's growth accounting for 25% of the GDP and employing about 60% of the total population. DRC is endowed with natural resources such as minerals, forests, natural fresh water. All these have been under managed and exploited which still remains a challenge to the country.

The country has made some progress in ensuring a favorable business environment and attracting foreign Investment in order to diversify the economy create more jobs, and reduce poverty. Despite DRC's natural resources to be exploited, the country still has a challenge of poor infrastructure and access to basic services such as electricity which is greatly still holding back it's growth.

Zambia

Figure 13 : GDP growth evolution from 2001 to 2020



Source: Constructed by us from World Bank Data

Zambia's economy experienced mixed growth characterized with periods of expansion and contraction. From 2001 to 2010, the country's GDP grew at an average annual rate of 4.4% but it slowed down to 3.6% in 2011 and before rebounding to 7.3% in 2012 then later fell to 2.9% in 2015 and -4.8% in 2020 due to the COVID-19 pandemic.

The sectors that contribute the most to the country's growth include mining, agriculture and services. These sectors contribute 85% o the country's GDP and a great contributor to the employment by 75%. Mining is the main source of the country's growth contributing 12% to the GDP and being responsible for about 70% of the total exports earnings. The main and

most important mineral in Zambia is copper making the country the second largest copper producer in Africa after DRC.

Agriculture is the second largest sector responsible for Zambia's growth accounting for 19% of the county's GDP and employing approximately 60% of the population. The main crops produced in Zambia are maize, tobacco, cotton, sugar among others.

The service sector also greatly contributes to the GDP by 54%. This sector includes tourism which is growing sector with attractions such as the Victoria falls and national parks. Other sub-sectors include transport, communications, finance etc. The sector has grown due to the country's implementation of economic reforms like trade liberalization, improving public financial management, and privatizing state-owned enterprises, hence improving the business environment and attracting foreign Direct investment.

Conclusion

In general the economic growth remains low in the Sub-Saharan countries compared to other regions. From the ten selected countries, we observe the same pattern of countries characterized by growth fluctuations, which makes it hard to significantly reduce the widespread poverty and allow countries to converge to other developing countries. The region remains fragile to the external economic shocks due to its lack of diversification to resources. Also the growth in these countries is affected by high inflation rates, accompanied by accelerated unemployment rates.

CHAPTER 3: METHODOLOGY AND ECONOMETRIC ANALYSIS

Chapter 3: Methodology and Econometric analysis

Introduction

This chapter concentrates on the steps, techniques used in the study. It describes the methodology used, the data sources and the models chosen for the practical analysis and explains why these models. It goes ahead to discuss the results obtained and suggest recommendations in accordance to the findings.

1: Methodology

1.1: Research design

In order to give the answer to our question "What are the key factors that contribute to economic growth in the Sub-Saharan countries?", we adopted positivism as our research philosophy[22].This philosophy was introduced by a French philosopher Auguste Comte[1798-1857][23], which assumes that objective knowledge can be obtained through scientific methods and that research should aim to discover universal laws and patterns through the collecting of quantitative data and using of statistical analysis to identify causal relationships between variables. Therefore given our research question, we have chosen positivism because we believe that there are objective measurable factors that can be identified, quantified and analyzed to explain the key determinants of economic growth in this region.

In addition to that, our research is based on a deductive method approach that involves testing of existing theories and hypothesis, which is starting with a general theory or hypothesis then using data to test whether the theory is supported or refuted. We chose this approach because we have established some hypotheses on the relationship between certain factors and economic growth. Thus by collecting and analyzing data, we shall generate conclusions through the logical reasoning and empirical evidence regarding the primary factors of economic growth in the SSCs. It is evident that our study conducts a quantitative study method.

Our research strategy combines case study and longitudinal research. The case study research involves in-depth analysis of a few Sub-Saharan countries in order to identify the key determinants of economic growth in those countries, necessitating therefore multiple sources

22 Research philosophy refers to the set of beliefs, values and assumptions that uphold a research approach or methodology i.e. regarding how data about a phenomenon should be collected, analyzed and used.

23 THE JOURNAL OF THE ROYAL INSITUTE OF PHILOSOPHY, Vol.XXVI.No.99, October 1951 pg.291

of data collection. Whereas the longitudinal research involves collecting data over a long period of time to track the changes in economic growth and the potential variables that leads to growth in these countries. So we chose this combination of strategies so that we could use the existing data sources to identify the key determinants, trends and changes in economic growth in few Sub-Saharan countries, and also to have a more extensive and nuanced understanding of this complex phenomenon.

As for time horizon, we collected data for the period from 1990 to 2019, that is 30 years, and we chose this time period because of the availability of data and also we stopped in 2019 because we did not want involve the after Covid-19 impacts which might hinder us from finding out the real factors of growth in this countries. The sampling strategy in our study depends on the availability of data since we are working with under developed countries, which are known for the lack of data. However in chapter two, we used random sampling, which stipulates that each member of the population has an equal chance of being selected, and which helps in reducing the sampling bias. We chose the countries from each sub-region, and also from each development class (income group) according to World Bank (i.e. Low, Lower-Middle and Upper-Middle income).

Since our data is quantitative[24], we used a quantitative collecting method of secondary data to acquire it. Secondary data is the data that has already been collected and published by other researchers or organizations so we used online databases, most specifically from World Bank Indicators and Penn World Table, version 10.01.

Moreover our study uses panel data modeling as per econometrical analysis, and this is the statistical analysis that uses panel data. Panel data combines both cross-sectional data and time series, meaning observing same variables from the same multiple entities (cross-sectional sample) over multiple time periods[25] as our study does. We chose this technique because it allows control for unobserved heterogeneity; such as omitted variables, which helps reduce garnering biased results. Also compared to analysis on times or cross-sectional alone, panel data analysis is better because it links both to provide more informative data that cannot be provided by either times series or cross-sectional data alone[26] which is what we look for in our study. We use Stata 17 software for our regression.

24 Quantitative data is the data that can be measured or counted in numerical values

25 Studenmud, A.H (2016). Using Econometrics: A practical Guide. Seventh edition, Pg.473

26 Badi.H.Baltagi (2005) «Econometric Analysis of panel» data Third edition, pg. 4 & 5

1.2: Panel data model analysis

In this study we employ panel data analysis which is generally suitable for empirical study with datasets containing both time series and cross-sectional observations at the same time. Our data, as expected follows this structure; we have a panel data for nine Sub-Saharan countries (cross-section) observed over the period time series) 1990-2019.The panel will allow us see how the GDP growth varies across different countries overtime and observe the effects of the chosen variables on the economic performance while controlling those factors that vary among countries yet are not observed in the data.

Panel Data: *This refers to the pooling of observations on a cross-section of households, countries, firms, etc. over several time periods. This can be achieved by surveying a number of households or individuals and following them over time*[27]. Panel analysis also known as longitudinal analysis, combines the study of a number of individuals (cross section data) over time (time series) consecutively. i.e; same unit cross section is measured at different times.

The general equation form for panel data model can be expressed as follows:

$Y_{it} = \beta 0 + \beta X_{it} + \varepsilon_{it}$ ……………………………………….. (1)

Where Y represent the dependent variable, $i$is the individual unit observed over time$t$, $\beta 0$ is constant for all variables, $\beta$is coefficient estimated of variables, X represent independent variables and $\varepsilon$is the error term that captures random variation and unobserved factors. It should be noted that;

$\varepsilon_{it} = \mu_{it} + v_{it}$………………. ……………………………………… (2)

With μ_{it} as the error for observable or un-observable individual specific effects and v_{it} as the random errors.

In this part we will attempt to present a summary of the steps (methodology) undertaken to conduct our analysis. Firstly we present our sample data and define our variables. We ensure there is consistency in variables for each country across different time periods. Secondly, just before proceeding with the main analysis, we conduct a descriptive analysis of our data, this present the summary statistics that delve into distribution of the variables, i.e. number of observations, mean, standard deviation, maximum and minimum.

27 Badi.H.Baltagi (2005) «Econometric Analysis of panel» data Third edition, pg.1

Thirdly we pass on to the model specification; in this part we formulate our mathematical equation by incorporating our variables in Logarithm in to the equation we are to use in our estimation. So the next step is for estimation of our specification with two panel data models. In panel data analysis we deal with a problem of unobserved heterogeneity and in order to address this challenge there are two main models (Studenmund 2016) that the analysis employs, these are; Fixed effects and Random effects models.

a) Fixed Effects Model (FEM)

This is also known as Within Estimator, Covariance Model or the Least Squares Dummy Variable Model. This model estimates the panel data equations in a way that dummy variables are introduced in a model so that estimated coefficients will not be biased because of the omitted time invariant variables[28] .It was also considered in this study because it assumes time-invariant characteristic of the individuals being perfectly collinear with the dummies by taking average times of individuals always not consistent under the hypothesis H_0: Cov(U_i, X_{it})=0 ,hence fixing the problem of multicollinearity.

The general equation form is expressed as:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \alpha i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots \quad (3)$$

Where: Yit represent the variable of interest for the *i*th country at the time *t.* Xit represents the vector of explanatory variables for the country *i* at the time *t.* β_0 and β_1 are the coefficients associated with the explanatory variables, αi is the intercept for each country, that represent individual (country) -specific fixed effect which captures time invariant heterogeneity. And ε_{it} is the error term that represents both unobserved factors and random errors.

b) Random Effects Model (REM)

This is also called Random Intercept or Partial Pooling Model. It assumes that there is no correlation between the fixed effects U_i with the regressors X_{it} under the hypothesis H_0: Cov (U_t /X_{it}) =0. It takes into consideration the differences or variations within each individual and between the units.

The general form of the linear equation is written as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \gamma_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots \quad (4)$$

28 Oscar T.R (2007) «Panel data analysis, Fixed and Random Effects using Stata» Pg.37

Where the difference from fixed effect equation is γi representing the individual-specific random effect which captures the unobserved heterogeneity which is assumed to be random and uncorrelated with the explanatory variables, and ε_{it} which is the error term for random errors specific to each observation.

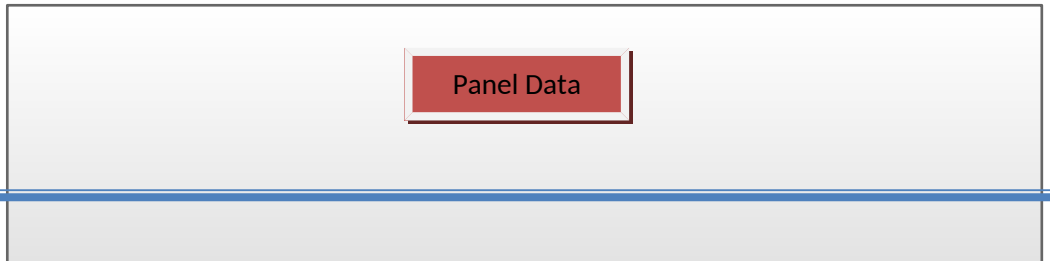
The Hausman specification test (1978) which works under the null hypothesis of consistence of the errors is carried out on the variables so as to determine the most appropriate model between the fixed effects and random effects. It considers two hypothesis namely; H0: random model is consistent meaning that E(uit/xit)=0 and H1: Fixed effects model is consistent. If the P-value of the test is greater than 0.05, the null hypothesis is accepted confirming that the random effect model is the preferred model but if the P-value is <0.05, H1 is accepted meaning hence the fixed effects model is preferred.

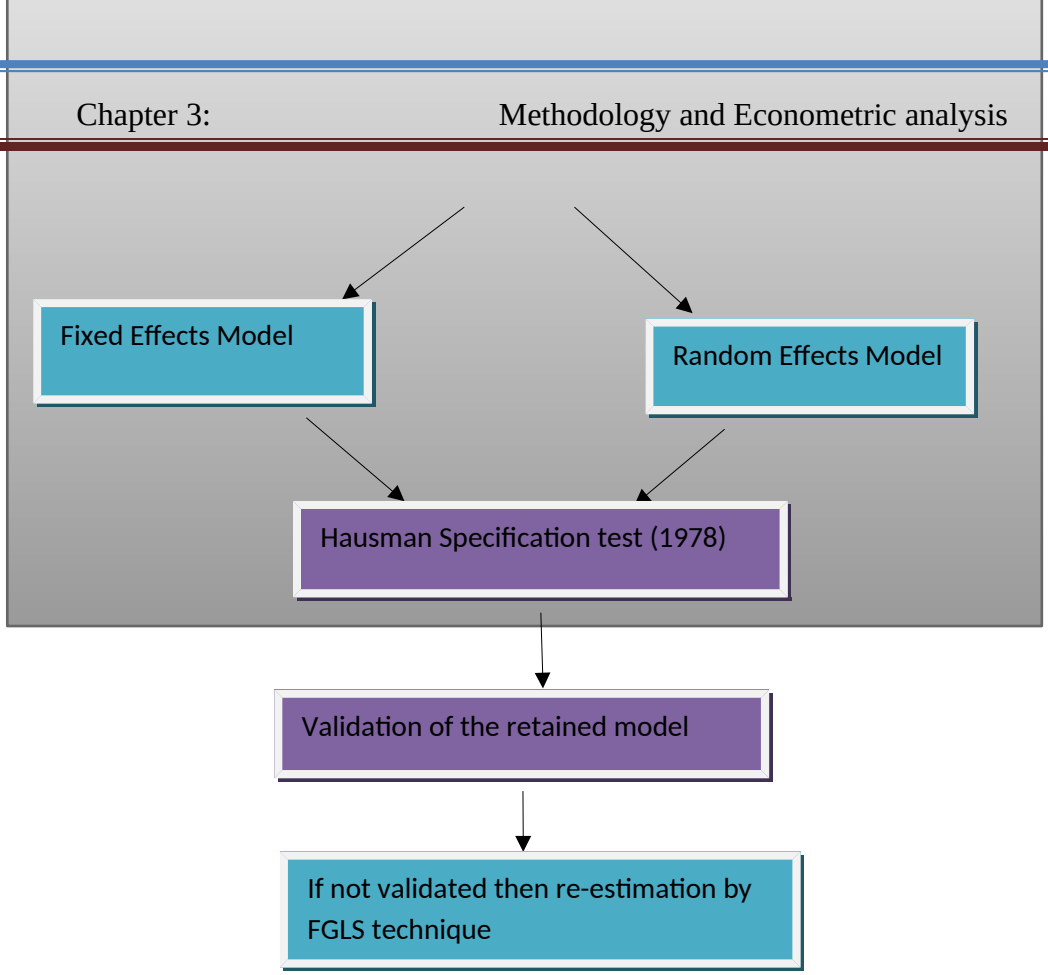
Different validation tests are carried out on the retained model. The tests that are carried out are Wooldridge test for autocorrelation of errors, this in order to observe the linear relationship between variables. This is done to analyze multicollinearity in between variables, which is explained by strong relational dependence between regressors, and also Modified Wald test for group-wise heteroskedasticity. Once the null hypothesis (H0: p-value > significant level at threshold of 1%, 5% and 10%) is accepted then the model is validated and can be used for the study analysis and also perform forecasts.

If the null hypothesis is rejected, then we are in the presence of heteroscedasticity, autocorrelation and multicollinearity which can lead to biased and inefficient coefficient estimates,unreliable standard errors and incorrect statistical inferences. As a result, to adequately address these problems, FGLS (Feasible Generalized Least Squares) technique is a suitable approach for estimation. So the retained model can be re-estimated for the analysis with FGLS technique in order to solve for these problems and give robust results.

The following are the steps taken in order to carry out a panel model analysis and are summarized in the figure below.

Figure 14 : Panel data model steps





Source: Eraborated by us using Microsoft word

2: Econometric analysis

2.1: Data presentation

The data used in the study is panel data. This refers to a type of data used in statistical analysis that combines both cross-sectional and time-series data. It entails studying multiple units such as countries or persons over several time periods,(Badi H.Baltagi 2013). Its benefits are; it improves the estimation efficiency and analysis, captures within-entity and between-entity variation enabling to identify both time-varying and time-invariant factors affecting growth and it allows for controlling unobserved heterogeneity and examining dynamic relationships by observing changes over time.

This part gives the data description of the components of our panel study.

a) The chosen Sub-Saharan Countries.

Our analysis study uses a balanced panel data of 9 countries from Sub-Saharan African countries, from the period of 1990 to 2019. The sample strategy depends on data availability. There are a number of countries that could have been incorporated in the sample which we

omitted because of the unavailable data more specifically on the chosen variables. For example, we had selected a sample of 17 countries but we had to reduce to 9 countries due to lack of data.

Tableau 3 : The chosen countries

Benin	Cameroon	Mali
Botswana	Congo	Uganda
Burkina Faso	Kenya	Nigeria

Source: Elaborated by authors using microsoft word

b) The chosen variables

Table 4 below shows the variables of interest; they are in logarithm in order to avoid the problems of heteroskedasticity, then their descriptions, the sources and the hypothesized outcome for each. We chose the real GDP growth as indicator of economic growth, therefore a dependent variable that is to be explained. The rest of the variables are independent variables, which are the potential key drivers economic in these countries.

Tableau 4 : Summary of the chosen variables and the expected results

Variable	Description	Source	Expected signs
Lgdp_c	GDP (constant 2015 US$)	World Bank (WDI)	Dependant variable
Lh	Human capital index, based on years of schooling and returns to education.	Penn World Table	+
Lgfcf_c	Gross fixed capital formation (constant 2015 US$)	World Bank (WDI)	+
Lexpt1	Exports of goods and services (constant 2015 US$)	World Bank (WDI)	+
Limp1	Imports of goods and services (constant 2015 US$)	World Bank (WDI)	-/+

Source: Elaborated by authors using Microsoft word

c) Description of the variables

→Dependant variable:

- **GDP per capita (GDPC)**: This is a proxy for or represents a variable to be explained (economic growth). GDP per capita is widely used as an indicator of a country's economic well being, that is its standard of living, productivity and economic development. It is expressed as the total economic output of a country or region

divided by midyear population[29], thereby providing a metric of the average economic well-being of each individual within that population. GDP per capita can be calculated as:

GDP per capita = GDP /midyear population

Where:

-GDP is the gross domestic product or the total economic output of a country or region

- Midyear population refers to the annual average of population of the country or region.

This measure helps to compare the economic performance of different countries or regions over time. Even so, it would be wise to note that GDP per capita is not a perfect measure of economic well-being, as it does not take into account factors such as income inequality and social well-being. Therefore, it is often used in conjunction with other indicators to provide a more complete picture of a country's economic and social status.

→ Independent variables

- **Human capital (H):** This enfolds the skills, knowledge and abilities of individuals acquired through experience, education and training, that steers to improved productivity and more innovative people. In our study human capital is measured by the average number of years of schooling, as a proxy related to education. The more healthier and educated people are, the more creative and innovative they become. This is supported by theoretical work advanced by Becker (1964) together with Lucas (1998) which highlights how human capital fosters technological progress leading to improved labor productivity and the adoption of new ideas and technologies. Additionally, it has been confirmed through many studies (Barro and Sala-i-Martin, 1995; Brunetti et al, 1998 etc) to be another important factor of economic growth[30].
- **Gross Fixed Capital Formation per capita (GFCF_C)** is the total investment in the physical capital goods within an economy per total population. It is an indicator of physical capital (Barro 1991, Barro and Lee 1994). These are goods Such as machinery, equipment purchases, plant and infrastructure. Thus it measures the

29 World Bank, World Development Indicators' metadata.

30" International Journal of Economics and Management Sciences" Vol. 2, No. 2, 2012, pp. 18-24 p.g19

amount invested in the acquisition of these produced assets per person in an economy in a given accounting period[31]. Our variable is expressed in US dollars, constant 2015 price. It is crucial to economic growth because it promotes the growth of the productive capacity, technological development, and innovation. Solow's (1956) and Romer's (1990) theories highlight the importance of capital accumulation in driving economic growth, emphasizing how greater capital formation investment can result in improved output levels and productivity gains.

- **Exports (EXP1)** are goods and services produced within a country but sold outside the country. They are generally the physical goods such as manufactured goods, or natural resources as well as services such as banking, consulting and tourism; it depends on what a country is able to export. As the country exports it receives revenues from the buyers from other countries and therefore they contribute to the country's overall income and GDP, showing the important role exports plays in a country's economy.

- **Imports (Imp1):** These are the goods and services that are purchased by a country from other nations. It is the part of the GDP consecrated for imports. In our study, it is expressed as per head, which is the representation of an individual's imports in an economy. In terms of their impact on GDP, imports are typically viewed as a subtraction from the country's GDP, as they represent spending on goods and services that were produced abroad rather than domestically. As a result, when imports exceed exports, a country can have a trade deficit which can harm its overall economic well-being in the long term. On the other hand imports can also be an important factor in a country's overall balance of trade (BOT) [32] and economic performance, as they can provide goods and services that are not readily available within a territory so it worth noting that imports can also have a positive impact on the economy by stimulating competition and encouraging innovation in domestic industries. Additionally, some imports can support domestic production processes, such as raw materials or specialized components that are not produced domestically.

d) Descriptive statistics:

The table below shows the descriptive statistic of the chosen variables.

31 "THE MEASUREMENT OF GROSS DOMESTIC FIXED CAPITAL FORMATION IN INDONESIA" Kusmadi Saleh march 1997 p.g3 and https://data.oecd.org/gdp/investment-gfcf.htm assessed on 05/05/2023

32 BOT is the difference between the value of a nation's exports and imports for a given period.

Tableau 5 : Descriptive statistics

Variable	Obs	Mean	Std.dev.	Min	Max
Lgdpc	270	7.103067	0.728896	5.808658	8.777318
Lh	270	0.515426	0.264063	0.029175	1.078007
lgfcf_c	270	5.407618	0.910941	3.863445	7.546506
limp1	270	22.21951	1.193185	20.45882	25..83571
lexp1	270	22.03393	1.128142	19.56119	25.00402

Source: Prepared by authors using data from WDI (World Bank) and PWT1001

The table above show the summary of the statistic description (mean, minimum, maximum and standard deviation) of the variables used in this study over nine countries in the SSA region in the period of 30 years. The number of observations is 270 for all the variables which shows that the panel is balanced

2.2: Model Specification

In the objective of finding out what are the potential key factors that are likely to explain economic growth in the Sub-Saharan countries, we identified some variables to include in our study after an analysis of the literature review. These are the variables that were highly likely to influence and impact significantly the economic growth (GDPC) in the Sub-Saharan countries: H, GFCF_C, IMP1 and EXP 1. Therefore our theoretical specification of the model takes this general linear functional form:

GDPC = f (H, GFCF_C, IMP1, EXP 1).…….. (5)

We employ a panel data regression. This is a balanced macro panel with a sample of 9 countries observed over a period of 30years starting from 1990 to 2019. Balanced because there are no missing observations, Macro because N is greater than 7, N=9 countries with T varying from a minimum of 20 years and in this case, T=30years making it a balanced macro panel. As mentioned before the variables are in log form, it can be denoted as (logarithm=Log=l)

Thus the linear regression form of the equation to be estimated is written as follows:

$Log\ gdpc_{it} = B_0 + B_1 log\ h_{it} + B2\ log\ gfcf\_c_{it} + B3\ log\ Imp1_{it} + B4\ log\ Exp1_{it} + \varepsilon it$…. (6)

Where:

i: indicates a country

t: indicates time period from 1990-2019

B_i: i=0.....4, represents the coefficients of the independent variables

εit: This is an error term that represents both unobserved factors and random

The model has five variables with gdpc as the dependent variable and the remaining four variables as independent ones. Gdpc stands for economic growth for the individual country i studied over a time t. This specification is the general form for the model and the appropriate model between the two models will be chosen after the estimation.

2.3: Interpretation of results

Tableau 6: Estimation of equation 6 using fixed effect model and random effect model.

Dependent variable lgdpc						
Independent variables	Coefficients	std.err.	P-value	coefficients	std.err	P-value
C	3.541984	0.3661888	0.000	3.747616	0.3705927	0.000
Lh	0.7108806	0.0861593	0.000	0.7530673	0.0855559	0.000
lgfcf_c	0.1039546	0.0213376	0.000	0.1212672	0.0214584	0.000
limp1	-0.1068817	0.0177878	0.000	-0.1199672	0.0177687	0.000
lexp1	0.2272581	0.0155777	0.000	0.2258855	0.0158978	0.000
Model	**Fixed Effects**			**Random Effects**		
No.Obs	270			270		
No.Groups	9			9		
R-squared	0.8608 (within)			0.8550 (overall)		
	F (4,257) = 397.47			Wald chi2 (4) = 1547.68		
	Prob >F =0.0000			Prob chi2 = 0.0000		

Source: Elaborated by authors using results prepared by Stata17.

From the above results;

The number of observations are 270 (9*30) meaning there are no missing observations hence the panel data is balanced. The quality adjustment test of Mc Fadden R-squared for both models are close to 1(within = 0.86, overall =0.85) which shows that both models are good for estimations. The first column shows the independent variables, Models, number of observations, number of groups and R- Squared. The second and third big column contain values of the estimated coefficients of the variables , standard errors, and P-values that show the significance of each independent variables at the significance level of 1% for each model respectively.

The constant coefficients for fixed effects and random effects models are 3.54 and 3.74 respectively. The coefficients of human capital index for fixed effects and random effects models (0.710 & 0.753) are positive and their p-values are less than 0.01 hence statistically significant at 1% significance level. This implies that human capital has an important positive impact on economic growth.

The coefficients of gross fixed capital formation per capita in both models, (0.103 & 0.121) respectively, are positive and their p-values are less than 0.01 hence statistically significant at 1% significance level. This means that the variable gfcf_c has an important positive impact on economic growth.

The coefficients of imports (-0.106 & -0.119) are negative for both models and their p-values are less than 0.01 thus being significant at 1% significance level. This means that imports have a negative important effect on economic growth.

The coefficients for exports (0.227 & 0.225) are positive in both models and their p-values are less than 0.01 hence significant at 1% significance level. This means that export of goods and services has an important positive impact on economic growth.

In light of the preceding analysis, with regards to the estimated coefficients of both models, all the coefficients associated with variables (explanatory variables) appear to be statistically significant and have the expected signs, which is in agreement with the explained theories and empirical studies. Imports in this case took the negative sign.

Both models have well estimated the results for this study but only one model that best explains the study results can be retained. A Hausman test was run in order to determine the best model for the estimation of results for this study.

- **Hausman Specification test (1978) results**

Tableau 7 : Specification test results.

```
. hausman fixed2 .

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed2       random2       Difference       Std. err.
-------------+------------------------------------------------------------
          lh |    .7108806     .7530673       -.0421867         .010179
    lgfcf_c  |    .1039546     .1212672       -.0173126               .
       limp1 |   -.1068817    -.1199672        .0130855        .0008243
      lexpt1 |    .2272581     .2258855        .0013726               .
------------------------------------------------------------------------------
                          b = Consistent under H0 and Ha; obtained from xtreg.
           B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

    chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =  10.86
Prob > chi2 = 0.0282
(V_b-V_B is not positive definite)
```

Source: Elaborated by authors using results prepared by Stata17.

According to the test, there are two hypothesizes. The null hypothesis (H_0), where the random effects model is retained if the p value> 0,05 and also the hypothesis H_1 where the fixed effects model is retained if the p value <0,05. In this case, the value of Hausman test is 10.86 and the probability value is 0.0282 which is less than 0.05 at 5% significance level. The null hypothesis is rejected hence retaining the Fixed effects model as the most appropriate model that explains, for the case of panel of the retained countries, the link between the GDP per capita and chosen independent variables.

Different validation tests were run on the Fixed effects model in order to know if there are no problems of auto-correlation of errors, multicolinearity and the absence of heteroskedasticity.

- The multicollinearity

Studenmund (2013) stated that the dependence of variables of each other can also be tested using the simple correlation coefficients. The problem of multicollinearity is when the correlation coefficient is high, that is > 0.80 which is the arbitrary number, subsequently resulting to large variances in the estimation of the coefficients we are interested in (ibid 2013).The table 3 shows the correlation between variables, the simple correlation ranges between -1 and +1, the closer it is to 1, the stronger the correlation, but the closer it is to 0, the less the correlation.

Tableau 8 : Correlation Matrix

Variables	Lgdpc	Lh	lgfcf_c	limp1	lexp1
Lgdpc	1.0000				

Lh	**0.7969**	1.0000			
lgfcf_c	**0.9162**	**0.7532**	1.0000		
limp1	0.4130	0.3364	0.4933	1.0000	
lexp1	0.6546	0.5097	0.6469	**0.9012**	1.0000

***Source**: Elaborated by authors using results prepared by Stata.*

In observation to the table above, there exists a strong positive correlation above the "arbitrary number", of (0.91) between physical capital represented by lGFCF_C and lGDPC, also between lIMP1 and lEXP1 (0.90). There exists also a positive correlation between lH and lGDPC of 0.79 and between lGFCF_C and lH of 0.75. Therefore we observe the multicollinearity problem among variables especially for those that the coefficients exceed 0.8.

Furthermore according to the Wooldridge test for autocorrelation in panel data, the results show that the p-value =0.0006 which is less than 0.01 at 1% significance level hence rejecting the null hypothesis. There exists auto-correlation of errors which renders it difficult to best explain the impact of the independent variables on the dependant variable, gdp per capita.

The results from the Modified Wald test for group-wise heteroskedasticity show that the probability is 0.0000 which is less than 0.01 at 1% significance level. The null hypothesis is rejected hence signifying the presence of heteroskedasticity of errors. The results for both the validation tests are found in the appendix 01.

All the above tests show that the model is not valid to estimate the impact of the independent variables on gdp per capita. In order to solve these technical problems, there is need to re-estimate the regression equation using a better and more advanced approach called FGLS (Feasible Generalized Least Squares).

The FGLS technique is the most preferred because it permits to use robust estimators in the presence of auto-correlation, heteroskedasticity and muticolinearity. The results obtained after the re-estimations are recorded in the table below.

Tableau 9 : The results of estimation of FGLS model estimated using the Stata17 software.

Dependent variable lgdpc			
Independent variables	Coefficients	Std.err.	P-value
C	6.232923	0.2822011	0.000
Lh	1.178049	0.0786279	0.000
lgfcf_c	0.139645	0.0200534	0.000
limp1	-0.0556072	0.0144309	0.000
Lexpl	0.1331699	0.0143471	0.000
No. Obs			270
No. Groups			9

Time periods	30
Wald chi2(4) = 805.28	
Prob>chi2 = 0.0000	
coefficient for all panels (0.9238)	

***Source**: Elaborated by authors using results prepared by Stata17.*

The coefficients estimated correspond to the elasticities of the different independent variables. The coefficients of the variables lh (1.178), lgfcf_c (0.139), and lexp1 (0.133) all have a positive impact on gdp per capita and their p-values equal to 0.000 which is less than 0.01 hence significant at 1% significance level. The variable limp1 has a negative coefficient (-0.055), whose p-value is 0.000 which is less than 0.01 hence significant at 1% significance level. The variable has a negative impact on gdp per capita.

An increase by one unit in the value of lh results into an increase of 1.17% in the value of gdpc. As well, an increment by one unit in the value of lgfcf_c results into an increase of 0.13% in the value of gdpc. An augmentation by one unit in the value of lexp1 leads to a rise of 0.13% in the value of gdpc. An increase by one unit in the value of limp1 results into a decline of 0.05% in the value of gdpc.

The results show that the variables; log human capital based on the number of years of schooling, log gross fixed capital formation, log percentage of exports have a positive effect on log gross domestic product per capita (economic growth) while log percentage of imports, have a negative effect on economic growth.

According to the results, the study shows that human capital is an important factor in determining the level of economic growth in a country. The longer the number of years of study, the more a person gains adequate knowledge and skills necessary for innovation, and also increases efficiency and productivity at work. According to the World Bank development indicators, the countries like Niger, Mali, Guinea, and Central African Republic have the lowest literacy rates ranging between 15% and 31% and also have the lowest economic growth rates. This confirms Barro's [1991] theory that the quality of education is important in attaining sustainable economic growth. Also, the Endogenous growth theory suggests that investment in education promotes research and development which results into innovation thus promoting economic growth. Hypothesis H1 is confirmed.

The results show that physical capital has a positive influence on the rate of economic growth. An increase in investment through buying of machinery, improving the infrastructure boosts efficiency and productivity of labor which in turn results into increased output. This is also testified by Adam Smith [1723-1790] in his classical growth theory, he explains the

importance of physical capital in driving economic growth. This confirms the hypothesis H2 that there exists a positive relationship between physical capital and economic growth.

According to the results of the study, imported goods and services affect negatively the rate of economic growth hence confirming hypothesis H3 of the negative sign. These goods are normally of higher prices which results into loss of foreign earnings and also lower the standards of living in the country due to high priced goods. This results into deficit in balance of trade for the country.

The study shows that exportation of goods and services bring about a positive impact on economic growth hence confirming hypothesis H_4. Exportation of goods and services increases foreign earnings for the country. Countries like Nigeria, that export more than importing have witnessed high economic growth rates. This was also confirmed by Bbaale and Mutenyo (2011) and Upreti, Parash (2015) whose studies showed that exports are a significant factor in boasting economic growth.

Conclusion

The aim of this chapter was to find out the determinants of economic growth in the countries of SSA using econometric methods. The study was based on nine countries studied over a period of 30 years from 1990 to 2019. The data used was obtained from the World Bank development indicators analyzed using the panel data analysis because it studies the variation in time and the cross section variation of variables.

The results confirm that education and investment greatly determine the rate of economic growth in SSCs. On the other hand, trade openness (based on exports and imports) has both a negative and positive impact on the rate of economic growth. The percentage of exports in the GDP of the country increases the rate of economic growth while the percentage of imports in the GDP declines the rate of economic growth.

As a result of this study, we recommend that countries ought to avoid deficit in balance of trade payments by promoting exports and substituting of imports which reduce percentage of imports in the GDP. In the case of importation of any goods, priority should be given to capital goods than consumer goods as these have a positive impact on economic growth. Capital goods such as machines of advanced technology are an investment to the country and

also increase the efficiency and productivity of different sectors more so the manufacturing sectors in different countries.

Countries ought to increase expenditure on the sector of education so that a big percentage of children can access free education and reduce on the rate of school dropouts. Also research on the best curriculum is necessary where more focus on practical skills should be made paramount than theoretical work so as to improve on the quality of graduates produced in each country.

Countries should embark on increasing investment in physical capital by acquiring equipments and machinery that are necessary for production. Also, most of the countries in SSA are dependent on agriculture, mechanizing agriculture through the use of advanced machines would increase agricultural returns which lead economic growth.

GENERAL CONCLUSION

General conclusion

Economic growth in Africa, more specifically in SSA is a subject that will continue to be studied until all discoveries have been brought to book and taken into consideration for the region to attain sustainable growth and development. The main objective of this study was to discover the key determinants of economic growth and the main sectors driving economic growth so that the policy makers and leaders could take them as a priority.

Firstly, a study on the existing empirical works on this subject was considered and later an evolution study was carried out on ten chosen countries studied over a period of two decades starting from 2001 to 2020. Furthermore, an econometric study was carried out based on a sample of 9 countries chosen from the three sub-regions of SSA studied between 1990 and 2019 based on the availability of data.

There exist quite a number of variables but we scaled down to four variables based on the empirical, theoretical studies and data available. Human capital index based on the average number of years for schooling, Investment proxied by gross fixed capital formation per capita, exports and imports are the independent variables while GDP per capita was the dependent variable representing economic growth in the region.

A panel data analysis was preferred as thoroughly analyzes the impact of these variables and the variance of time using the Fixed effects and Random Effects models and then later passing on to a more advanced model(FGLS) for more robust and valid results. Three of the independent variables (Human capital, gross fixed Capital Formation per capita and exports) were confirmed significant and impact positively the rate of economic growth once concentrated on, while Imports proved to be of the negative effect on the rate of economic growth among the studied countries.

According to the evolution study of the chosen countries, agricultural sector seemed to be main source of economic growth for most non oil producing countries while oil and gas sector proved a very important driver for growth among oil producing countries.

Agriculture is the back borne of Africa. Many countries in SSA have flourished thanks to this sector and a big percentage of exported goods from this region are agricultural exports which confirms the positive relationship between exports and economic growth.

According to the African Development Bank report 2023, 5 of the ten fast growing economies in the world are from SSA and these countries are Benin, Ivory Coast, Ethopia, Rwanda, and Tanzania. Their GDP rates are set to increase to 6.1%, 7.1%, 6%, 7.8% and 5.8%

respectively. One of the key factors responsible for this achievement is increased level of investment which also confirms the results of our study.

Here are some of the recommendations:

- Education in SSA should be taken as a priority sector in all countries to be invested in as this produces the researchers, policy makers and all the skilled labor force responsible for sustainable growth. More institutions of higher learning should be put in place and at subsidized tuition fees so as to encourage more nationals to pursue their studies and attain advanced skills and knowledge.
- Policy makers should identify and concentrate more on those strategic sectors that are boasting growth in each individual country.
- Countries that have minerals like Zambia, DRC, should invest in their exploitation and processing so as to export value-added mineral products than exporting them in raw form. This will increase export earnings thus boasting economic growth.
- Oil producing countries like Nigeria, Angola, Gabon, should consider also exploiting and investing in other sectors like agriculture in order to diversify their economies instead of over relying on just one sector. This will diversify their exports hence increase their export earnings.
- Investment in importing capital goods should be considered as this increases productivity and also reduce on the negative impact of imports on the country's economy.

Limitations: Many countries in SSA are less developed which renders it difficult to have data for some variables. Some countries possess data for certain variables while others like Lesotho, Comoros, Angola, Burundi, didn't have data for most of the variables chosen for the study.

Much of studies have been done, however, more attention is needed in studying factors in relation to each country in order to find out the most suitable policies and strategic sectors for each country, as all these countries possess diversity in opportunities, population, natural resources, climate, geographical location advantages, different political strategies and regimes among others. All these factors dictate the policies to be implemented according to the kind of opportunities a country is blessed.

APPENDICES.

Appendix 01: Validation tests.

1. Test 1

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 8) = 30.567

Prob > F = 0.0006

2. Test 2

Modified Wald test for group-wise heteroskedasticity

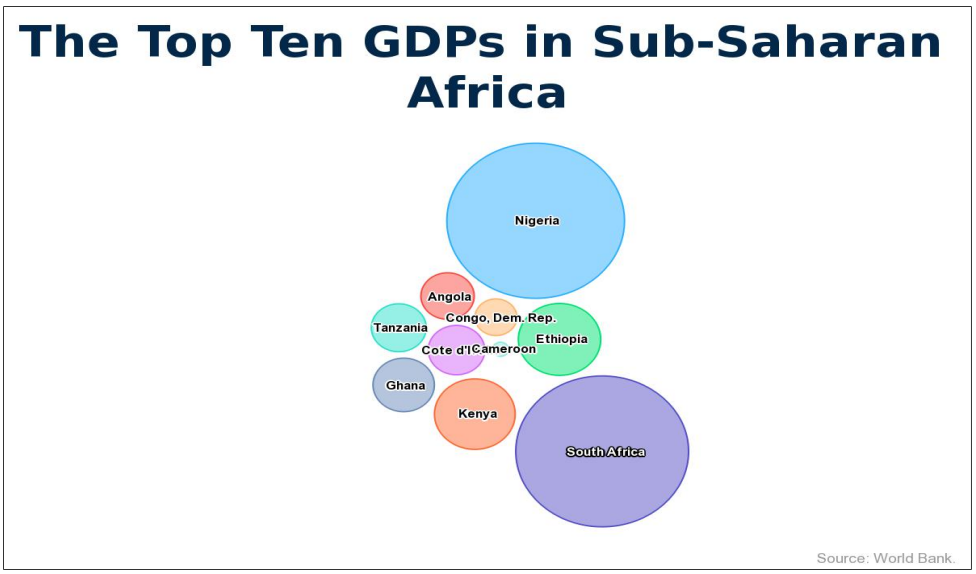
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (9) = 573.95

Prob>chi2 = 0.0000

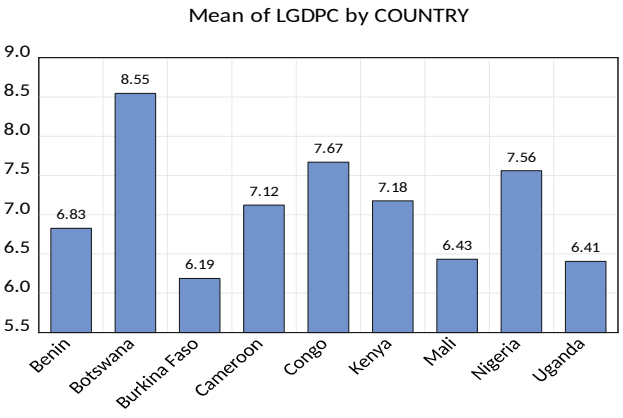
Appendix 02:

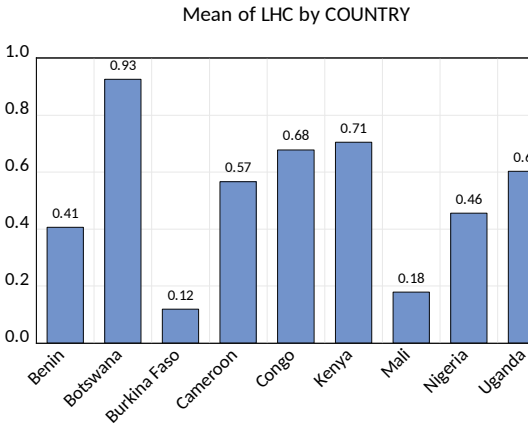


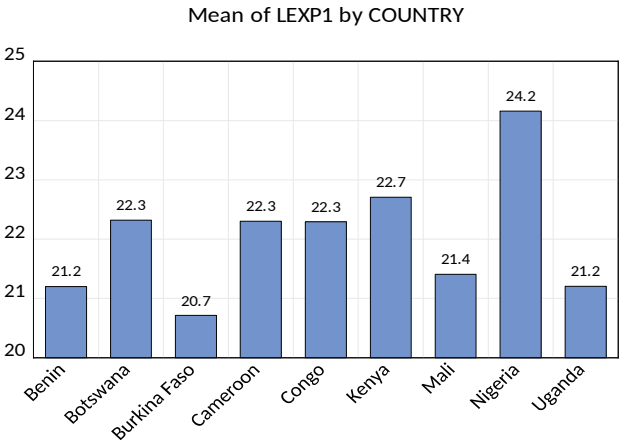
Appendix 03: GDP growth (annual %) from World Bank used for evolution analysis

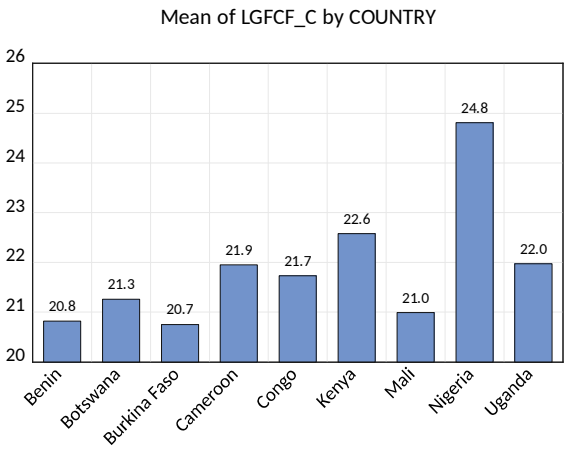
	LSO	GAB	CMR	ZMB	KEN	NGA	MLI	MWI	UGA	DRC
2001	3,56	2,14	4,32	5,32	3,78	5,92	15,38	-4,97	5,18	-2,10
2002	0,72	-0,25	4,48	4,51	0,55	15,33	3,11	1,70	8,73	2,95
2003	4,56	2,25	5,45	6,94	2,93	7,35	9,12	5,71	6,47	5,58
2004	1,69	0,69	7,05	7,03	5,10	9,25	1,56	5,42	6,81	6,74
2005	3,47	2,68	2,23	7,24	5,91	6,44	6,53	3,27	6,33	6,14
2006	4,23	-2,81	3,81	7,90	6,47	6,06	4,66	4,70	10,78	5,32
2007	4,19	6,01	4,33	8,35	6,85	6,59	3,49	9,60	8,41	6,26
2008	5,52	-3,31	2,85	7,77	0,23	6,76	4,77	7,64	8,71	6,23
2009	-1,26	0,13	2,58	9,22	3,31	8,04	4,81	8,33	6,80	2,86
2010	5,27	7,09	2,90	10,30	8,06	8,01	5,31	6,87	5,64	7,11
2011	4,61	7,09	3,38	5,56	5,12	5,31	3,21	4,85	9,39	6,87
2012	6,33	5,25	4,63	7,60	4,57	4,23	-0,84	1,89	3,84	7,09
2013	1,79	5,64	5,00	5,06	3,80	6,67	2,30	5,20	3,59	8,48
2014	1,71	4,31	5,72	4,70	5,02	6,31	7,08	5,70	5,11	9,47
2015	3,13	3,88	5,67	2,92	4,97	2,65	6,17	2,80	5,19	6,92
2016	3,61	2,09	4,54	3,78	4,21	-1,62	5,85	2,48	4,78	2,40
2017	-3,14	0,47	3,54	3,50	3,84	0,81	5,31	4,00	3,13	3,73
2018	0,07	0,84	3,96	4,03	5,65	1,92	4,75	4,39	6,30	5,82
2019	0,93	3,92	3,48	1,44	5,11	2,21	4,76	5,45	6,44	4,38
2020	-8,36	-1,84	0,26	-2,79	-0,25	-1,79	-1,24	0,80	2,95	1,74

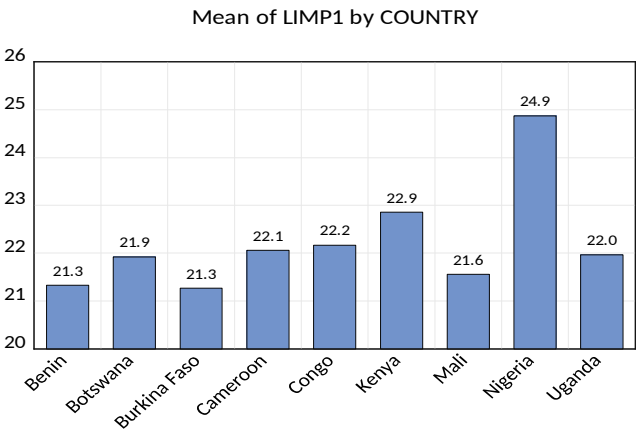
Appendix 04: Graphic representation of the mean of five variables used in the regression in respect to their countries











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ABSTRACT

This study aims to investigate the determinants of economic growth in the Sub-Saharan Countries. To do this, two econometric models based on a panel of 9 countries over the period from 1990 to 2019 was used. The research employs fixed effects model and FGLS estimation in Stata 17. We use the Secondary data from World Bank and PWT 10.01, and the chosen variables basing on the existing literature are; GDP per capita as a proxy for economic growth, and a dependent variable, human capital depending on the average number of years of schooling, gross fixed capital formation as a proxy for physical capital, exports and imports, all four as independent variables. All variables are in logarithm form.

The results emphasize the importance of investments in human capital and gross fixed capital formation as the factors that play a positive and significant role in driving economic growth in the Sub-Saharan Countries. Also exports are a significant determinant and influence positively the growth in the SSCs, therefore the need for promoting export oriented strategies such as trade diversification, market access facilitation, while imports were found to significantly affect economic growth negatively in this region, thus the need for cautious management of imports policies, in order for this countries to maintain a sustained economic growth.

Key Words: Economic growth, Sub-Saharan countries, Panel, Fixed Effect Model, FGLS,GDP per capita, human capita, gfcf, exports and imports.

Résumé

Cette étude vise à investiguer les déterminants de la croissance économique dans les pays subsahariens. Pour ce faire, deux modèles économétriques basés sur un panel de 9 pays sur la période de 1990 à 2019 on tété utilisés. La recherche utilise un modèle à effets fixes et une estimation FGLS dans Stata 17. Nous utilisons les données secondaires de la Banque mondiale et PWT 10.01, et les variables choisies sur la base de la littérature existante sont ; Le PIB par habitant comme proxy de la croissance économique, et une variable dépendante, le capital humain en fonction du nombre moyen d'années de scolarisation, la formation brute de capital fixe comme proxy du capital physique, les exportations et les importations, toutes quatre comme variables indépendantes. Toutes les variables sont sous forme logarithmique.

Les résultats soulignent l'importance des investissements dans le capital humain et la formation brute de capital fixe en tant que facteurs qui jouent un rôle positif et significatif dans la croissance économique des pays subsahariens. De plus, les exportations sont un déterminant important et influencent positivement la croissance dans les pays subsahariens, d'où la nécessité de promouvoir des stratégies axées sur l'exportation telles que la diversification des échanges, la facilitation de l'accès au marché, tandis que les importations ont eu un effet négatif significatif sur la croissance économique dans cette région, d'où la nécessité de gestion prudente des politiques d'importation, afin que ces pays maintiennent une croissance économique soutenue.

Mots clés : croissance économique, pays subsahariens, panel, modèle à effets fixes, FGLS, PIB par habitant, habitant humain, fbcf, exportations et importations.