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**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF BUSINESS AND ECONOMICS**  
**DEPARTMENT OF ECONOMICS**

**THE IMPACT OF EXTERNAL DEBT, UNEMPLOYMENT, AND  
INFLATION ON ECONOMIC GROWTH: EVIDENCE FROM  
SUB SAHARAN AFRICAN COUNTRIES**

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**June, 2022**

**The Impact of External Debt, Unemployment, and Inflation on  
Economic Growth: Evidence from Sub-Saharan African Countries**

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*A Thesis Submitted to the School of Graduate Studies of Addis Ababa  
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**Addis Ababa, Ethiopia**

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## **ABSTRACT**

*Achieving a high rate of economic growth, full employment, and price stability is key to macroeconomic policy objectives and a top priority for all countries worldwide. As a result, if these fundamental macroeconomic policy goals are to be realized, understanding the influence of external debt, unemployment, and inflation on economic growth is crucial. This study aims to examine the impact of external debt, unemployment, and inflation on economic growth in Sub-Saharan African countries. The study used panel data from thirty Sub-Saharan African countries from 2005 to 2019. The data were processed using STATA 15 software for the windows econometrics package. The researcher employed a dynamic panel regression model, the system generalized method of moments (system GMM) estimation strategy, and the Granger causality test. The study found that the three primary factors, external debt, unemployment, and inflation, have a significant negative relationship with economic growth in Sub-Saharan Africa. As external debt, unemployment, and inflation increased, all three variables had a detrimental influence on growth. Our results indicate that foreign debt, as a result of debt servicing, has a detrimental influence on growth by crowding out both private and governmental investment. This supports the debt-overhang hypothesis' applicability in the SSA African region. According to the findings, economic growth had no causal relationship with inflation, but it had a one-way causal relationship with unemployment and external debt which flowed from unemployment to economic growth and from economic growth to external debt.*

**Key words:** *External Debt, unemployment, inflation, economic growth, impulse response, causality, SSA countries, system GMM model*

## Declaration

I Astaraki Animut declared that this thesis, entitled “**The impact of external debt, unemployment and inflation on economic growth: evidence from sub Saharan African countries**” is my original work and that is prepared in partial fulfillment of the requirements for the degree of masters of Science in Economics at Addis Ababa university.

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## **LIST OF ACRONYMS**

DOH	Debt Overhang Hypothesis
DEDH	Direct Effect of Debt Hypothesis
FDI	Foreign Direct Investment
FE	Fixed Effects
GDP	Gross Domestic Product
GNI	Gross National Income
GMM	Generalized Method of Moments
GNP	Gross National Product
HIPC	Highly Indebted Poor Country
ILO	International Labor Organization
IMF	International Monetary Fund
LDCs	Less Developed Countries
MMT	Modern Money Theory
OLS	Ordinary Least Square
REH	Ricardian Equivalence Hypothesis
RE	Random Effects
SSA	Sub-Saharan Africa
WDI	World Development Index

# CHAPTER ONE: INTRODUCTION

## 1.1. Back Ground of the Study

The majority of countries seek to build their economies quickly and sustainably. However, accomplishing such a goal has proven challenging due to a multitude of factors that drive economic growth. Economic growth has always been a key concern for economic policymakers. Researchers have also realized the importance of the topic and have extensively studied economic growth, along with its determinants. Inflation is one of many variables that can be described as a determinant of economic growth (R. J. Barro, 1995). Price stability is one of the most important indications of stable macroeconomic performance. A rapid and sustained increase in price may wreak havoc on the economy's trajectory. Even though growth is a major macroeconomic goal in and of itself, the government may have to run fiscal deficits in order to achieve rapid economic growth. An alternate line of action to finance such a deficit could result in inflation (N. Mankiw, 2006).

The external debt burden, along with its servicing, is another issue affecting economic growth in Sub-Saharan African countries. African countries' external debt is a source of worldwide concern. These economies' widespread indebtedness and their burden of external debt have sparked heated debate among policymakers, economists, academics, and the general public. Countries must be able to finance their budgets through a long-term funding policy. To fuel economic growth, the majority of Sub-Saharan African countries rely on external debt. This is mostly due to a lack of internal finance sources to support socioeconomic activity and economic growth. When tax collections fall short of government expenditure predictions, governments usually have little choice but to raise taxes or borrow - either internally or abroad (Owusu-Nantwi & Erickson, 2016). According to (R. Barro, 1997), the majority of poor countries have insufficient internal financial resources to fund their annual budgets. As a result, developing-country governments frequently borrow to bridge the gap between anticipated expenditure and expected revenue. When governments use borrowing as a means of avoiding tax burdens, they end up with public debt (Ogunmuyiwa, 2011). Governments can borrow internally or externally. But, due to crowding out effect of domestic borrowing on private investment traditionally developing countries have relied on external debt and they search domestic borrowing only when foreign resources are unavailable (*Panizza et al., 2010*). However, as a result of their heavy reliance on external debt most developing country's economies usually confront huge fiscal

deficits due to increased debt service, particularly foreign debt service as a result of huge debt burden (Shabbir, 2013).

South Africa, Guinea Bissau, Eritrea, Ghana, Togo, Sierra Leone, Gabon, Congo, Angola, Mozambique, Kenya, and Zambia all have debts totaling more than 70% of their respective gross domestic products, according to the most recent figures from the IMF and the World Bank (GDPs). According to a recent World Bank report released on October 11, 2021, the debt of low and middle-income countries in Sub-Saharan Africa reached a record \$702 billion in 2020. Sub-Saharan Africa's debt was estimated to be approximately \$305 billion in 2010. The region has more debt than it can pay, the report showed. Total external debt rose from 305 billion dollars in 2010 to 492 billion dollars in 2016, 578 billion dollars in 2017, 613 billion dollars in 2018, 665 billion dollars in 2019, and 702 billion dollars in 2020. Debt servicing climbed from 14 billion dollars in 2010 to 52 billion dollars in long-term principal repayment and from 4 billion dollars in 2010 to 18 billion dollars in long-term interest payments (Welle ([www.dw.com](http://www.dw.com)), World Bank, 2021).

Another fundamental goal of macroeconomic strategies is to achieve high and sustainable GDP growth while maintaining low and stable unemployment rates. In addition to debt and inflation, in developing countries as well as industrialized economies the rising rate of unemployment has become a source of concern for policymakers and academics. This is due to the significance of unemployment as a crucial labor market outcome and an indicator of the status of an economy in general, as it plainly reflects a country's economic growth (Byrne & Strobl, 2004). Furthermore, the unemployment rate reflects the economy's overall performance and it represents aggregate economic activities. The destruction of human capital, social marginalization, demonstrations, increasing crime rates, and sickness are some of the economic and social consequences of unemployment, according to (Kingdon & Knight, 2004). Widespread poverty and income disparity are exacerbated by unemployment. As a result, it is crucial to analyze the relationship between unemployment and economic growth in order to assure appropriate policies that promote economic progress.

According to a number of country case studies, job creation is critical for rising living standards, increasing productivity, and encouraging social cohesion, all of which contribute to a country's overall growth (WB, 2012). Many recent research have found that the growth patterns observed

in the majority of emerging nations have harmed employment-led inclusive growth and development.

Every country in the world, whether small, large, advanced, emergent, developing, post-conflict, or resource-rich, has agreed that job creation and inclusive growth are critical for their long-term success (IMF, 2013). Depression, a loss of self-respect, and other vices such as thievery, prostitution, and others are all social difficulties associated with unemployment. The economic concerns of unemployment include depriving the country tax revenue in the form of income tax, wasting productive hours, and many others, while the social issues of unemployment include depression, a loss of self-respect, and other vices like robbery, prostitution, and many more (Adarkwa et al., 2017).

## **1.2. Statement of the Problem**

Price stability, full employment, and a healthy balance of payments are some of the indicators of better economic performance and among the priorities of governments when it comes to macroeconomic management. One of the recurring challenges that many Sub-Saharan African countries, face is a high level of debt that exceeds their repayment capacity, increasing number of unemployed labor, and high rate of inflation. For a variety of factors, the public external debt situation, inflationary pressure and unemployment level of sub-Saharan African countries is getting increasingly acute. This is the reason for the researcher to select external debt, unemployment, and inflation as main factors to affect growth and to study their impact on and causality with growth. The researcher studies many theories and previous empirical literatures relevant to the topic in order to perform this research work.

Classical economists argue that government debt repayments, especially external debt repayments, hinder economic growth by discouraging private investment and deterring potential foreign investors (Krugman, 1988). Debt has a positive direct effect on economic growth, according to neoclassical growth theory. This is because it is expected that the amount borrowed, if spent properly, will enhance investment.

The Keynesian school of thinking is viewed as a single-cause explanation for growth, in which debt-financed government expenditure multiplies national output or revenue (Elmendorf & Mankiw, 1998). In an underemployment economy, the Keynesian theory of debt and economic growth intervenes, believing that the impact of debt on economic growth is positive in the short run (Wagner, 1911; (Ncanywa & Masoga, 2018). According to the Ricardian equivalence

hypothesis (REH), government debt has no influence on growth (Ricardo, 1951; (R. J. Barro, 1989),(Afzal, 2012).

In relation to the interaction of economic growth and inflation the discoverer of classical theory Adam Smith, considered that there is no apparent link between inflation and the tax effect on profit levels and output, and saving was the most important factor controlling the rate of growth. AD and AS lead to a path of adjustment for Keynesians. It first shows a positive relationship between inflation and economic growth, but as the adjustment path develops, it becomes negative. Milton Friedman proposed monetary reform and claims Inflation will have no effect on unemployment, output, or other real economic factors. Neoclassical Economists devised their own hypothesis for the relationship between inflation and economic growth, claiming that inflation can indefinitely raise output growth rates by encouraging capital accumulation (Mundell, 1963),(Tobin, 1965). In contrast to Mundell and Tobin, Stockman, (1981) developed a model that shows a negative relationship between inflation and economic growth.

Empirically also researchers arrived on different conclusion about the impact of external debt and inflation on economic growth. Among the research done in developing countries, (Anyanwu & Erhijakpor, 2005), examines the impacts of foreign debt on economic growth in fourteen West African nations using a pooled data set from 1990 to 2002 and finds that the external debt to GDP and external debt to exports ratios have a significant negative impact on economic growth. Similarly, Using Ordinary Least Squares, (Deshpande, 1997), and (Fosu, 1999), estimated an enhanced production function in SSA and discovered a negative link between external debt and growth. (Iyoha, 1999), used the ARDL model on the data of thirty-eight (38) years from the period 1980 to 2017 and discovered that external debt has a detrimental impact on economic growth in Kenya. (Ejigayehu, 2013), uses data from eight severely indebted poor African nations between 1991 and 2010 to analyze whether external debt affects the economic growth of selected extremely indebted poor African countries and the estimation demonstrates that the debt crowding out effect, rather than the debt overhang, has an impact on economic growth. Contrary with the above findings,(Warner, 1992), using the OLS estimation technique on 13 developing nations from 1982 to 1989 discovered a positive link between foreign debt and investment. Ceesay et al., (2019) explores the impact of debt on growth in Western African countries from 1970 to 2017 and they discovered that the effect of debt-to-GDP ratio on Francophone Western African country's economic growth is positive. Sulaiman & Azeez, (2012), claimed that external

debt accumulation does not imply slow economic growth. And others, (Ribeiro et al., 2012) using quarterly data on 13 European countries and the multiple regression result shows surprisingly, no link could be identified between the debt problem, the level of government debt, and GDP.

On the relationship between inflation and economic growth also researchers arrived on different conclusions. Fischer, (1993), by using basic mixed regression alternative claims that inflation confuses the price mechanism, which would damage the efficiency of resource allocation and, as a result, has a detrimental impact on economic growth. Similarly, (R. Barro, 1997) and (Motley, 1998) uses data from a cross-section of nations and looked into the link between inflation and economic growth and concludes that an increase in average inflation decreases economic growth. Using OLS estimation technique, correlation analysis, and scatter plots, Enu et al., (2013) examined the relationship between inflation and rate & GDP growth rates in Ghana from 1980 to 2012. All three methods revealed a substantial negative linear link between GDP growth rate and inflation rate. On the contrary, Mallik & Chowdhury, (2001), investigate the link between inflation and GDP growth for four South Asian nations, (Bangladesh, India, Pakistan, and Sri Lanka). The cointegration and error correction models are used to compare empirical evidence using annual data from the IMF International Financial Statistics. For all four nations, the authors find evidence of a long-run positive link between GDP growth rate and inflation. Both inflation and economic growth have a substantial feedback loop. The other research by (Sidrauski, 1967), concludes that inflation has no long-term association with growth. Furthermore, (Easterly & Bruno, 1999) found that inflation and economic growth had a negligible relationship.

The causation between external debt, inflation, and economic growth is also a subject of debate among researchers. Among others, (Fischer, 1993) Fisher confirms that there is a causal link between inflation and economic growth and it goes from inflation to growth. Similarly, (Datta & Mukhopadhyay, 2011) conclude, that a causal link goes from inflation to growth in their study in Malaysia. In contrast to Fisher, (Umaru et al., 2012) used the Granger causality test to investigate the connection between inflation and economic growth in Nigeria. The study demonstrated that GDP generates inflation, not the other way around. (Mohd Noor et al., 2007) conducted a study on the relationship between unemployment and output in the Malaysian economy; the regression results revealed a negative long-term relationship between unemployment and GDP, as well as a two-way causality link after applying the Granger Causality Test. In contrast, (Mosikari, 2013)

used yearly time series data from 1980 to 2011 to investigate the impact of unemployment on South Africa's gross domestic product. Granger causality test result of his studies revealed that economic progress and the rate of unemployment do not cause each other to change.

From the theoretical models and empirical studies, it concludes that due to a range of variable factors such as the data coverage, methodology, the researcher's choice of control variables, and sampled countries' development level, the impact of external debt and inflation on economic growth is contradictory and inconclusive. This suggests that more research in this area is required. Likewise, SSA countries' foreign debt, inflation rate, and unemployment are among the highest in the world today. Such a phenomenon also makes the investigator more interested to see the impact of external debt, inflation, and unemployment on the economic growth of SSA countries.

In addition in the previous studies most researchers used OLS (ordinary least squares) estimation, and others use VAR (vector autoregressive model), VECM (vector error correction model), and ARDL estimation techniques. However, OLS estimation techniques does not take into account endogeneity between the variables and that render parameter estimations unreliable. Similarly, other models such as VAR, VECM, and ARDL models are not efficient to eliminate the problems of endogeneity, omitted variables bias, and measurement error. And are not preferable to obtain a better coefficient of parameters.

Furthermore, in sub-Saharan Africa researchers examined the impact of external debt on growth, the impact of inflation on growth, and the impact of unemployment on growth independently. As a result, they failed to determine the macroeconomic objective to pursue as a priority. Because as they are poor and developing Sub-Saharan African countries cannot simultaneously control inflation, unemployment, and a huge external debt burden.

Finally, unlike the previous studies, the current paper used not only more recent data and a larger number of observations, but also used one of the frontline econometric techniques, the system GMM estimation approach to fill the methodological gap and to untie the external debt, unemployment, inflation-economic growth dynamics in SSA countries and it also employed the granger causality test to find the direction of causality.

## **1.3. Objective**

### **1.3.1. General Objective**

The General objective of this paper is to investigate the impact of external debt, unemployment, and inflation of sub-Saharan African countries on their economic growth.

### **1.3.2. Specific Objectives**

1. To investigate the trend, structure and magnitude of external debt, unemployment, inflation and economic growth.
2. To examine which one from among external debt, unemployment and inflation is more significant to affect economic growth of sub Saharan African countries.
3. To investigate whether there is causality between variables external debt, unemployment inflation and economic growth and to find the direction of causality.
4. To assess if the debt overhang hypothesis (DOH) operate for countries in Sub-Saharan Africa.

## **1.4. Basic Research Questions**

This paper tried to answer the following questions:-

- i. What did the external debt, unemployment, inflation, and economic growth look like in terms of trend, structure, and volume during the research period?
- ii. Which determinant among external debt, inflation and unemployment is more significant to affect economic growth of sub Saharan African countries?
- iii. What appears to be the causal relationship between inflation, unemployment, and economic growth?
- iv. Does debt overhang hypothesis works for sub-Saharan Africa?

## **1.5. Hypotheses of the Study**

Although, the impact of external debt and inflation on economic growth is difficult to predict, as both might have a positive or negative impact. This research hypothesizes that;

- a) All the three explanatory variables total external debt, unemployment and inflation will have a significant negative impact on economic growth of SSA countries.
- b) There will be bidirectional causality between explanatory variables external debt, unemployment and inflation and the dependent variable economic growth.
- c) The debt overhang hypothesis (DOH) may work for SSA countries.

## **1.6. Significances of the Study**

Many research papers might have been done on the variables like external debt, inflation, unemployment and economic growth individually. But this study will analyze inflation, unemployment, foreign debt and economic growth together in a single model and it will find the direction of their causality. This research will make a unique addition by establishing a thorough knowledge of the influence of inflation, unemployment, and external debt on economic growth in Sub-Saharan African nations, as well as their causal relationships. As discussed on the introduction and problem statement section, achieving a rapid economic growth must be in harmony with stable price, full employment, and healthy balance of payment, therefore, studying these variables together and knowing their interrelationship is very important for macroeconomic policy making. This paper could also be serving as a mirror to someone else who wants to conduct a study on the topic to know the impact on and causation of external debt, inflation and unemployment with growth and from among these major macro-economic variables which one is more significantly affect economic growth of sub Saharan African countries .

## **1.7. Scope and Limitation of the Study**

This paper tends to assess the impact of external debt, unemployment and inflation on economic growth. In relation with debt in this research only external debt will be considered. because , even if it is possible to borrow either from the domestic or from the external market almost all sub Saharan African countries involved in external debt due to high crowding out effect of domestic borrowing on private investment (Panizza et al, 2010). A balanced panel is utilized to

reduce information loss due to missing values in data for some variables, and as a result, only 30 nations in Sub-Saharan Africa are chosen as the study area. The time of the study is delimited to be the recent fifteen years starting from 2005 to 2019. This period is selected because, it is more recent and sufficient data is available in this time interval. The main variables of interest included in this study are inflation, unemployment, external debt and economic growth. In conducting this paper, we had faced some problems like: - lack of complete or continuous data for some variables in sub-Saharan African region. Furthermore, our nation Ethiopia is not included in the sampled countries due to the lack of complete data for some variables and the fact that the data utilized in this study is a balanced panel. It is regrettable. The findings of this study, on the other hand, can be utilized to inform macroeconomic policymaking in Ethiopia and other countries not included in the sample. Because most countries in Sub-Saharan Africa share similar economic conditions, such as high inflation and unemployment, and are heavily indebted.

## **1.8. Organization of the Paper**

This research is organized into five chapters with its own set of sections and sub-sections. The first chapter contains an introduction to the investigation's main body, as well as a statement of the problem, the study's objective, a research question, the study's significance, and scope and limitations. The second chapter compiles a list of the most notable theoretical and empirical studies. The third chapter discusses the study's methodology and data sources. The fourth chapter covers data analysis, which includes descriptive analysis, a discussion of econometric model results, and the causality test result. The conclusion and policy implications are addressed in the final chapter, chapter five.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1. Theoretical Literature Review

### 2.1.1. Theories of economic growth

According to (Jhingan, 2003), Economic growth is the process through which a country's real per capita revenue increases over time, and it is measured by the increase in the quantity of services and products produced inside the country. Economic growth is a hot topic these days, and an overview of these concerns is required to begin with the earliest notions and theories that formed the foundations of present economic growth theories. In the table below, the main concepts and theories of economic growth are presented in historical sequence.

Table 2.1 – The Economic Growth Theories and Concepts

<b>Economic Growth Theories and Concepts</b>	<b>Period of Emergence</b>
Mercantilism	Early fifteenth century
Physiocracy	Second half of the eighteenth century
Classical Theories	In the year 1776,
Keynesian Theories	In the 1930s
Neo-Keynesian (Post-Keynesian) Theories	In the 1950s
Neoclassical Theories and Exogenous Theory of Robert Solow	From the 1950s to the 1960s,
Endogenous Growth Theories (new growth theory)	From the 1980s to the 1990s,

Source: Author's presentation

#### 2.1.1.1. Mercantilism

Representatives of mercantilism are the originators of growth theories (15<sup>th</sup> - 17<sup>th</sup> centuries). Antoine de Montchrestien, a French economist, coined the term "mercantilism" and popularized it in the scientific community (Montchrestien & Billacois, 1999). Mercantilists saw wealth acquisition as the primary source of economic growth and the primary goal of traders' and the state's economic actions (Mcdermott, 1999). While early mercantilists favored coins and precious metals as absolute liquid assets, subsequent mercantilists viewed a nation's economic strength in terms of the total number of products produced and advocated for a trade surplus.

### **2.1.1.2. Physiocracy**

Physiocrats replaced mercantilists in the second half of the 18th century. The Greeks used the term physiocracy to describe the natural government. It's an economic theory formed by a group of enlightened French economists in the 18th century who thought that a nation's wealth was primarily derived from the value of "land development" or "land agriculture" and that agricultural products must be highly valued. For the Physiocrats, the sole source of value in society's products is agricultural labor. All non-agricultural and industrial labor was considered to be unproductive supplementary labor for agricultural labor (Marx, 2000). They were against the government interfering in economic processes (Osipian, 2007).

### **2.1.1.3. The Classical Growth Theory**

The influential work "The Wealth of Nations" by (Smith, 1776) is widely regarded as the start of classical economics. The most prominent and notable representative of the classical school is Adam Smith (1723-1790). Adam Smith related a rise in people's wealth to an increase in the output of the productive factors (land, labor, and capital), as demonstrated by rising labor productivity and a rising stock of operating capital. Population growth, the expansion in the share of employees in the material production sector, investment, and geographical discoveries were all given a lot of attention, all of which contributed to rapid growth (Smith, 1776). Growth in population, according to Smith, is endogenous and is determined by the available means of sustenance. Investment was also regarded as endogenous, relying on the capitalists' hard work and savings. The division of labor and technological advancements were the key driving forces behind Smith's increasing productivity. Smith placed competition at the heart of the economic area and the country's economy as a whole (Reid, 1989). Smith identified three production factors: land, labor, and capital. Savings, according to Smith, is the most important element influencing the rate of growth. He expressed his production function as follows :

$$Y = f(L, K, T)$$

Where Y represents output, L represents labor, K represents capital, and T represents the land. Another classical economist Thomas Malthus (1766-1834), in his ideas on economic growth, describes population growth and increases in productivity as pessimistic. According to Malthus, if the proportions between population growth and means of subsistence remain constant, we

would face imminent depletion of the Earth, resulting in a fierce battle for scarce resources, the growth of wars, epidemics, hunger, mass disease, and so on (Lavrov and Kapoguzov, 2006).

#### **2.1.1.4. The Keynesian and Post-Keynesian (neo-Keynesian) growth theories**

The book "The General Theory of Employment, Interest, and Money," written by John Maynard Keynes in 1936, laid the groundwork for Keynesianism. Keynesians think that government intervention is necessary to achieve full production. They think that government engagement in the economy through expansionary economic policies will raise investment and promote demand, allowing the economy to reach maximum capacity. Aggregate Demand (AD) and Aggregate Supply (AS) curves are used in their model (Dornbusch, *et al* (1996).

#### **2.1.1.5. Neoclassical growth theories and exogenous theory of Robert Solow**

Solow and Swan developed the neoclassical growth model. They developed a growth model in which scientific innovation or technical change replaced investment (capital growth) as the key component explaining long-term growth, and the level of technological change is determined exogenously, meaning it is unaffected by other factors such as inflation. According to (Gokal & Hanif, 2004), the theory of growth in neoclassical economics is based on the premise of declining returns to labor and capital separately and constant returns to both variables combined. Technology, labor, and capital are the factors of production growth in neoclassical growth theory. In a similar concept Solow growth model, views economic growth in terms of growth in total GDP due to population growth, technical progress, and investment (Solow, 1956).

#### **2.1.1.6. Endogenous Growth Theories (new growth theory)**

Since the mid-1980s, a new wave of literature and research on applied economies of growth has emerged, inspired by so-called "new" growth theory or endogenous growth theory, with the goal of understanding and explaining output growth discrepancies.

Endogenous growth models are a set of ideas that replicate economic growth as a result of technological breakthroughs. Economic growth is determined by savings and capital accumulation rates, as demonstrated in the neoclassical growth model. Because technological discoveries have no bearing on this growth process, they are represented as exogenous variables that are calculated outside the model and provided. However, (Aghion & Howitt, 1998) suggest

that there are multiple reasons to believe that economic decisions made by economic agents influence technological advancement. In the endogenous growth model, Economic growth is generated by forces within the production process and technological advancement is seen as a crucial driver in long-run economic growth, which the neoclassical growth model could not account for. As a result, technological progress becomes endogenous in endogenous growth models.

### **2.1.2. The Relationship between External Debt and Economic Growth**

World Bank defines external debt as the entire public and private debt owed to nonresidents repayable in foreign currency, products, or services. And, the total amount of principal repayments and interest paid in foreign currency, products, or services is referred to as total debt service (World Bank, 2015).

The paper's theoretical literature on public debt and economic growth is reviewed in this section. Three schools of thought (Classical, Keynesian, Ricardian,) have presented various arguments on the relationship between public debt and economic growth in the theoretical literature. On the subject of public debt, classical economists (primarily Smith, Ricardo, and J.S. Mill) demonstrated that they shared some basic ideas that led to similar conclusions. Smith analyzes the economic repercussions of governmental debt in his book "The Wealth of Nations" (Smith, 1776). Even if all of the debt is owing to domestic investors, Smith argues that governments should not run budget deficits since the buildup of debt is considered "pernicious" for the nation. The reason for this is that the requirement to repay the debt will soon result in higher taxes, triggering domestic capital flight and currency depreciation, both of which will harm remaining domestic manufacturers. He claims that debt stymies the "natural march of a nation towards wealth and prosperity" (ibid). In his examination of public debt, Ricardo shares Smith's views on the unproductive nature of government expenditures (for example in the case of war) and the belief that funding them through public borrowing reduces the investible products, hence jeopardizing society's ability to accumulate wealth (Ricardo, 1973). With regard to the "equivalence" of the means of financing public expenditures, J.S. Mill argued in the same vein as Smith and Ricardo. He agreed with Smith and Ricardo that government expenditures are unproductive and that, as a result, public debt has a negative impact on the economy (J.S. Mill, 1976).

The three traditional economists' (Smith, 1776), (Ricardo, 1973) and (J.S. Mill, 1976) share the viewpoint that borrowing to fund public spending is harmful to the economy and its ability to generate wealth. Other classical economists also states, high debt raises hopes of future confiscation and increases uncertainty, it could have a considerably larger negative impact on economic growth, possibly through inflation and finance. They claim that governmental debt stifles economic growth by reducing both the budget process' financial discipline and the private sector's access to credit (Broner et al., 2014). They further claim that government debt repayments, particularly external debt, stifle economic growth by discouraging private investment and deterring potential foreign investors (Modigliani, 1961); (Krugman, 1988).

Debt over hang is a circumstance in which the expected payback on foreign debt falls short of the contractual value of the obligation, stated (Krugman, 1988). There are two versions of debt overhang hypothesis (DOH): classic (traditional) and broad. The debt overhang effect occurs when a country's debt discourages investment, according to a narrow perspective. And, when investors expect inflation, devaluation, and other economic distortionary actions to service the debt, the broader version of debt overhang theorizes that there will be a disincentive to invest (ibid.). As a result, if investors anticipate that the government will raise the tax rate on capital gains to service the debt, they would cut their investment levels to avoid paying higher future taxes ((Sachs, 1989); (Anyanwu & Erhijakpor, 2005). Negotiating debt rescheduling also hinders investment since it creates uncertainty in the business climate (Claessens et al., 1996).

Second, the Keynesian school of thought is regarded as a mono-causal explanation of growth, in which debt-financed government spending has a fiscal multiplier effect on national output or income (Elmendorf & Mankiw, 1999). According to Keynesian economic theories, governmental debt takes money from private investors but has no effect on consumption because the borrowed funds are injected back into the economy to boost general demand, maybe through wages and salaries and other capital expenditures (Onogbosele & Ben, 2016). As a result, Keynesian economists overlooked the difficulty of financing budget deficits through tax cuts or borrowing, instead emphasizing frequent government intervention to boost aggregate demand, employment, and production, which was fueled by government borrowing, either domestically or internationally (Nwannebuike et al., 2016). In an underemployment economy, the Keynesian theory of debt and economic growth intervenes, believing that the impact of debt on economic

growth is positive in the short run. According to Keynesians, Because of the investments it creates, debt does not burden present or future generations.

The Ricardian equivalence hypothesis (REH) claims that the impact of the general economic level on demand is the same whether public expenditures are financed through debt or tax increases (Ricardo, 1951). The hypothesis proposes that a possible tax will allow debt repayment, i.e., individuals will increase their wages by purchasing government bonds (Ricardo, 1951; (R. J. Barro, 1989). Households are generally sensitive to increasing consumption when a government reduces taxation and decides to fund its budget deficits through a bond problem, according to the REH, because they believe the government will increase taxes in the future to repay debts. As a result, neither debts nor fiscal development has a long-term impact on economic growth (Afzal, 2012); (Onogbosele & Ben, 2016). In addition, the Debt Laffer Curve theory aims to explain the link between debt and economic development. The theory assumes a nonlinear relationship between debt and growth, with an optimal amount of debt that encourages growth and additional debt contraction stifling investment and growth efforts beyond that threshold (Husain, 1992).

### **2.1.3. The Relationship between Unemployment and Economic Growth**

The term "unemployment" has been defined in a variety of ways by different researchers. According to Karl Pribam (1946), "unemployment" develops when the quantity of labor power exceeds the number of job openings. When there is an excess supply of the required labor force on the market, unemployment arises. Madan's (1965) defined "unemployment is the absence of opportunities of jobs for people willing to and actively looking for a job. The International Labor Organization (ILO) defines unemployment based on three (3) important conditions of which must be meet simultaneously and these conditions are; not working, ready to get employed and searching for a job (ILO, 2019).

Based on theoretical linkage, the relationship between economic growth and the unemployment rate could be traced from one school of economic thought to the next. According to the classical economists, the link between economic growth and unemployment is a one-way link that occurs between labor inputs and economic growth (Kaldor (1967) and Dernburg & McDougall) (1985). Cobb-Douglas production function based on technical linkages between output and inputs such

as labor and capital is also referred to by classical economists. The model showed that provided all other variables are fixed, the amount of labor force can assist determine the pace of output increase.

The question of output (economic growth) and unemployment is discussed in terms of aggregate demand by Keynesian economists. The demand for labor, according to Keynesians, is an example of derived demand. According to Hussain & Nadol (1997), Thirlwal (1997), and Grill and Zanalda (1995), the Keynesian theoretical links for economic growth and unemployment indicate that increases in employment, technical change, and capital stock are mostly endogenous. Harrod (1936), Domar (1947), and Solow (1956) investigated the question of long-run unemployment in determining the amount of economic growth and established the theoretical link between economic growth and unemployment.

The research of Okun on the Potential GNP: Its Measurement and Significance, revealed the extension of the Keynesian model. Okun's law is named after Arthur Okun, an economist who published research on the relationship between two main macroeconomic variables, unemployment and production. It asserts that "for every 1% decrease in unemployment in an economy, GDP will rise by 2%, and GNP will rise by 3%." This implies that unemployment is inversely proportional to a country's GDP and GNP (Okun, 1963).

#### **2.1.4. The Relationship between Inflation and Economic Growth**

Inflation, according to Balami (2006), is a long-term increase in the general price level of a wide range of goods and services. As a result, inflation denotes a loss of real value in the economy's medium of exchange and unit of account, as well as a decrease in the purchasing power of money per unit (Subash, 2011).

Since the introduction of classical economic theory to current economic theories, economists have studied inflation and its impact on economic growth. This section discusses growth theories' perspectives on the relationship between inflation and economic growth (classical, Keynesian, monetarist, neoclassical, and endogenous). Adam Smith is the father of classical theory. Smith believed that saving was the most significant element influencing the rate of growth. There is no clear link between inflation and the tax effect on profit levels and output in traditional views.

Aggregate Demand (AD) and Aggregate Supply (AS) curves are used in the Keynesian model. In this model, the AS curve is upward sloping in the short run, implying that changes in demand affect both price and output (Dornbusch, 1985). They similarly claim that AD and AS result in a route of adjustment. It indicates a positive association between inflation and economic growth at first, but it eventually turns negative as the adjustment route progresses.

Milton Friedman proposed monetary reform. Monetarism incorporates the element of expectation into the Phillips curve and divides it into short and long term segments. Phillips curve will hold in the short run, but not in the long run, according to this theory. In the long run, expected inflation will correspond to real inflation. As a result, unemployment, output, and other real economic variables will be unaffected by inflation. Money neutrality is the term for this concept (Friedman, 1993).

Neoclassical growth economists came up with their own theory for the link between inflation and economic growth. (Mundell, 1963) explained how inflation affects economic growth and claims, that inflation could boost production growth rates indefinitely by promoting capital accumulation, because households would keep less money and more other assets in reaction to inflation. (Tobin, 1965) agreed with Mundell that inflation is a positive indicator of economic expansion. Inflation, he claims, causes people to exchange their money for other assets, resulting in increased capital intensity and economic expansion. Stockman, (1981), in contrast to Mundell and Tobin, created a model that reveals a negative link between inflation and economic growth. According to Stockman's model, an increase in the inflation rate results in a lower steady-state level of output, lowering people's welfare.

## **2.2. Empirical literature review**

### **2.2.1. The Relationship between External Debt and Economic Growth**

Researchers came to diverse conclusions about the interaction of external debt and growth. Deshpande, (1997), attempts to explore the debt overhang hypothesis, and after empirically investigating the growth experience of 13 heavily indebted poor African nations through a panel data regression employing OLS estimation for two different time periods (First period: 1975-1983; Second period: 1984-1991) he found that foreign debt has a negative influence on investment. Anyanwu & Erhijakpor, (2005), argued that massive debt accumulation discourages

private investment because of the threat of greater taxes in the future to service the loan. Furthermore, other debt-related macroeconomic turmoil in the domestic sector could hinder growth.

In their polemical article, (Reinhart & Rogoff, 2010) looked at the question of public debt and economic growth. The following is based on their findings: (i) In comparison to well-developed markets, developing markets have lower governmental and private external debt thresholds. Annual growth slows by around two percentage points when external debt hits 60% of GDP. (ii) When the debt/GDP ratio is less than 90%, the link between government debt and real GDP growth is weak. (iii) There is no clear link between public debt and inflation levels for advanced countries as a group, such as: (the United States, had higher inflation when the debt/GDP ratio was high). Qayyum & Haider, (2012a), attempts to empirically explore the influence of external debt and foreign aid on economic growth while taking into account the quality of institutions in terms of effective governance, utilizing annual data from a panel of sixty developing countries from 1984 to 2010. The empirical findings show that external debt has a negative impact on economic growth. Similarly, Eberhardt and Presbitero (2014) investigated the long-term link between debt and growth in a broad panel of nations. The findings show that a nonlinear link exists in the long run, and that the relationship between public debt and economic development varies per country. However, there is little evidence of a common debt threshold for countries over time. The authors came to the conclusion that the problematic debt limit of 90% could be due to a misinterpretation of the results or a faulty empirical specification. According to Warner, on his study conducted on 13 developing nations using least square estimates, from 1982 to 1989, rather than debt a drop in export prices, a high international interest rate, and sluggish economic growth in the developed world are the primary factors slowing investment growth in most debtor countries (Warner, 1992). External debt accumulation, according to (Sulaiman & Azeez, 2012), does not imply slow economic growth. Because it is critical to make efficient use of public debt resources. The focus of public debt analysis should be on how debt is utilized by indebted countries. On their study over the period 1980-2019, (Pescatori et al., 2014), looks at the importance of institutional quality in the link between debt and growth in the West African Economic and Monetary Union (WAEMU). They found 54.50% of GDP as debt threshold level and while it has a negative effect over that barrier, debt has a favorable influence on growth below this threshold. The findings also demonstrate that incorporating institutional quality into

the debt-growth relationship has a large and beneficial impact on growth. This finding emphasizes the critical role that institution quality plays in debt management.

Ethiopia, one of the SSA countries, has gained relatively little from the marginal rates of return created from any extra investments that new external loans give due to its enormous debt servicing obligations. The accumulation of external debt and its repayments deplete the resources available for sustaining economic growth in a nation like Ethiopia (Pattillo et al., 2011). According to him, the impact of debt on economic growth may be beneficial at the outset of debt acquisition but quickly turn negative as debt accumulates, resulting in a nonlinear relationship.

### **2.2.2. The relationship between unemployment and economic growth**

On the basis of their research, (Abrams & Wang, 2007) discovered a negative link between economic growth and unemployment for the 20 OECD nations between 1970 and 1999. The destruction of human capital, social marginalization, demonstrations, increasing crime rates, and sickness are some of the economic and social consequences of unemployment, according to Kingdon & Knight, (2004). (Mohd Noor et al., 2007) conducted a study on the relationship between unemployment and output in the Malaysian economy; the regression results revealed a negative long-term relationship between unemployment and GDP, as well as a two-way causality link after applying the Granger Causality Test. Göçer, Erdal et al., (2015) employed a panel data analytic method to investigate the relationship between the rate of youth unemployment and economic advancement in eighteen (18) European nations from 2006 to 2012. The study's findings revealed that there is a long-term negative association between young unemployment and economic advancement.

After using annual data from 1978 to 2010, Li and Liu (2012) found that there was a mutually short and long term stable equilibrium relationship between unemployment, economic progress, and inflation. Their study also confirms that economic progress is negatively correlated with the unemployment rate. The Granger causality test demonstrates just a one-way Granger causation, indicating that unemployment has no impact on economic advancement but, economic advancement does cause a change in unemployment.

Dritsakis & Stamatou, (2016) use the ARDL model to investigate the link between unemployment rate, fiscal growth, and inflation rate in Greece, using annual data from 1995 to

2015. The finding of the test demonstrated that both in short and long run economic growth and unemployment had a negative association. Furthermore, whereas short-term unemployment causes a change in fiscal growth, fiscal growth does not induce a change in the rate of unemployment. But, in the long run economic growth and unemployment cause a change to each other. (Akter, 2018) used panel data from four South Asian nations (India, Pakistan, Nepal, and Bhutan), as well as Bangladesh, to examine the relationship between unemployment and economic growth from 1990 to 2010. Economic growth has a major impact on unemployment, according to the study, and there is a negative association between economic growth and unemployment.

Stephen (2012) investigated the impact of the Nigerian economy's urban unemployment crisis on economic growth, using inflation and investment as intermittent variables. According to estimates, there is a negative link between urban unemployment and economic growth. (Mosikari, 2013) used yearly time series data from 1980 to 2011 to investigate the impact of unemployment on South Africa's gross domestic product. After using the Granger causality test, the findings of his studies revealed that there is a long-term relationship between the rate of unemployment and economic advancement, as well as that economic progress and the rate of unemployment do not cause each other to change. (Makaringe & Khobai, 2018) used periodical data from the first quarter of 1994 to the fourth quarter of 2016 to explore the trends and effects of unemployment on GDP growth in South Africa. They also utilized the ARDL model to see if there was a short-term or long-term relationship between fiscal growth and unemployment and the results showed that there is a negative relationship between the variables in the two runs.

Abiy Serawitu's study connects Okun's law prediction with graphical trend analysis to explore the relationship between unemployment and economic growth (GDP) descriptively. The findings showed that unemployment had a detrimental effect on Ethiopia's economic development, with rising unemployment causing a fall in real GDP (Serawitu, 2020).

### **2.2.3. The relationship between inflation and economic growth**

Fischer, (1993) published a study titled "role of macroeconomic factor in growth" that looked at the relationship between inflation and economic growth. The data set in this research includes many macroeconomic variables, including inflation, for 93 nations. He used a basic mixed

regression alternative. The paper's findings suggest that inflation has a negative impact on economic growth by lowering investment and slowing the pace of productivity increase. Fisher further claims that inflation confuses the price mechanism, which would damage the efficiency of resource allocation and, as a result, have a detrimental impact on economic growth. He confirms that there is a causal link between inflation and economic growth and it goes from inflation to growth. Barro, (1997), looked into the link between inflation and economic growth as well. He used data from 100 nations spanning 30 years, from 1960 to 1990. In addition to inflation, he took into account other factors that influence economic growth. Systems of regression equations were utilized to examine the data. According to the regression results, an increase in average inflation of 10% per year reduces the growth rate of real per capita GDP by 0.2 percent - 0.3 percent per year and lowers the investment to GDP ratio by 0.4 percent - 0.6 percent. (Motley, 1998), preferred price stability after including inflation in his model to investigate the impact of inflation on real GDP growth rates, and his findings show a negative link between inflation and real GDP growth . Inflation have a substantial feedback loop with economic growth. The link between the two variables is, implicitly negative due to the decrease in company profit levels and the savings achieved through increasing wage expenses (Gokal & Hanif, 2004).

Gokal & Hanif, (2004), Bruno Easterly (1998), (R. J. Barro, 1995), and (Fischer, 1993) are only a few of the early cross country studies that revealed inflation has a negative impact on economic growth. Even more interestingly, the relationship between economic growth and inflation has been found to be negative in some cases but positive in others. By using co integration and error correction models on annual data from the IMF International Financial Statistics, (Mallik & Chowdhury, 2001), investigate the link between inflation and GDP growth for four South Asian nations, (Bangladesh, India, Pakistan, and Sri Lanka). For all four nations, the authors find evidence of a long-run positive link between GDP growth rate and inflation.

On the other hand, several empirical investigations have discovered that inflation and economic growth have no link. According to one study by (Sidrauski, 1967), inflation has no long-term association with growth. Furthermore, (Easterly & Bruno, 1999) found that inflation and economic growth had a negligible relationship. Datta and Chanda (2011) found that there is causality between inflation and economic growth in the short run, with the direction of causality

being from inflation to economic growth, but that economic growth causes inflation in the long run. In contrast, (Umaru et al., 2012) employed the Granger causality test to analyze the relationship between inflation and economic growth in Nigeria. The study found that GDP causes inflation rather than the other way around. Fekadu Dereje Girma discovered that a rise in economic growth lowers inflation in his analysis of the relationship between inflation and economic growth in Ethiopia, one of the SSA countries, from 1980 to 2011. This demonstrates the inverse relationship between inflation and growth (Girma, 2012).

We have summarized numerous more literatures published on the topic in Table 2 below. The majority of the literatures listed in the table are supplements to the empirical literature reviewed before.

Table 2.2 Summary for empirical Literatures on Developing Countries

Authors	Country	Period	Topic and Method	Results
(Cetin, 2019)	BRICST countries	2008-2016	The impact of external debt and economic growth on BRICST countries, panel GMM methods	External debt has a positive impact on economic growth.
(Kasidi & Said, 2013)	East Africa	2011-2019	Effect of external debt on economic growth, ARDL bounds test	The research revealed that external debt had a beneficial impact on economic growth.
(Were, 2001)	Kenya	1970-1995	The impact of external debt on economic growth, Ordinary Least Square	The research demonstrated that external debt has a detrimental impact on economic production.
(Göçer & Erdal, et al., 2015)	Central & Eastern Europe	2006-2012	The Relationship between Youth Unemployment and Economic Growth: ARDL	Youth Unemployment & economic growth have a negative relationship
(Dritsakis & Stamatiou, 2016)	Greece	1995-2015	Relationship between unemployment fiscal growth and economic growth & inflation, ARGDL	Unemployment and inflation both have a detrimental impact on growth.
(Umaru et al., 2012)	South Africa	1994-2016	The effect of unemployment on economic growth in south Africa, ARDL	In both the short and long run, there is a negative link between unemployment and growth.
(Kryeziu & Durguti, 2019)	Eurozone Countries	1997-2017	The Impact of inflation on growth, OLS regression	Inflation has a strong positive impact on growth of the euro zone
(Umaru et al., 2012)	Nigeria	1970 -2010	Causality between growth & inflation Granger Causality	Rather than the other way around, GDP causes inflation.

Source: Authors Computation.

### **2.3. Evaluation of the Theoretical and Empirical Literatures**

It is revealed from the theoretical and empirical literature that most research have looked into the relationship between debt and growth, unemployment and growth, and inflation and economic growth separately. Since, the interaction of external debt, unemployment and inflation variables with economic growth are observed separately the comparison of the extent of the impact of the three variables is neglected and it is a major problem in the research. In terms of relationships, there is inconsistency on the findings as some studies discovered positive relationships between variables, while others discovered negative relationships, or none at all in the most extreme circumstances and also in terms of econometric methodologies used to investigate the relationship between the four variables. Most of the researchers in the literature used estimation techniques like OLS and ARDL to look into the impact of debt, unemployment, and inflation on economic growth. However, due to the dynamic nature of the variables these estimating strategies are biased and inefficient to solve the endogeneity problem.

### **2.4. Conceptual framework**

Depending on the circumstances, external debt is typically utilized to fund one of two major kinds of expenditures: increased investment or higher consumption, or both, which domestic resources cannot support. As a result, the influence of external debt on economic growth and living standards is determined by borrowing countries' spending patterns, particularly in developing countries.

External debt will raise output while also tightening the debt burden, if it is used to fund larger investments and finally it resulting in enhanced economic growth Were (2001), (Sulaiman & Azeez, 2012). However, external debt may have a detrimental influence on economic growth by crowding out private investment as a result of the peoples expectation of raising the tax rate on returns to capital by the government to pay the debt, and as a result, businesses cut their investment levels to avoid higher future taxes (Krugman, 1988); (Sachs, 1989);(Anyanwu & Erhijakpor, 2005); (*Panizza et al., 2010*). This viewpoint supports the DOH (debt overhang hypothesis), which holds that when a country acquires huge debts, it signals a shrinking fiscal space, which generates uncertainty in the minds of investors and discourages investment owing to the fear of future tax increases (Krugman, 1988).

Secondly, external debt dampens economic growth through human capital development effect. Debt service burden on government reduces public spending as well as spending on

social investments such as education and health which are crucial for economic growth (Cohen, 1993). Therefore, government failure to invest in health and education reduces human capital, productivity slows down and hence a fall in economic growth (consistent with endogenous growth model). Furthermore, if there is a high debt burden it crowds out public investment and slows economic growth because the government's short-term revenue is utilized to service the debt (Serieux & Sam, 2001).

In the researcher's opinion, external debt will have a significant negative impact on growth and debt overhand hypothesis (DOH) may work for SSA. Because SSA countries have weak institutions that are unable to utilize the debt effectively and this resulted in mismanagement of debt and finally hinders economic growth Escobari and Mollick (2013). In addition, most SSA countries had huge accumulated debt as a result, of this those countries' governments' short-term revenue is used to service the debt and this will decrease economic growth through its crowding-out effect on public investment like, on health and education (Serieux & Sam, 2001).

High inflation may have both negative and positive effects on economic growth in the following ways: if an increase in the price of final goods and services is relatively higher than an increase in the price of raw materials, the effect of inflation on economic growth will be positive because high profit of producers due to an increase in the price of final goods used for further production, and expansion of their asset size by which the level of goods and services produced rises and leads to high growth (Mundell, 1963), (Tobin, 1965), (Mallik & Chowdhury, 2001). Furthermore, an increase in the number of products and services in a market fosters competition among sellers or producers, lowering the higher price to a modest level, preventing hyperinflation in the goods market. However, if the price of raw materials in a factor market rises faster than the price of final goods and services in the goods market, the effect of inflation on economic growth will be negative because the high price of raw materials raises production costs and evict producers out of the market, reducing the quantity of goods and services available, slowing GDP growth and increasing the price of items (Fischer, 1993), (R. Barro, 1997), (Motley, 1998),.

The researchers predicts that inflation will have significant negative impact on growth. Because in SSA countries investors are not strong enough in capital and they stop production when cost of production rises and this decrease investment and GDP growth. In addition recent SSA experience for example in Sudan shows that, an increase in price erode the peoples thrust on

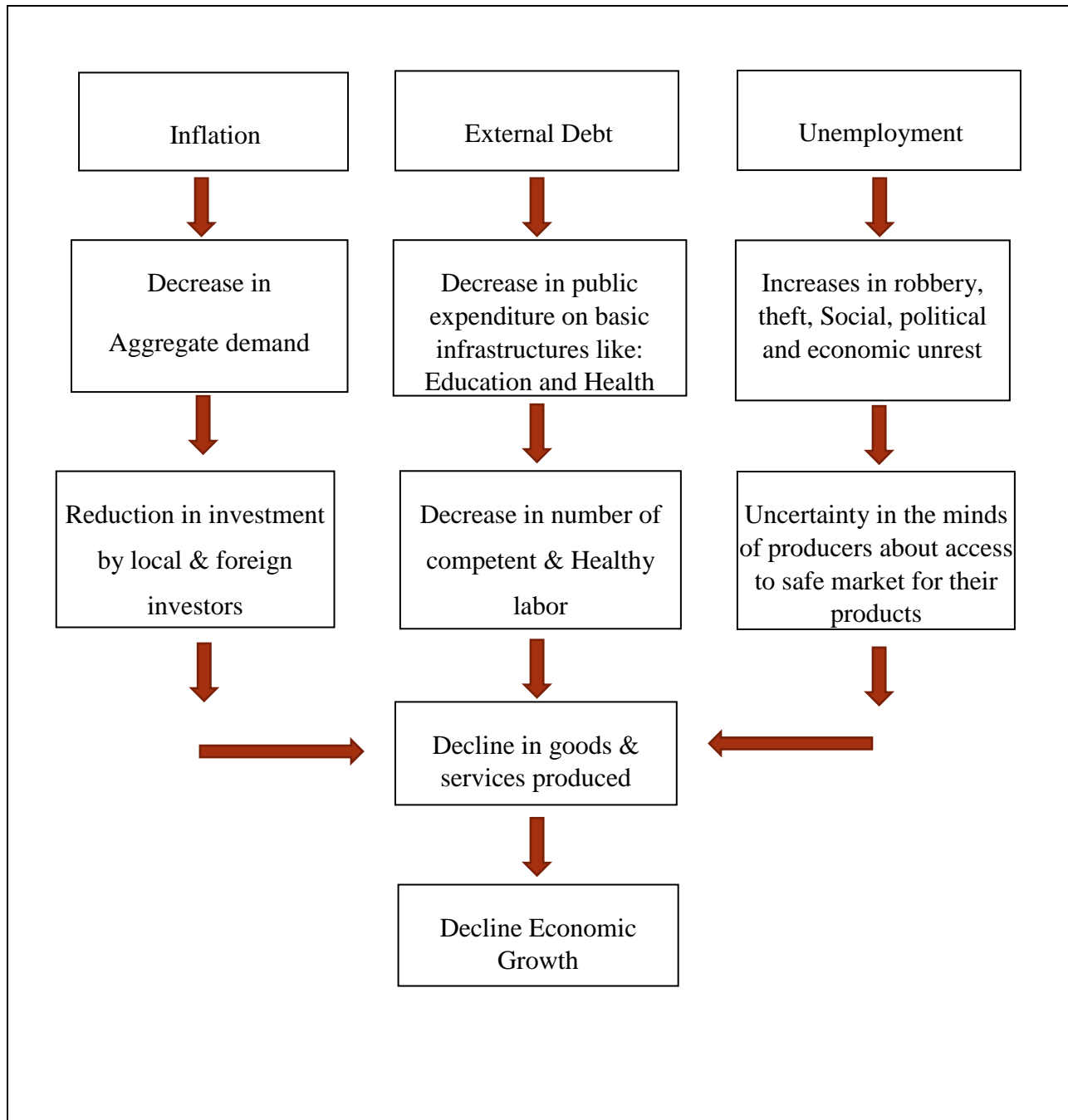
their government, and increases social unrest and public revolt, this social unrest adversely affect growth .

Unemployment has a number of negative economic consequences. It causes low aggregate demand, erodes human capital, and lowers individual self-esteem and confidence, and increases inequality, exclusion, and marginalization. It also causes social dislocation, social unrest, conflicts, it encourages workers to engage in illegal activities such as stealing, robbery, and other forms of social crime in order to meet their basic needs (Adarkwa et al., 2017). Furthermore, it discourages foreign direct investment due to fears of political and economic turmoil and excessive taxes by the government of a nation in relation to regulating this high unemployment, which causes a lowering of the level of goods and services produced, ultimately harming the nation's economic advancement.

Therefore, in the researcher expectation, all the three variables external debt, unemployment and inflation will have a significant negative impact on economic growth of SSA countries. In addition all the three explanatory variables are expected to have a two-way causal relationship with economic growth.

Young (2009) defines a conceptual framework as a diagrammatic description of the relationships between dependent and independent variables. The conceptual framework in this study examines the impact of public debt, unemployment, and inflation on economic growth in nations of Sub-Saharan Africa. The conceptual framework used for the investigation of the influence of foreign debt, unemployment, and inflation on economic growth is shown in Figure 2.4.

Figure 2.4 Conceptual Framework



Source: Author's own formulation based on analytical and empirical review

## **CHAPTER THREE: METHODOLOGY**

### **3.1. Types and Source of Data**

This study used secondary annual panel data for a sample of 30 Sub-Saharan African nations from 2005 to 2019 to examine the impact of external debt, unemployment, and inflation on economic growth. Due to a lack of sufficient data for some variables, the study has been limited to this time period. The data for the dependent variable economic growth, the main explanatory variables of interest external debt, unemployment, and inflation, and the control variables foreign direct investment, total debt service, population growth, gross capital formation, gross domestic saving, export, and import, are all obtained from the World bank data set.

### **3.2. Method of Data Analysis**

The study investigates the impact of external debt, inflation and unemployment on economic growth of SSA countries and the direction of causality among external debt, inflation, unemployment, and growth. The data of total external debt stock percentage of GNI will be used for measuring external debt, unemployment as a percentage of total labor force (modeled ILO estimate) is taken as a measure of unemployment, the inflation rate consumer prices (annual %) is used for measuring inflation, total debt service (% of GNI) is used to measure debt service, foreign direct investment (FDI) net inflow percentage of GDP will be used to measure the foreign direct investment, population growth rate will be used to measure population growth, export and import as a percentages of GDP will be used to measure export and import and the dependent variable economic growth will be measured by GDP per capita growth rate as explained on (N. G. Mankiw, 2009) Gross domestic product is often considered the best measure of how well the economy is performing.

As long as method of data analysis is concerned, both descriptive and econometric methods of analysis will be used. In the descriptive part tabular presentations and graphs will be included. In the econometric section a dynamic panel regression model will be employed in studying the effect of external debt, unemployment and inflation on growth, panel granger causality test will also be applied in order to check whether there is a causality among public debt, inflation and unemployment and the direction of causality and also a generalized method of moment (GMM) will be used to estimate the impact of selected explanatory variables on the economic growth.

A panel data set, also known as a longitudinal data set, contains repeated observations on the same units, such as individuals, homes, businesses, countries, or any other set of organizations that remains consistent through time. In the social sciences, panel data, which consists of information acquired from the same individuals or units at many times in time, is often used to evaluate theories of individual and society change. In contrast to static cross-sectional analyses, the most essential aspect of panel studies is that change is deliberately incorporated into the design, allowing individual or other unit level changes in a set of variables to be directly quantified. (Menard, 1991) distinguished panel data from two other types of longitudinal data: "repeated cross-section" and "trend" data. Data consisting of observations gathered on various variables for a single unit at multiple points in time; and "time series" data consisting of observations collected on several variables for a single unit across time. Panel data are distinguished by the fact that they comprise measures of the same variables from multiple units observed repeatedly over time (Gujarati, 2003).

Compared to cross section analysis, panel analysis has a number of advantages. The following are a few of them:-First, because of unidirectional causation is not tenable in many analyses, one of the key motives for evaluating panel data is to try to discover the causal ordering between the variables of interest. Second, in cross-sectional analysis, measuring variables at a single time point makes it difficult to establish temporal order and so rule out the possibility that co variation between X and Y is caused by Y or through a reciprocal causal link. However, in panel studies, observing X and Y through time on the same units allows the researcher to construct particular models that must satisfy the time precedence criteria, that is, where earlier values of one variable may affect subsequent values of the other. Third, when reciprocal causation is hypothesized, the panel analyst can estimate non-recursive models with feedback effects between variables with fewer restrictive assumptions than in the cross-sectional case. Panel data can also be used to account for the effects of external variables that may cause the relationship between X and Y to be partially or completely false. Fourth, because the analyst can use the additional observations across time to estimate both causal effects and measurement features of the variables, measurement error models can be estimated with panel data with fewer restrictive assumptions than in the cross-sectional setting.

### 3.3. Model Specification

The primary goal of this empirical study is to find out how public external debt, unemployment, and inflation impact economic growth. To create an empirical model, the researchers expanded Solow Swan's neoclassical growth model. Solow initially developed the neoclassical growth model in the 1950s. The model assumes that the production function is well-behaved, with constant returns to scale and no technical innovation. It also presupposes that capital stock can be modified to capital-intensive or capital-light manufacturing strategies. Due to the declining marginal product of capital, the model predicts that rich and poor economies will converge. The model disproves the notion that emerging countries face structural constraints that cannot be overcome by free market forces. In the Solow model, unlike the Harrod-Domar model, where capital is the only producing element, both capital and labor can be employed to produce output. Consider how capital (K), labor (L), influence an economy's production function: The production function in Solow's neo-classical model is as follows.

$$Y = F(K, L) \text{-----} (1)$$

According to the production function, output is a function of various inputs. This function has constant returns to scale and a declining marginal product of each element.

$$dF/dX > 0, dF/dX_2 < 0 \text{-----} (2)$$

Where X stands for each of the factors K, L.

Economic theories, however, are insufficient, according to (Sala-i-Martin, 1997), to identify the exact determinants of growth. They propose the following cross-sectional regression model as a solution to this problem:

$$g = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon$$

Where g is the vector of economic growth rates, and  $x_1, \dots, x_n$  are vectors of possible explanatory variables that vary from one researcher to another and  $\varepsilon$  the error term.

This study employs a dynamic panel regression model in estimating the effect of external debt, unemployment and inflation on economic growth in SSA. The predetermined variables in the model comprises the dependent variable GDP growth, lagged values of the dependent variable (growth rate of GDP) and the main independent variables external debt, unemployment rate, inflation rate, and control variables foreign direct investment, domestic investment, debt servicing, population growth, government spending, etc. The inclusion of the lagged value of GDP growth rate aimed at incorporating the persistence of the variables in the estimation.

Furthermore, the use of dynamic panel model would help account for temporal serial correlation, and minimize the likelihood of estimating spurious regression model.

Dynamic panel data regression model can be specified in the following general form:

$$y_{it} = \alpha y_{it-1} + \beta x_{it} + \mu_i + v_{it} \dots\dots\dots (*)$$

Where y denotes output growth, x is the vector of all explanatory factors,  $\mu$  symbolizes the unobserved country-specific time-invariant effect, v defines the stochastic error term, and  $\beta$  is the parameters to be estimated, i denotes a specific country, and t denotes time.

The following general model will be employed to see the impact of public external debt, unemployment and inflation on economic growth:

**General Model**

$$GGDPPC_{it} = \beta_i + \beta_1 GGDPPC_{it-1} + \beta_2 TEXD_{it} + \beta_3 UNEMP_{it} + \beta_4 INF_{it} + \beta_5 FDI_{it} + \beta_6 TDSERV_{it} + \beta_7 POPG_{it} + \beta_8 GCF_{it} + \beta_9 GDSAV_{it} + \beta_{10} M2_{it} + \beta_{11} EXP_{it} + \beta_{12} IMP_{it} + \epsilon_{it}$$

Where;

$GGDPPC_{it}$  = Gross domestic product per capita growth of country i in year t.

$TEXD_{it}$  = Total external debt stock of country i in year t expressed as percentage of GNI.

$UNEMP_{it}$  = Share of unemployed labor out of total labor force in year t expressed in percentage.

$INF_{it}$  = Inflation rate of country i in year t expressed in percentage.

$FDI_{it}$  = Foreign direct investment net inflow of country i in year t as percentage of GDP.

$TDSERV_{it}$  = Total debt servicing of country i in year t expressed as percentage of GNI.

$POPG_{it}$  = Population growth of country i in year t expressed in percent.

$GCF_{it}$  = Gross Capital Formation of country i in year t expressed as percentage of GDP.

$GDSAV_{it}$  = Gross Domestic Saving of country i in year t expressed as percentage of GDP.

$M2_{it}$  = Broad Money Supply of country i in year t expressed as percentage of GDP.

$EXP_{it}$  = Export of goods and services of country i in year t expressed as percentage of GDP.

$IMP_{it}$  = Import of goods and services of country i in year t expressed as percentage of GDP.

$\epsilon_{it}$  = The error term ,i= 1,2,.....N and t= 1,2,.....T

### 3.3.1. Description of variables

Table 3.3.1 Description of Variables

<b>Variables</b>	<b>Description</b>	<b>Measurement Unit</b>
<b>Economic growth (GDP)</b>	The "market value of all final goods and services produced by the factors of production within an economy yearly" is referred to as economic growth (WDI, 2017). It is the sum of aggregate consumption, investment, government expenditure, and net exports in mathematical terms. Researchers and policymakers use economic growth to analyze the performance of economies around the world. The endogenous variable in this study is the economic growth variable. The real GDP per capita derived from the WDI is used as a measure of economic growth, according to Muhanji and Ojah (2011) and Egert (2012).	<b>Percent (%)</b>
<b>External Debt</b>	Total external debt is defined as "the debt owed by an economy to non-residents, which is usually repayable in goods, services, or money." That is, an economy's external debt is made up of public, publicly guaranteed, and private nonguaranteed long-term debt, as well as IMF loan and short-term debt" (WDI, 2017).It denotes a country's inability to meet its external debt obligations, which have a negative impact on economic wealth and result from an obligation overhang. S. Shabbir (2013). Following Quresi and Ali (2010) and Hassan and Akhter (2012), the external debt stock total, a WDI variable, is employed as a proxy for debt in this analysis. We expected this variable to have a negative impact on economic growth, similar to the findings of Senadza, B., Fiagbe, K., & Quartey, P. (2017) and Munasinghe, S. D. (2020).	<b>Percent (%)</b>
<b>Unemployment</b>	Unemployment can be defined as the percentage of total labor force who are willing but not able to gain employment at a particular time and prevailing wage rate. Unemployment, according to the International Labor Organization (2009), is a state of unemployment	<b>Percent (%)</b>

	<p>in which people are jobless and have actively sought work in the previous four weeks. Unemployment, according to Jhingan (2003), is defined as the number of persons who are unemployed in a given economy, often expressed as a proportion of the labor force. Unemployment as a percentage of total labor force is used as a proxy of unemployment. This variable is expected to have a negative impact on economic growth.</p>	
<b>Inflation</b>	<p>Inflation is a substantial increase in the general price level of goods and services in an economy over a period of time. When the price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money. And, therefore This variable's proxy is expected to have a negative impact on economic growth.</p>	<b>Percent (%)</b>
<b>Foreign Direct Investment</b>	<p>Foreign direct investment within the context of international business as an investment “that reflects the objective of a resident entity in one economy obtaining lasting interest in an enterprise resident in another country” IMF (1993). Foreign direct investment measures the net inflow of investment as a percentage of GDP. This variable is expected to have a negative impact on economic growth.</p>	<b>Percent (%)</b>
<b>Total Debt Service</b>	<p>Debt service is the amount of money needed to pay off the debt's interest and principal over a set period of time. Debt servicing refers to the percentage of income used to pay off debt. Debt servicing can have both a beneficial and negative impact on economic growth, according to the literature. When there is a debt overhang, debt servicing has a negative impact on the economy (Krugman, 1988). Debt overhang occurs when the benefit derived from debt is less than the cost of servicing the debt. Debt servicing, on the other hand, can help the economy grow by facilitating a profit environment between creditors, borrowers, and other investors. Debt service on external debt (%) of GNI is utilized as a proxy for debt servicing in this study, as defined by the WDI. We believe that the</p>	<b>Percent (%)</b>

	debt overhang theory holds true in Sub-Saharan Africa, and that this variable will have a negative impact on economic growth.	
<b>POP growth</b>	According to (world bank, 2020), Population growth is defined as the rise in number of population from one year to another. The proxy for this variable is projected to have a positive or beneficial impact on economic development. This is because an increase in population can be utilized by investors as a source of low-cost labor, resulting in an increase in investment volume and, ultimately, GDP growth.	<b>Percent (%)</b>
<b>Gross capital formation</b>	Capital formation refers to the net additions to the stock of capital in the economy, which indicate the real scenario of investment levels, and investment aids in the expansion of productivity capacity, hence increasing potential output. As a result, this variable is expected to have a beneficial impact on economic evolution, which is consistent with Adhikary, B. K. (2011).	<b>Percent (%)</b>
<b>Gross domestic saving</b>	Gross Domestic Savings is made up of savings from the private sector, the public sector, and the household sector. It is calculated as a proportion of the gross domestic product (GDP). According to the Keynesian paradox of thrift, gross domestic savings has a negative relationship with investment. As a result, the impact of this variable on SSA economic growth is expected to be negative.	<b>Percent (%)</b>
<b>Broad money supply</b>	Broader money is defined as the total of narrow money (external currency and demand deposits) plus quasi money (time deposits and savings deposits). In this analysis, the broad money supply (M2) is considered. It is projected to have a positive impact on SSA countries' economic growth.	<b>Percent (%)</b>
<b>Export</b>	Goods and services produced in one country and sold to buyers in another are known as exports. The Export Led-Growth Hypothesis claims that increasing export commodity production is a significant indication of economic growth. As a result, economists believe that	<b>Percent (%)</b>

	increasing exports leads to increased economic output because export is linked to economic development (Saaed, A. A. J., & Hussain, M. A. (2015); Dey, S. (2018).This variable is expected to have a favorable impact on economic growth.	
<b>Import</b>	Imports are goods and services that citizens, businesses, and governments buy from another country. It is a product or service that is made outside of the country and bought in the country of origin. Imported goods and services become desirable when local industries are unable to supply comparable items and services at a low cost or efficiently. This variable is expected to have an adverse impact on economic growth because increase in import raises capital out flow and this reduce the demand for goods of local investors and this will decrease level of investment and finally decline economic growth.	<b>Percent (%)</b>

**3.3.2. Expected Signs**

Main variables of interest total external debt, unemployment, and inflation are expected to have a significant negative impact on economic growth of sub-Saharan African countries for the reasons explained on the table above.

**TEDBT:** - it is expected to have negative effect on growth due to low quality of institutions to effectively use the external debt Escobari and Mollick (2013) and it’s crowding out effect on private investment (Krugman, 1988) and public investments (Serieux & Sam, 2001).

**UNEMP:** - It is expected to have a negative and a significant impact on economic growth. Because, it is bad for the economy as it pushes the labor force to inter in to illegal acts like theft and robbery and other social crimes to fulfill their basic needs (Adarkwa et al., 2017). This creates social and economic unrest and this creates doubt on domestic investors to get secure market and safe transportation of their products and also this social, political and economic unrest decreases foreign direct investment (FDI) finally reduces growth.

**INF:** - It is a substantial increase in the general price level of goods and services in an economy over a period of time. And, an increase in price of goods and services will reduce aggregate demand and this reduction in aggregate demand causes a reduction in investment and finally slow in economic growth (Barro (1995); (Neil, 2000). Therefore, inflation is expected to have a significant negative impact on economic growth of SSA countries

Table 3.3.2. Expected Sign of Variables

Variables	Significance	Expected sign
Total external debt	Significant	Negative
Unemployment	Significant	Negative
Inflation	Significant	Negative

### 3.4. The model Estimation Technique

Researchers employ different model estimating approaches like as Ordinary Least Square Estimation (OLS), Fixed Effect and Random Effect (FE & RE), Instrumental Variable Method (IV), and Two-Stage Least Square Estimation (2SLS), in various Formal regression analyses. However, due to the presence of biases, coefficient estimates in different procedures in panel regression analysis become contradictory. The Instrumental Variable (IV) and Two-Stage Least Square Estimation (2SLS) approaches have been identified in the literature as effective tools. However, they have a flaw in that they employ "external" instruments. These methods use "external" variables as instruments to compensate for any endogeneity among variables; nevertheless, these instruments rarely match the "validity and relevance" criteria of a good instrument, and are frequently inadequate. As a result, both the IV and 2SLS approaches rely on getting a second variable that is associated with the explanatory variable that causes endogeneity but uncorrelated with the error term. When utilizing an external instrument, however, it is difficult to satisfy the exogeneity and relevance properties of a good instrument since it is difficult to locate an instrument that is associated with the explanatory variable while being uncorrelated with the error term. In this research we employed generalized method of moments GMM estimation technique because, it has many qualities than other estimation techniques. According to Baum et al. (2003), the GMM estimation procedures produce more efficient estimates than the 2SLS and the IV in the presence of heteroscedasticity.

When errors are heteroscedastic, the class of instrumental variable estimators that employ linear combination of the instrument is no longer efficient, but the Generalized Methods of Moments is the most efficient estimator (Stock and Watson, 2007). The GMM technique employs lags of endogenous variables as instruments, with the endogenous variables being preset and hence unrelated to the error term. The distinction of the GMM technique is based on the moment condition, which assumes weak exogeneity of regressors and no serial correlation.

In general, the GMM technique generates consistent and efficient parameter estimations when the following factors within the data generation process are considered:

- a. When lags of the explained regressors are used as instruments to deal with the occurrence of endogeneity among some variables. The validity of the instruments, on the other hand, is dependent on the source (variable) of endogeneity.
- b. There are small time periods and large entities in the data sample (countries).
- c. There are country-specific fixed effects that are distributed randomly.
- d. There is no cross-country autocorrelation, but there is country-specific autocorrelation and heteroscedasticity in the error term.
- e. When the dependent variable is influenced by the lagged dependent variable.

In the literature, two types of GMM estimators have been identified: Difference GMM and System GMM. Arellano and Bond (1991) proposed a difference GMM that uses the initial difference of the equation being estimated to overcome the problem of inconsistency caused by endogeneity among some variables in the model.

Although the difference GMM aids in the resolution of endogeneity across variables, it does have some drawbacks. The procedure correctly eliminates time-invariant country-specific effects that could be of interest and lead to model misspecification. Given that the difference GMM technique has some substantial biases, the difference estimator may suffer from a weak instrument problem when the regressand is highly persistent. A weak instrument undermines the differenced estimator's asymptotic characteristics and may be harmful to small samples, increasing the variance of the coefficient and biasing the coefficient of small samples.

In general, if the dependent variable in an equation is persistent and close to a random walk, using the difference GMM estimator produces both biased and inefficient coefficient estimates in a finite sample, and this is especially true when  $T$  is small.

Blundell and Bond (1998) developed the system GMM technique to address the problem of weak instruments associated with the difference GMM technique employing level and differenced equations. When the moment conditions of the level form and the differenced forms are merged, the efficiency of the equation under estimation improves (Roodman, 2009).

Furthermore, the system GMM is deemed the best appropriate panel regression approach over difference GMM because of the following properties inherent in its process:

- i. The use of lagged values of explanatory variables as instruments overcomes the endogeneity problem.
- ii. It allows for the use of both level and lagged values of the variables in the equation.
- iii. Because the system GMM uses many data for each entity (country) over time, the problem of information loss associated with cross-sectional regression is eliminated.
- iv. Even with short time periods ( $T$ ) and big countries, System GMM can yield reliable and unbiased parameter estimates ( $N$ ).

In principle, the dynamic panel GMM estimator eliminates the problems of endogeneity, omitted variables bias, and measurement error in panel OLS estimation, but it also shows the problem of weak instruments (Bazzi and Clemens, 2009; and Roodman, 2009). Despite its occasional instrument drawbacks, Hauk and Wacziarg (2009) and Kumar and Woo (2010) say that system GMM is the most recommended technique. Sargan Test of Over-identification was used to test the hypothesis of valid over-identifying constraints within the GMM system to assure instrument validity. Furthermore, the Arellano-Bond Test would be performed to determine whether or not there is a serial correlation. In this research we employed generalized method of moments GMM estimation technique.

### 3.4.1. Difference or System GMM Specifications:

Given the general dynamic model,  $Y_{it} = a + Y_{it-1} + \beta X_{it} + \varepsilon_{it}$

Where,  $a$  is coefficient of the lagged dependent variable and  $\varepsilon_{it} = \mu_i + v_{it}$ , *Bond* (2001) Rule-of-thumb for deciding between Difference and System GMM specifications consists of the following steps:

1. First, we use a pooled OLS and LSDV technique to estimate the dynamic model (i.e. using the Within estimation or fixed effect approach)
2. The pooled OLS estimate for  $a$  is treated as an upper-bound estimate, whereas the matching fixed effect value for  $a$  is treated as a lower-bound estimate.
3. If the resulting Difference GMM estimate is near to or less than the fixed effect estimate for  $a$ , the System GMM estimator should be utilized. Because of the poor instrumentation, the Difference GMM estimate is downward biased.
4. If the model has a random walk (persistent) behavior, it's also a good idea to employ a System GMM.

Because of these advantages the researcher employed system generalized method of moments (GMM) estimation technique.

## 3.5. Data Diagnostic tests

### 3.5.1. Unit root test

According to Gujarati (2003), a stochastic process is stationary if its mean and variance remain constant over time and the value of covariance between two time periods depends only on the distance between the two time periods, not on the actual moment at which the covariance is computed. The unit root test is used to check that variables are stationary and to avoid the formation of false regression. Levin and Lin (LL) Test (1992), Im, Pesaran, and Shin (IPS) Test (2003), Breitung's Test (2000), Levin-Lin-Chu Test (2002), and the Fisher Test are some of the stationary tests used in panel regression analysis. This study, on the other hand, uses the Levin-Lin-Chu and the Fisher Test to assess the stability of variables for the reasons listed below.

The Levin-Lin-Chu and Fisher Test, unlike the (IPS) Test, does not require balanced panel data to obtain a reliable result. The Fisher Test also allows for the use of various lag lengths in independent Augmented Dicky-Fuller Regressions and can be used for any unit root test. In addition, the Fisher Test does not necessitate simulation correction factors that are unique to sample size and specification. The Fisher Test uses p-values from unit root tests for each cross-sectional item, which are derived by Monte Carlo simulations, which can be considered a major flaw in the test (Choi, 2001).

### **3.5.2. Autocorrelation**

The correlation of a random error term  $u_{it}$  across time for a particular entity, is known as autocorrelation. If  $\text{Cov}(u_i, u_j) \neq 0$ , for  $i \neq j$ , then error terms are said to be auto-correlated. Model misspecification, data manipulation, event inertia, and spatial ordering all may contribute to autocorrelation problem. A robust one-step estimation of the standard error will be performed for the likelihood of autocorrelation and heteroscedasticity within panel data. The presence of heterogeneity among countries due to individual country specific effects and the introduction of a lagged dependent variable as regressors, are associated with persistence of autocorrelation problem in the dynamic panel model. SSA countries have unique social, economic, and geographical characteristics that must be taken into account during the estimation process. The presence of various sources of persistence suggests the presence of serial correlation, which would bias and inconsistency the OLS parameter estimations.

If there is no evidence of higher order autocorrelation inside the error terms, the results of system GMM estimate are considered robust. Therefore, to determine if the idiosyncratic error terms are serially correlated, the Arellano-Bond (1991) test for second order autocorrelation in first differenced errors was used to test the autocorrelation problem. As a rule of thumb, if AR (1) is significant and AR (2) is insignificant at 5% levels is reflects there exists no problem of second order serial correlation (ibid).

### **3.5.3. Tests for over identification**

More diagnostic tests may require ensuring that the system GMM generates a reliable model estimate. The findings of the system GMM must demonstrate the accuracy of the instruments used in the estimation. The validity of the instruments demands that the endogenous explanatory

variable and the instrument be correlated, and that the instrument be uncorrelated with the error term. As a result, the instrument must meet the criteria of relevance and exogeneity. Because of its appropriateness for examining the validity of an instrument, the Sargan (1988) test is used in this study to test the validity of the over-identifying restriction. As a general rule, if we accept the null hypothesis ( $p > 0.05$ ) for both Hansen and Sargan tests, we can conclude that the instruments are jointly valid.

#### **3.5.4. Panel Cointegration Test**

If all the four series GDP per capita growth rate (GDPPCG), total external debt stock (TEXD), unemployment (UNEMP) and inflation (INF) are not stationary at the level I (0), panel cointegration tests are applied in order to check the long-run relationship between the four variables. Pedroni (2004) co-integration test, will be used in this regard

#### **3.6. Panel causality test**

One of the most important yet a difficult issue in empirical investigation is differentiating the causal relationship among economic variable. According to (Lin,2008), this difficulty, arises from none experimental nature of social science data. If cointegration exists between two variables X and Y, then one of three relationships may exist: a) X impacts Y, b) Y impacts X, and c) X and Y impact each other. The first two indicate one way relationship, whereas the third indicates a two-way relationship. Granger, (1969) created a causality test method to determine the pattern of such a relationship. It is claimed that X 'Granger causes' Y if current and lagged values of X improve the prediction of the future value of Y. In this research panel VAR granger causality test was used to investigate the relationship between variables and the direction of causality.

## **CHAPTER FOUR: ANALYSIS OF THE DATA**

This chapter contains the analysis and discussion of descriptive statistics and the study's regression results. Using various econometric techniques, the researcher investigates economic growth in general, as well as foreign debt, unemployment, inflation, and some other macroeconomic and demographic factors that affect SSA countries' economic growth. The chapter is divided into four sections, the first of which (section 4.1) focuses on descriptive statistics of the data based on basic statistics and pairwise variable relationships to give tentative support for the proposed hypothesis. The second section (section 4.2) contained the results of econometric estimation of the model specified in the third chapter, the third section (section 4.3) discusses the study results presented in section two of this chapter, the final section (section 4.4) discusses the causal relationship of the main explanatory variables external debt, unemployment, and inflation with economic growth.

Overall, this chapter focuses on the analysis of the data in tabular and graphical presentation, econometric estimation of the panel dataset to analyze the impact of foreign debt, unemployment, and inflation on economic growth as well as the causal relationship of external debt, unemployment and inflation with economic growth.

### **4.1. Descriptive analysis of the data**

This section presents the results of descriptive statistics for the dependent and independent variables utilized in the study for the sample nations. Economic growth was the study's dependent variable, with external debt, unemployment, and inflation as the main independent variables, and foreign investment, debt servicing, population growth, gross capital formation, gross domestic saving, money supply, export, import, and lagged GDP growth as the control variables.

This part of analysis presents the tables and charts that compare the means, standard deviation the maximum and minimum values of the selected variables with 450 number of observation in 30 sub Saharan African countries studied across the region over the sample period.

Table 4.1 Statistical summary of the variables from the period 2005 to 2019

<b>Variables</b>	<b>No of Observation</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Maximum</b>	<b>Minimum</b>
<b>Real GDP per capita growth (%)</b>	450	1.640193	3.790933	14.99794	-36.55692
<b>External debt stock (% GNI)</b>	450	37.12797	26.8217	179.0082	3.895006
<b>Unemployment (%)</b>	450	7.776567	7.20812	29.12	0.32
<b>Inflation (%)</b>	450	6.638868	7.122144	63.29251	-8.97474
<b>Foreign direct investment (% GDP)</b>	450	3.849643	5.637111	39.82762	-11.19897
<b>Total Debt servicing (% GNI)</b>	450	2.59561	4.324713	45.11784	0.0614783
<b>Population Growth (%)</b>	450	2.574161	0.8046327	3.907317	0.03224
<b>Gross capital formation (% GDP)</b>	450	23.83536	9.36566	79.40108	6.699039
<b>Gross domestic saving (% GDP)</b>	450	16.88026	14.73769	62.53645	-13.78005
<b>Broad money supply (% GDP)</b>	450	29.91957	17.91521	120.8165	7.218083
<b>Export (% GDP)</b>	450	28.59337	15.37513	77.46413	0.6111681
<b>Import (% GDP)</b>	450	35.78183	14.12126	85.77826	0.5882712

Source:-Author's computation on STATA 15 software.

As shown in table 4.1, all variables had 450 observations (panel data of 30 sub-Saharan African countries for 15 years) and the economic growth measure used in the study, GDP per capita growth, indicates that sub-Saharan African countries experienced positive GDP per capita growth on average over the sample period of 2005 to 2019. The average GDP per capita growth rate for the nations studied was 1.64 percent, with a minimum of -36.56 percent and a maximum of 15.00 percent. This indicates relatively the fast growing country among the sample countries grew at a rate of 15 percent and the least growing nation among the examined countries, on the other hand, lost 36.56 percent of its original growth rate during the sample period. The growth data set has a standard deviation of 3.79, showing that it custards around the mean and that there is very little variation in the growth statistics among the countries under study.

There are statistics that must be mentioned in relation to the model's explanatory variables. External debt was the model's first independent variable. It has a maximum value of 179.00 percent and a minimum value of 3.89 percent and is calculated as total external debt stock as a percentage of gross national income (GNI). External debt has a mean of 37.12 percent and a

standard deviation of 26.82 percent than the other explanatory factors. The mean indicates that the studied SSA countries' external debt stock is approximately 40 percent of their gross national income. Unemployment is the study's second independent variable, which is calculated as a ratio of unemployed workers to the total labor force and has a mean value of 7.78 percent, with maximum and minimum values of 29.12 percent and 0.32 percent, respectively. The mean unemployment rate of the sampled Sub-Saharan African nations had an average of 7.78 percent, which indicates that 7.8 percent of the total labor force of sample SSA countries' was unemployed. Furthermore, the standard deviation of unemployment was 7.21 percent, indicating that unemployment varies little among the sampled countries. Inflation has a maximum value of 63.29 percent and a minimum value of -8.97 percent over the study period, with mean 6.64 percent and standard deviation of 7.12 percent respectively. This means that the average inflation rate in the selected countries was 6.64 percent, with a 7.12 percent variation in its distribution within the sample period. Foreign investment, as defined by foreign direct investment as a percentage of GDP, had a mean value of 3.85 percent and a maximum and minimum value of 39.82 percent and 1.11 percent, respectively, in the research. The data set of foreign direct investment has a standard deviation of (5.64 percent), indicating that there is a lot of diversity in the level of foreign investment among the SSA countries. Debt service was the fifth variable studied, and it had a mean value of 2.59 percent, indicating that the average debt service to GNI ratio in the sampled SSA countries under research is 2.59 percent. In the supplied data set, the minimum and maximum values of debt service are 45.12 percent and 0.06 percent, respectively, indicating that debt service accounts for 0.06 percent and 45.12 percent of GNI in SSA nations with the lowest and greatest debt service to GNI ratios, respectively. The data set revealed that the debt service standard deviation is equal to (4.32 percent). This means that the total debt service to GNI ratio in the sample countries under study show little variation in its distribution.

Table 4.1 further reveals that the mean for the given data set for the sixth variable Population Growth of the SSA nations under study is 2.57 percent, implying that the population of the sampled SSA countries grew by 2.57 percent on average during the study period. Furthermore, across the study period and supplied data set, this study shows a maximum value of 3.91 percent and a minimum value of 0.03 percent population increase. The standard deviation of the Population Growth data set was equal to 0.80 percent. This demonstrated that the population growth of the sample countries varies relatively little.

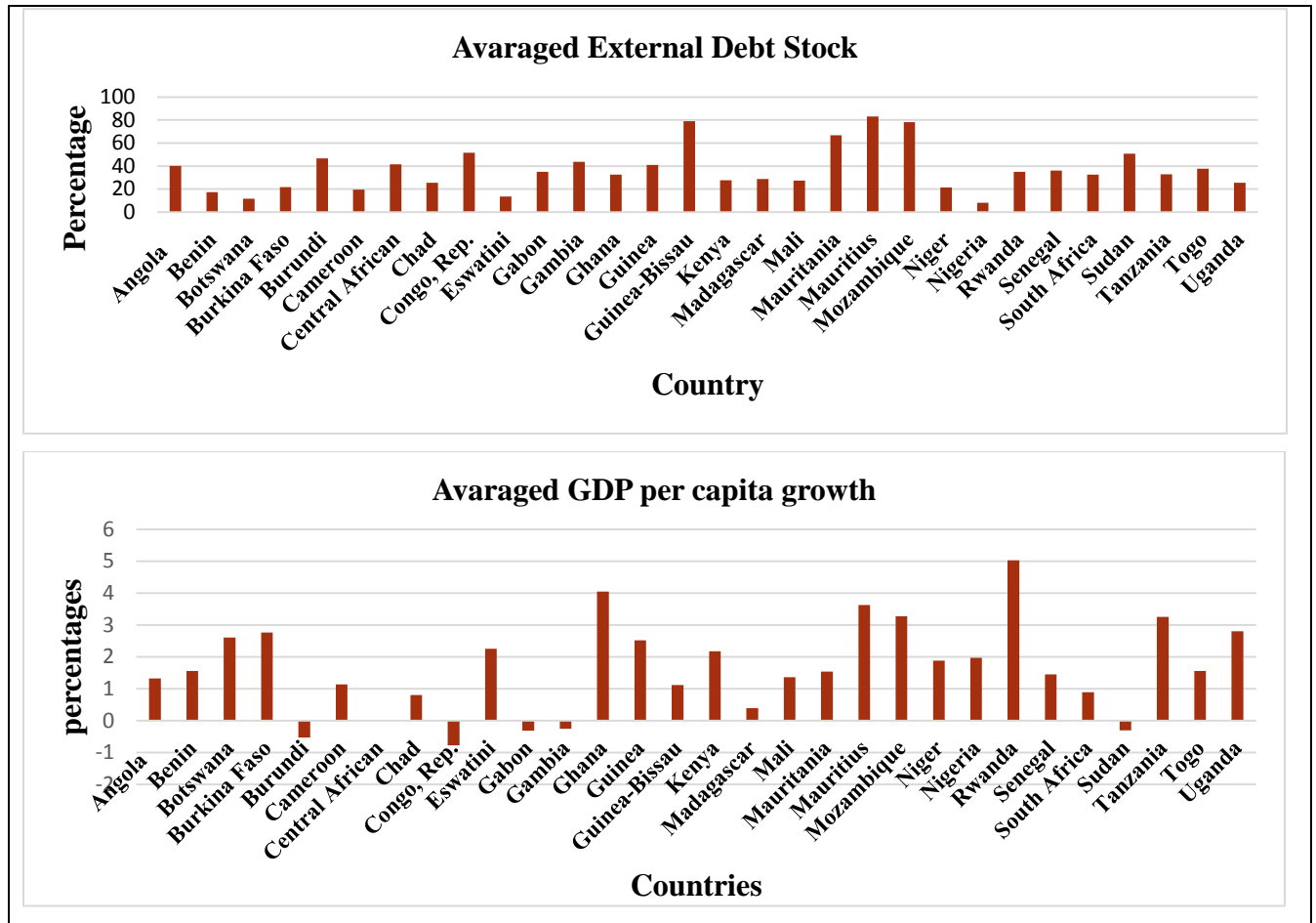
The seventh factor is Domestic investment, or gross capital creation, as a percentage of GDP ranges from 79.40 percent to 6.69 percent, with a mean of 23.83 percent and a standard deviation of 9.36 percent, respectively. This means that, on average, domestic investment accounts for 23.83 percent of GDP in the selected SSA nations across the study period. The statistics on gross domestic saving, which is calculated as a percentage of GDP, revealed a maximum value of 62.54 percent and a minimum value of -13.78 percent for the sample period of 2005 to 2019, with a mean of 16.88 percent and a standard deviation of 14.74 percent, respectively. It may be deduced from these mean and standard deviation data that the sample countries saved on average 16.88 percent of their GDP. Because this average value is high and saving is inversely related to investment, SSA GDP growth may be harmed as a result of this high average saving. And, as the standard deviation demonstrates, there was a lot of diversity in the gross domestic savings of SSA nations.

The ninth independent variable broad money supply as a percentage of GDP has a maximum and minimum value of 120.82 percent and 7.22 percent, respectively. It has a mean of 29.92 percent and a standard deviation of 17.91 percent. The mean and standard deviation figures indicated that the sampled SSA nations have a money supply of around 30% of their GDP on average, and that there was a substantial difference in money supply amongst SSA countries over the study period.

The remaining explanatory factors, export and import assessed as a percentage of GDP, had the lowest values of 0.61 percent and 0.59 percent, respectively, and the highest values of 77.46 and 85.78 for the thirty SSA nations studied. The average value of export and import from 2005 to 2019 was 28.59 and 35.78, respectively. It demonstrates that SSA countries have a negative trade balance since their exports are smaller than their imports on average. Export and import standard deviations were 15.37 percent and 14.12 percent, respectively.

It's also useful to compare the trends in total foreign debt, unemployment, and inflation in the sampled Sub-Saharan African countries with GDP per capita growth. The charts and graphs below compare the trends in total foreign debt, unemployment, and inflation for thirty countries in Sub-Saharan Africa over the last fifteen years to the trend in GDP per capita growth.

Figure 4.1(a): Average external debt stock and GDP per capita growth

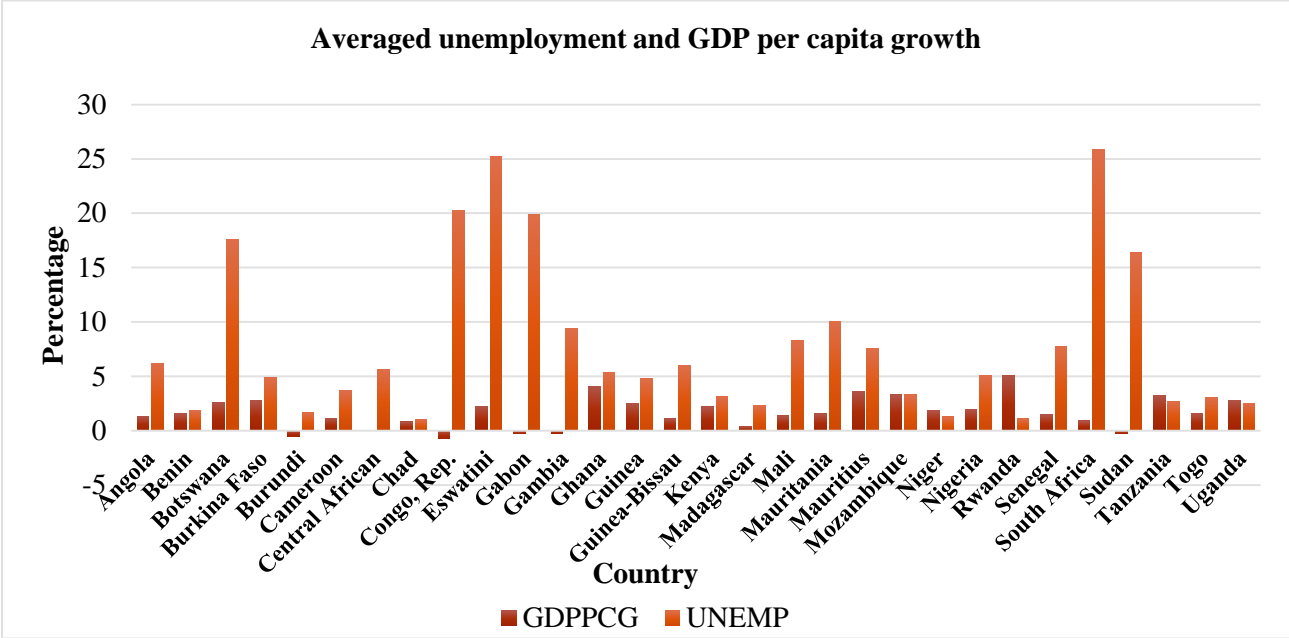


Source: Author's computation based on WB data.

Figure 4.1(a) above conveys important information regarding the possible direction of the relationship between external debt stock and real GDP per capita growth within the region of Sub Saharan Africa from 2005 to 2019. For example, from among the first three countries Angola Benin and Botswana, Angola had high external debt stock followed by Benin and Botswana. But, their GDP per capita growth rate was the direct opposite of this order that means Botswana had high GDP per capita growth followed by Benin and Angola. Mauritius had the highest average foreign debt stock percentage of GNI value of 83.15 percent among the sample nations, followed by Guinea Bissau and Mozambique with 79.09 percent and 78.21 percent, respectively. But, these countries' GDP growth is lower than that of other countries with a lower foreign debt stock. Rwanda and Ghana on the other side, has the highest GDP per capita growth, with rates of 5.03 and 4.04 respectively. But both of these countries had relatively low external debt stock as compared with Mauritius, Guinea Bissau, and Mozambique. Similarly, countries like Burundi,

Congo republic, and Sudan that had relatively high external debt stock runs a negative GDP growth rate. As a result, we can deduce that nations with a higher foreign debt stock will grow more slowly than countries with a lower external debt stock, implying that external debt and growth move in the opposite way.

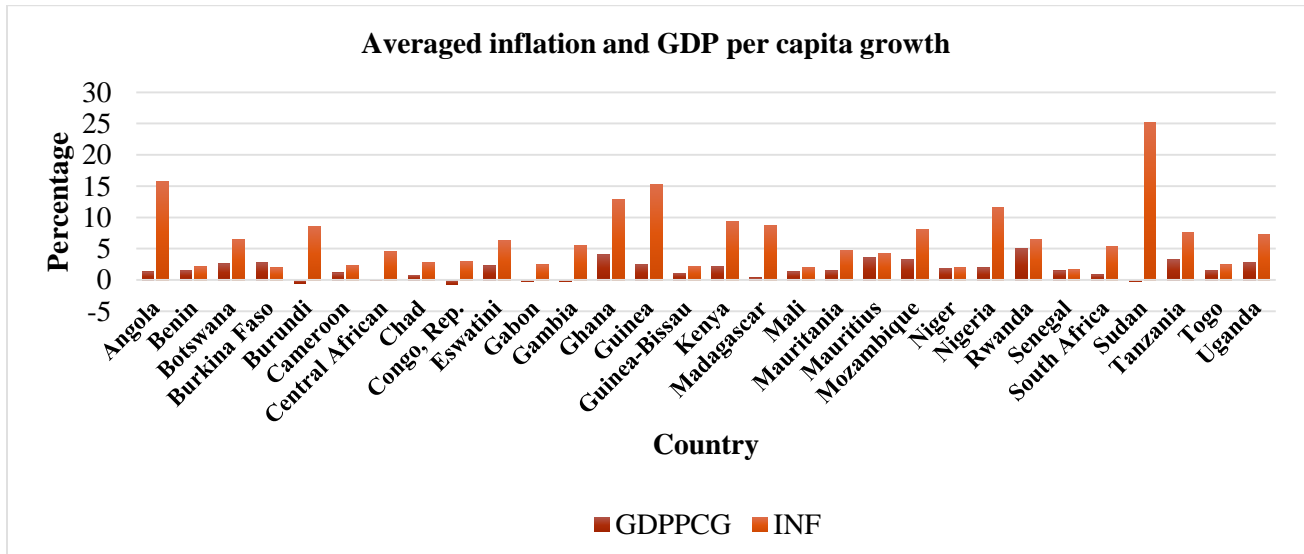
Figure 4.1 (b): Trend of Average unemployment and GDP per capita growth for the sample SSA countries from 2005 to 2019.



Source: Author's computation based on WB data.

The information on the relationship between unemployment and GDP per capita growth for Sub Saharan African nations was shown in Figure 4.1(b) above, which was averaged from 2005 to 2019. As the graph shows, unemployment and economic growth have an inverse connection. This is attributed to the countries with the highest unemployment rates, such as South Africa, Eswatini, Congo Republic, and Gabon, having low economic growth. Countries with high rates of economic growth, such as Rwanda, Ghana, Mauritius, and Mozambique, have lower unemployment rates than the countries listed above. As a result of this link, one might deduce that high unemployment rates may be one of the reasons for low economic advancement in many Sub-Saharan African countries.

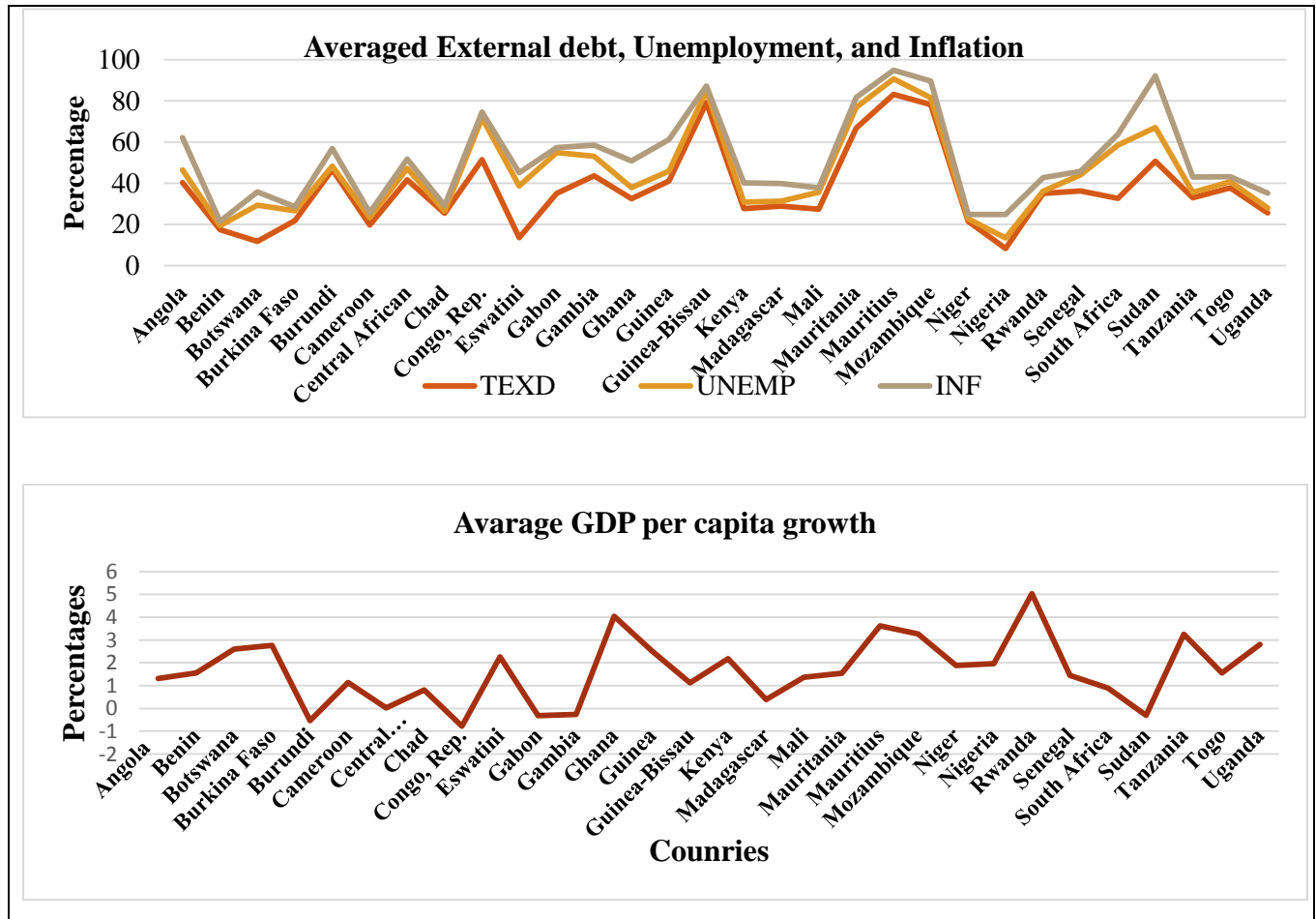
Figure 4.1(c): Average inflation and GDP per capita growth



Source: Author's computation based on WB data.

The graph shows the relationship between inflation and growth, based on averaged data from 2005 to 2019 for the sampled thirty Sub-Saharan African nations, shows that countries with high inflation rates have low economic growth, similar to the two factors discussed above, namely foreign debt and unemployment. In graph 4.1(c) above, Sudan has the highest inflation rate of 25.15 percent, followed by Angola and Guinea, both of which have inflation rates of 15.69 percent and 15.34 percent, respectively. Sudan also has a very low economic growth rate, which is negative, implying that inflation and growth are inversely related. In comparison to other countries with low inflation rates, such as Rwanda, Mauritius, Tanzania, and others, Angola and Guiana have a very low growth rate. For example, Rwanda has the highest economic growth rate, 5.3 percent, but its inflation rate is 6.52 percent, which is quite modest when compared to the inflation rates of Sudan, Angola, and Guinea, which have the highest inflation rates, respectively. We may deduce from the above graph of average inflation and GDP per capita growth that the distribution of average inflation and GDP per capita in the Sub-Saharan area over the sample period is highly variable and the two variables inflation and GDP growth related in an opposite direction.

Figure 4.1(d): Average of external debt, unemployment, inflation and GDP per capita growth of sub Saharan countries from 2005 to 2019.

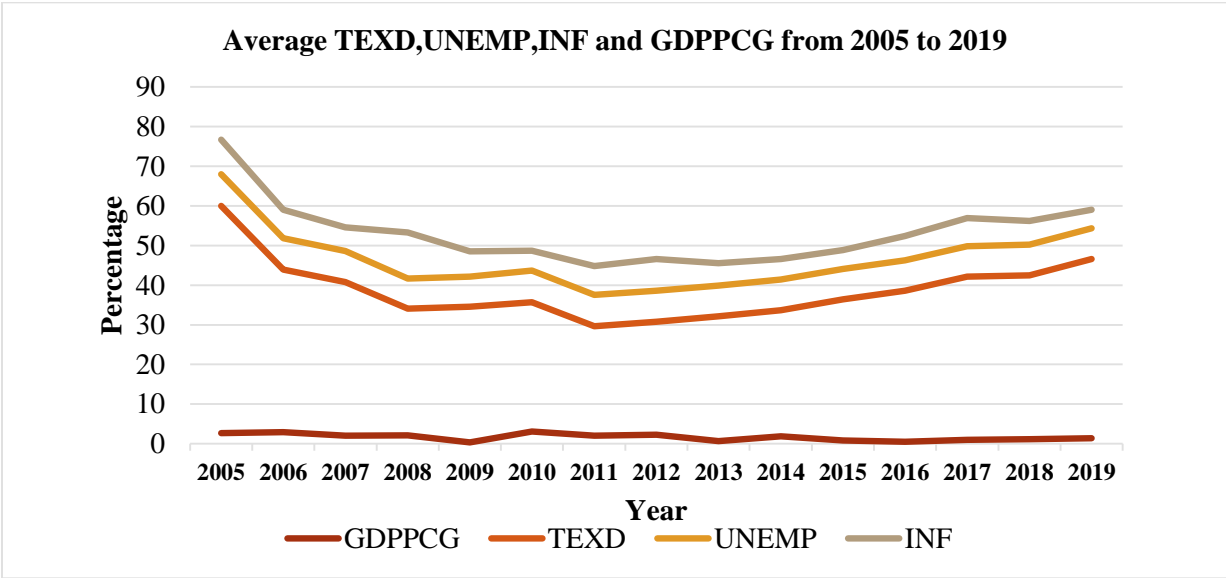


Source: Author's computation based on WB data.

The patterns of the three primary variables of interest external debt, unemployment, and inflation, as well as the dependent variable GDP per capita growth, are shown in Figure 4.1(d). The three macro-economic factors foreign debt, unemployment, and inflation are close companions and move hand in hand, based on the patterns of these variables. This is because, with the exception of a little difference in Botswana, the three variables showed remarkably similar patterns from the first country, Angola, to the last country, Uganda. Mauritius has the highest average value for all three variables: inflation, 4.30 percent unemployment, 7.5 percent and external debt 7.51 percent, while Nigeria has the lowest average value for unemployment 5.03 percent and external debt 5.03 percent, and Niger has the lowest average value for inflation

1.98 percent. On the graph above the trend of GDP per capita growth fluctuates in the opposite direction of the three variables discussed previously. When the three variables external debt, unemployment, and inflation rises GDP per capita growth falls. One can see this relationship from the graph on Burundi, Central Africa Republic, Congo Republic, Guinea Bissau, and Sudan and, when these variables falls, GDP per capita growth rises. One can see this relationship from the graph on Burkina Faso, Cameroon, chad, Eswatini, Ghana, Kenya, and Nigeria. In general all the three variables external debt, unemployment and inflation were inversely related with GDP per capita growth and average distribution of all variables GDP per capita growth, foreign debt, unemployment, and inflation across the studied SSA countries was extremely variable from one country to the next over the sample period.

Figure 4.1(e): Average of external debt, unemployment, and inflation and GDP per capita growth of sub Saharan countries from 2005 to 2019

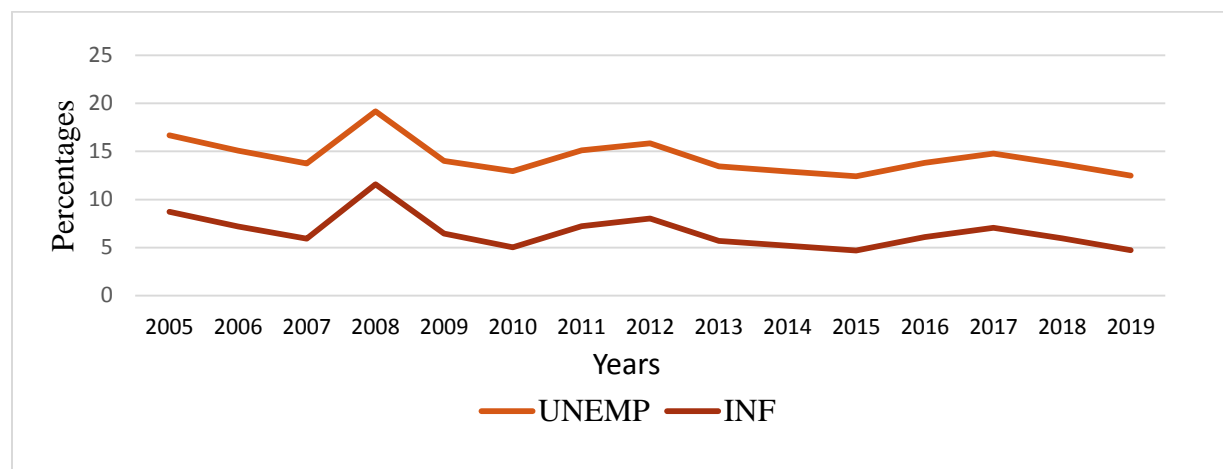


Source: Author's computation based on WB data.

Figure 4.1 depicts the patterns in the major variables of interest external debt, unemployment, inflation, and GDP growth over the sample period of 2005 to 2019. (e). The patterns of the variables show that, similar to the country averaged data figure 4.1(d) described above, the three independent variables had the same patterns of fluctuation and that the region's economic growth has a trend that is the polar opposite of the debt, unemployment, and inflation trends. Even if there were a few slight differences. The three variables steadily fell from 2005 to 2011, but DGP per capita slowly climbed, especially up to 2010, and after 2011, the three variables steadily

increased while GDP per capita continuously decreased. In general, the data in graph 4.1(e) implying that an increase in the three variables external debt, unemployment, and inflation will decrease GDP per capita growth in the region.

Figure 4.1(f): Averaged unemployment and inflation of sub Saharan countries from 2005 to 2019



Source: Author's computation based on WB data.

The trajectories of the primary explanatory variables unemployment and inflation on data averaged from 2005 to 2019 for a sample of thirty Sub-Saharan African countries are shown in Figure 4.1(f). We can deduce from the patterns of their trends that inflation and unemployment have a strikingly similar pattern, and their graphs are nearly identical. Again, one can draw a preliminary conclusion about their impact on growth, namely that both have a similar impact on growth, whether positive or negative, and that the Philips curve theory, which states that as inflation rises, unemployment falls, may not be applicable in the Sub-Saharan African region.

According to an examination of some of the above summary statistics, Sub-Saharan African nations, specifically the selected samples, have varying levels of economic growth, foreign debt, unemployment, and inflation, implying that country-specific effects are important.

## 4.2. Estimation and Econometric Results

This section presents the empirical findings from the econometric studies on the factors influencing economic growth in the Sub-Saharan African region. The analysis used the generalized method of moments (GMM) as an estimation technique. Using these general methods of moment is primarily motivated by the need to address the residual autocorrelation

problem, as well as the fact that the lagged values of the endogenous variable are included as regressors and some other control variables are endogenously determined with economic growth. It also serves as a further confirmation of the robustness of our estimation findings.

From the two types of GMM estimation techniques that are system and difference GMM techniques we employed the system GMM estimation technique to estimate our basic dynamic regression model. This is because alternative GMM estimation techniques, such as difference GMM, have failed to pass several diagnostic tests and generate reliable findings. The system GMM estimator is used to fix some of the issues with difference GMM. In addition, system GMM differs from difference GMM in the sorts of system generated instrumental variables it uses, as well as the fact that it uses differenced instruments for level lagged variables, essentially eliminating the weak instruments problem of difference GMM and producing more appropriate outputs.

As stated in the preceding chapter we compared the estimation coefficients of lagged dependent variable GDP per capita growth that derived from fixed effect estimation, difference GMM estimation, and pooled OLS estimation techniques in order to choose between difference and system GMM estimation. The coefficient of the lagged dependent variable, i.e. GDP per capita growth, determined using difference GMM estimation was 0.0067, which is lower than the coefficient calculated using fixed-effect estimation, which was 0.0098. In this situation, the weak instruments will cause the difference GMM estimation to fail *Bond* (2001). This demonstrates that the system generalized method of moments is the optimum estimation strategy for our model (*See appendix 5, 6, and 7*).

The estimation was done using the system GMM estimator in this case. We begin with the estimation of our basic dynamic regression model through the system GMM estimation technique. In this regard both one-step and two-step system GMM estimators are employed and their outcomes are presented in table 4.2 below. The beta coefficient, which reflects each variable's level of influence on the dependent variable and its sign, is shown in the following regression outputs table. The standard errors are shown in parenthesis.

The following is the outcome of the empirical model developed in the previous chapter and used in the study to determine the impact of external debt, unemployment, inflation, and some other factors on economic growth in the Sub-Saharan African region.

Table 4.2: Estimation Results of system GMM estimators (both one step and two step)

VARIABLES	(1) One-step system GMM	(2) Two-step system GMM
Real GDP per capita Growth (t-1)	0.053* (0.030)	0.073* (0.039)
Total External Debt	-0.059* (0.032)	-0.104** (0.041)
Unemployment	-0.326*** (0.104)	-0.289*** (0.093)
Inflation	-0.076** (0.036)	-0.084** (0.042)
Foreign direct investment	0.225* (0.123)	0.278** (0.130)
Total debt service	-0.123* (0.074)	-0.099* (0.057)
Population growth	-0.996 (0.640)	-0.718 (0.764)
Gross capital formation	1.072** (0.471)	1.611** (0.653)
Gross domestic saving	-1.070** (0.455)	-1.572*** (0.609)
Broad money supply	0.100*** (0.038)	0.142*** (0.055)
Export	1.136*** (0.439)	1.595*** (0.591)
Import	-1.131** (0.458)	-1.628*** (0.625)
Constant	5.947** (2.490)	5.203** (2.583)
Hansen	0.201	0.394
AR(1)	0.043	0.023
AR(2)	0.661	0.756
Prob > chi2	0.000	0.000
Wald chi2 (12)	162.524	145.272
Observations	390	390
Number of country_id	30	30
Number of instruments	28	30

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Authors' Estimations using STATA 15 software

Notes: \*\*\* Significant at 1% level of significance; \*\* Significant at 5% level of significance; \* Significant at a 10% level of significance

The values of the model coefficients, as well as the values of several post estimation tests such as AR (1) and AR (2), Hansen J's statistics, sargen test, wald test result, and so on, are displayed in the above system generalized method of moments (system GMM) output.

To begin, the probability of Hanssen J's statistics is insignificant at 5 % level of significance i.e. ( $p > 0.05$ ). It implies that all instruments used in the model are jointly valid or there is no problem over identification. The Wald test statistics or ( $\text{prob} > \text{chi}^2$ ) for the overall regressions show that all of the variables are statistically significant when considered together. As an autocorrelation test, the values of Arellano bonds AR (1) and AR (2) are utilized, and the results demonstrate AR (1) is significant and AR (2) is insignificant at 5% level of significance. As a result, we can conclude that the autocorrelation problem does not exist. In addition to this, according to Roodman (2009), the appropriate range for Hansen's J statistics, which is the test for instrumental validity and over-identifying restriction is (0.1–0.25). Despite the fact that based on our scope of knowledge no literature exists that claims that regression findings with Hansen J statistics outside of Roodman's range are erroneous. Because there are a dozen of articles with Hansen's test findings that are far higher than 0.25, even up to 1. And our Hansen's J statistics result is by far the best in comparison to those articles. As shown in the table above, the Hansen's J statistics in our regression results, in one step system GMM, are in the specified range, confirming that all instruments are valid and in two-step system GMM also the Hansen's J statistics test result is not far from the specified range. Furthermore, as shown in table 4.2, an Arellano-Bond AR (2) Z-statistics test for second-order autocorrelation in the residuals verifies that the estimation does not suffer from second-order autocorrelation problem.

Although both one step and two step system GMM estimations results are robust system GMM estimates and can be used independently as system GMM estimations, two-step system GMM had some advantages. It's more robust to one-step system GMM, and it's more efficient and robust to heteroscedasticity and autocorrelation (Roodman, 2009). In addition, under two step system GMM estimation if all of the variables don't change their sign and significance that they had under one step system GMM estimation. This can be used as a checking mechanism and gives an assurance for correctness of our estimation.

Table 4.2 shows that variables such as lagged GDP per capita growth, foreign direct investment, gross capital formation (domestic investment), money supply, and export have a positive

relationship with economic growth, both in one step and two-step system GMM regression. This showed that economic growth was positively linked to the variables: foreign direct investment, gross capital formation, broad money supply, and export, as well as its lagged value. External debt, unemployment, inflation, debt servicing, gross domestic savings, and imports, on the other hand, have negative coefficients both in one step and two-step GMM regression. Population growth is the other independent variable in our regression model, and it is statistically insignificant in both one-step and two-step system GMM regression, with negative coefficients. From the above regression result one can understand that all of the variables included in the model does not changed their sign and significance in both one step and two step system GMM regression and this indicates that our regression is robust and provides efficient coefficients of variables.

From one-step and two-step system GMM results shown in the table above, as it is more robust than one-step system GMM estimator, we interpreted the regression results of two-step system GMM in the following result discussion part of this chapter.

### **4.3. Discussion of the study result**

This section has been dominated by the discussion of estimation results provided by the system GMM estimators. As it's crucial to consider our empirical findings in light of theoretical and empirical context, this section examines our findings from the theoretical and empirical context in order to make sense of the results.

Based on the above-mentioned regression result, the following interpretation is offered for each variable analyzed: The constant term's coefficient of 5.947 indicates that if all other factors remain constant, the GDP of SSA countries will increase by 5.947 percent if the explanatory variables (included in the model) are all jointly zero.

As can be observed from the regression result in table 4.2, one of the explanatory variables for this model was lagged GDP per capita growth. It has a statistically significant at 10% level of significance and has favorable impact on economic growth in the region. We can draw from the estimate that lagged GDP was one of the most important elements in the economic expansion of Sub-Saharan African countries. The positive association between lagged GDP (GDP t-1) and current economic growth indicates that previous year's GDP was used as an initial capital for

current period investment, boosting economic growth. This study's findings were similar to the finding of Blomstrom (1996) who has found a positive relationship between lagged GDP and GDP growth.

The coefficient of external debt, as measured by total external debt stock as a percentage of GNI, is -0.104, with a P-value of (0.010) according to the aforementioned regression analysis in table 4.2. It can be interpreted as when external debt increased by 1 unit, economic growth in Sub-Saharan African countries declined by 0.104 unit, which is statistically significant at the 5 % level of significance. As expected, the association is negative. This negative association shows that external debt in Sub-Saharan Africa has a detrimental influence on economic growth by crowding out private investment because people expect the government to raise the tax rate on returns to capital to pay the debt. As a result, firms have reduced their investment levels in order to avoid future tax increases. In addition, SSA countries have institutions that are weak and unable to utilize the foreign loan effectively and this resulted in mismanagement of debt and finally hinders economic growth (Escobari and Mollick, 2013).

Furthermore, because most external debts are awarded to SSA countries in the form of tied loans, which must be used for preset purposes determined by a borrower-lender agreement and inspections with the lending country or organization are necessary to guarantee that the loan is only used for the stated purpose and, as a result borrowers do not have the choice to use borrowed money as they see appropriate, and the pre-determined goals of the loan may be unproductive due to a variety of unforeseeable factors. Therefore, the negative signed and significant coefficient of external debt in our empirical estimates of one-step and two-step system GMM regression support the debt overhang hypothesis(DOH), demonstrating that larger external debt is related with lower rates of real GDP growth in SSA.

It also rejects the Ricardo equivalence hypothesis (REH), which states that government debt has no impact on growth (Ricardo, 1951). This study's findings were similar to those of (Deshpande, 1997), (Krugman, 1988), (Sachs, 1989), and (Anyanwu & Erhijakpor, 2005). As a result, the researcher fails to invalidate the null hypothesis that external debt in Sub-Saharan Africa has a negative relationship with economic growth.

In both one step and two step system GMM regressions, unemployment, which is expressed as a percentage of the total labor force, showed negative coefficients as expected, with coefficients - 0.326 and - 0.289 with ( $p = 0.002$ ) in both cases, and was statistically significant at the 1% significance level. It was estimated that a 1 unit rise in unemployment rate resulted in a 0.289 unit decline in economic growth when other independent variables are held constant. In other words, a higher unemployment rate causes the SSA economy to contract. This is because unemployment has negative economic implications such as the destruction of human capital, social marginalization, demonstrations, and an increase in crime rates (Kingdon & Knight, 2004). It is bad for the economy as it pushes the labor force to inter in to illegal acts like theft and robbery and other social crimes to fulfill their basic needs (Adarkwa et al., 2017).

It also resulted in reduction in output as well as personal misery for people who are unemployed. Apart from reduced output, unemployment leads to increased government spending on unemployment compensation and welfare programs. For example Ethiopian government finance a group of unemployed labor to start their own business and this is one of the unemployment compensations which in turn lead to higher taxation. Higher taxes on people, as we all know, reduced production and efficiency. As a result, the problem of unemployment is not limited to the unemployed, but it affects the economy in a variety of ways. This finding is in line with ((Mohd Noor et al., 2007); (Abrams & Wang, 2007), (Dritsakis & Stamatiou, 2016), and (Makarunge & Khobai, 2018)) studies. As a result, this research fail to reject the null hypothesis that total unemployment and SSA growth have a strong negative connection.

In terms of inflation, this study's regression results indicate that the relationship between inflation and growth is negative and significant at the 5 % significance level ( $p$  value = 0.046). It implies that when inflation rate increased by 1 unit, the economic growth of the Sub-Saharan African countries declined by 0.084 unit, assuming all other independent variables remain constant. In other words, the sampled SSA countries' inflation and growth have a significant negative association. The result matches the a priori prediction given earlier in the inquiry. As a result, the researcher fails to refute the null hypothesis that inflation and growth have a negative relationship. The negative link between inflation and economic growth demonstrates that when inflation rises, the SSA region's economic growth declines in the opposite direction. According to the findings of the study, inflation is a drag on the economy. It lowers the purchasing power of

money, discouraging investment that could boost the economy's productive capacity. Furthermore, inflation would have a negative influence on economic growth by increasing the cost of borrowing, and an increase in the cost of borrowing would reduce investment, resulting in a decline in economic growth. This result has been supported by various studies like ((Barro (1995); (Neil, 2000); and (Adaramola & Dada, 2020)).

Another significant predictor of SSA's economic growth is foreign direct investment. The foreign investment to GDP ratio, which is a measure of foreign direct investment, has a favorable impact on growth, which is consistent with expectations. Foreign direct investment has a positive coefficient of 0.278 and is statistically significant at the 5 % significance level in explaining SSA nations' economic growth. It shows that a 1 unit increase in FDI resulted in an increase of SSA GDP per capita growth by 0.278 unit. The importance of foreign direct investment (FDI) met our expectations, as it improved the trade balance, especially if foreign enterprises' motivations are to export. Foreign investment also encourages capital investment in local industry and the development of new industries. This will enhance domestic productivity, resulting in more goods and services being produced and, as a result, increased economic growth. Although, the amount to which foreign FDI has a favorable impact on GDP is determined by the quality of the economic environment, in theory, inward FDI has a positive impact on a host country's economic growth by increasing capital accumulation, access to superior technology, increased efficiency, higher competitiveness, and exports (Hlongwane, 2011). As a result, the null hypothesis that foreign direct investment has a positive influence on SSA growth was not rejected. The findings of this study are in line with those of (Michael, 2018),and (Masipa, 2014).

The coefficient of external debt service, as assessed by total external debt service to gross national income ratio, is -0.106, with a P-value of 0.061, according to the regression analysis in table 4.2. Holding the other independent variables constant at their average value, it means that increasing external debt servicing by one unit reduced economic growth of SSA nations by 0.106 unit, which is statistically significant at the 10% significance level. The control variable total external debt service to GNI ratio has a negative coefficient, as expected because high debt servicing might prevent a country from allocating resources to productive activity - the crowding out hypothesis. Similarly, debt service discourages private investment by raising the prospect of future tax increases to pay for the debt (Krugman, 1988). Furthermore, most SSA nations have

large amounts of accumulated debt, as a result of which their governments' short-term revenue is utilized to service the debt, reducing economic growth by crowding out public investment in human capital such as health and education (Serieux & Sam, 2001). It reveals that debt servicing has a negative influence on economic growth and severely limits a country's ability to repay debt, supporting the debt-overhang hypothesis in SSA countries. Therefore, the researcher failed to reject the null hypothesis. This finding is consistent with previous studies of (Fosu, 1999); (Serieux & Sam, 2001), and (John Gachunga, 2019).

The coefficient of the rate of increase in total population as measured by population growth is negative 0.718, which is statistically insignificant with a P-value of 0.347. It is completely contrary to our expectations. Even if statistically insignificant, the population growth coefficient has a negative sign. This could be due to the fact that the statistic used to measure economic growth was GDP per capita growth, which decreases as the population expands since the capital stock per capita decreases. It will also result in lower capital and income/output per capita. The increase in population is mirrored by an increase in capital depreciation. As a result, the researcher rejected the null hypothesis that population increase has a major beneficial impact on SSA growth.

Gross capital formation has a statistically significant positive impact on regional economic growth. This is exactly what was expected. As a result, the null hypothesis that capital formation has a positive influence on growth was not rejected. It can be interpreted as a 1 unit increase in gross capital formation resulted in a 1.611 unit increase in economic growth. We may deduce from the data that capital production was one of the most important factors in Sub-Saharan African countries' economic growth. According to the data, there is a considerable association between capital formation and economic growth in Sub-Saharan Africa. The findings supported the Harrod-Domar model, which showed that national income growth is directly proportional to capital formation (i.e., the more an economy is able to invest out of a given GNP, the higher the GDP growth rate). This result is consistent with (Ugwuegbe, 2013) and (Aslan & Altinöz, 2021)'s research.

The gross domestic savings to GDP ratio is used to explain this variable in the model. The coefficient of gross domestic saving, as measured by gross domestic saving as a percentage of GDP, is -1.572, with a P-value of 0.010, according to table 4.2. Holding the other independent

variables constant, it can be deduced that if gross domestic savings increased by 1 unit, economic growth in the SSA nations decreased by 1.572 unit, which is statistically significant at a 1% level of significance. It implies that when saving increases obviously investment will decline as saving and investment are inversely related and the reduction in investment finally decreases GDP growth. This is because the Keynesian concept of an aggregate demand-driven economy gives birth to the paradox of thrift. An increase in the savings rate reduces spending in the economy, lowering overall production growth (via Keynesian consumption). This result is consistent with the study of (Joshi et al., 2019) who found a negative and significant relationship between gross domestic saving and GDP growth. As a result, the researcher failed to reject the null hypothesis that gross domestic saving has a negative influence on economic growth.

The money supply (M2) coefficient is positive and has a positive relationship with economic growth. According to table 4.2, the broad money supply coefficient as a percentage of GDP is positive 0.142, with a P-value of 0.010. Holding all other independent variables constant, when money supply increased by 1 unit, SSA's economic growth increased by 0.142 unit, and the effect is stronger at the 5% level of significance. As a result, the researcher failed to reject the null hypothesis that money supply influences economic growth in a positive way. This means that increasing the amount of money in circulation will increase the amount of financial resources available in the economy, and increase in supply, according to the law of demand, tends to lower the cost of borrowing money. In addition, an increasing the money supply will reduce the saving interest rate that banks pay to depositors, lowering gross domestic saving and increasing investment, boosting economic growth. Furthermore, increasing the money supply boosts banks' lending capacity by avoiding liquidity concerns, which lowers bank lending interest rates to borrowers, which increases investment and, ultimately, economic growth. This result is supported by the work of (Gatawa et al., 2017).

The total export percentage of GDP is used in the model to explain export. According to table 4.2, the export coefficient is positive 1.595, with a P-value of 0.007. If all other independent variables remained constant, a 1 unit increase in export resulted in a 1.595 unit rise in SSA's economic growth, which would be statistically significant at a 1% level of significance. As a result, the null hypothesis that export has a positive influence on economic growth was not rejected by the researcher. As expected, export has a positive impact on SSA's economic growth,

meaning that as exports rise, so does economic growth in the same direction. It means that more exports indicate a high level of output from a country's factories and industrial facilities, as well as a larger number of workers employed to maintain these firms running. When a corporation exports a large amount of commodities, it also brings money into the country, stimulating consumer spending and contributing to economic growth. Exports increased capital inflow into SSA countries, which was then utilized to expand output. It was also employed as a source of foreign exchange, which was used to settle their debt because it was paid in foreign currency, as well as to reduce the impact of debt overhang. Furthermore, as a result of technology transfer, employment creation, and economic growth, export expansion is thought to allow better resource allocation, economies of scale, and enhancement in production practices. Empirical studies such as (Taghavi et al., 2012); Balassa (1985), Ram (1987), and Khalifa Al-Youssif (1997) found that export positively affects economic growth.

The model explains the import variable as a ratio of total import to GDP. The coefficient of import is -1.628, with a P-value of 0.009. It represents that when import increased by 1 unit other independent factors were held constant, the economic growth of the sampled SSA countries decreased by 1.628 unit, which was statistically significant at a 1% level of significance. As a result, the null hypothesis that import has a negative impact on SSA growth was not rejected. This means there isn't enough information to back up the favorable association between imports and regional growth. As expected, imports have a negative impact on the SSA region's growth, implying that as imports rise, growth falls in the opposite direction. This implies that when a country's imports exceed its exports, the country's balance of trade is distorted, and the currency devalues. Because the value of a currency is one of the most important indicators of a nation's economic performance and gross domestic product, devaluation of a country's currency can have a significant influence on citizens' real activities and the country's GDP. This result is consistent with the study of (Taghavi et al., 2012) who found a negative and inverse relationship between import and growth.

According to both one and two step system GMM estimation results, even though all three main variables of interest, external debt, unemployment, and inflation, negatively affect economic growth in the Sub-Saharan African region, the magnitude of the estimated effect of

unemployment is the largest followed by inflation and external debt. This demonstrates that unemployment has a greater impact on SSA growth than debt and inflation.

Taken together, our empirical findings revealed that external debt, unemployment, inflation, debt servicing, gross domestic saving, and import were found to be statistically significant factors that negatively affect the growth of Sub-Saharan African countries out of twelve variables that were expected to affect GDP growth. While lagged GDP, foreign direct investment, gross capital formation, money supply, and export were found to have a positive and significant impact on SSA growth. Population growth was found to have a negative and statistically insignificant impact on SSA growth.

#### 4.4. Panel Unit root and Causality Tests

As previously stated, the regression analysis was carried out using the system generalized method of moments (GMM) estimation methodology, which does not require the use of unit root tests because, the system can deal with the issues that arise while dealing with non-stationary data of variables. However, knowing the stationarity of variables is critical before undertaking co integration and testing panel granger causality.

##### 4.4.1. Panel Unit Root Tests

Table 4.4.1 Panel Unit Root Tests result:

Unit root tests				
Variable	Levin-Lin-Chu unit-root test		Fishier	
	Statistics	P –value	Statistics	P -value
Real GDP per capita growth (%)	-19.4690 (-10.0325)***	0.0000	235.5234 -9.1688	0.0000 0.0000
External debt (% GNI)	-11.3759 (-2.7363)***	0.0031	696.0192 -14.8847	0.0000 0.0000
Unemployment (%)	-13.2362 (-6.0648)***	0.0000	169.6104 -6.6934	0.0000 0.0000
Inflation (%)	-22.9159 (-11.8045)***	0.0000	316.9743 -13.7067	0.0000 0.0000

Source: own computation on STATA 15 software

The \*\*\*, \*\*, and \* represents 1%, 5% and 10% level of significance. And the values in ( ) are the t- critical value.

The above table for unit root test represents all of the four variables GDP per capita growth, external debt, unemployment and inflation are all stationary at level. As a result, there is no need to conduct cointegration test.

#### **4.4.2. Lag length selection for the Panel VAR model**

It is necessary to pick the optimal lag length of the VAR model before executing the causality, impulse response, and variance decomposition of the VAR model. The optimum for the VAR model is chosen after testing the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and, Hannan-Quinn Criterion (QIC). In the VAR model, the BIC standard provides an ideal lag of 1 (see appendix 3), which is extremely suitable in terms of macroeconomics. As a result of the test, at lag 1 the VAR model's statistical tests are trustworthy.

#### **4.4.3. Test of cointegration**

A cointegration test isn't necessary because, as shown in table 4.4.1, all of the variables are stationary at the same level, i.e.  $I(0)$ , implying that the variables have no long-run relationship. After selecting the optimal lag of the VAR model and conducting the cointegration test, the next step is to estimate the Standard VAR model. But, since we find the coefficients of variables using System generalized method of moments (GMM) as presented under the previous section of this chapter and GMM is relatively the best method of estimation than panel VAR estimation technique to get the best and most efficient coefficients of variables, here we do not need to use VAR model estimation and its interpretation, rather our focus is only on the impulse response and factor variance decomposition of variables. Therefore, we only check the causality test of the variables through panel granger causality test and the impulse response and variance decomposition tests of variables.

#### **4.4.4. Granger Causality**

The panel granger causality test is a statistical hypothesis test used to see if one time series can be used to foretell another. If a signal  $x_1$  granger causes a signal  $x_2$ , then past values of  $x_1$  should contain information that helps anticipate  $x_2$  beyond the information contained in past

values of  $x_2$  alone, according to granger causality (Granger, 1969). The panel VAR granger causality test findings are shown in the table below.

Table 4.4.4 Panel VAR Granger Causality test Results

Dependent	Independent	chi2	Degree of freedom	Prob > chi2
GDPP per capita	Total external debt	0.001	1	0.973
	Unemployment	5.356	1	0.021
	Inflation	0.209	1	0.647
	ALL	5.375	3	0.146
Total external debt	GDP per capita growth	9.342	1	0.002
	Unemployment	1.556	1	0.212
	Inflation	10.802	1	0.001
	ALL	27.692	3	0.000
Unemployment	GDP per capita growth	1.756	1	0.185
	Total external debt	0.706	1	0.401
	Inflation	3.511	1	0.061
	ALL	5.808	3	0.121
Inflation	GDP per capita growth	2.485	1	0.115
	Total external debt	5.989	1	0.014
	Unemployment	2.377	1	0.123
	ALL	10.833	3	0.013

Source: own computation based on the data using STATA 15 software.

#### Panel VAR-Granger causality Wald test

Ho: independent variable does not Granger-cause dependent variable

Ha: independent variable Granger-causes dependent variable

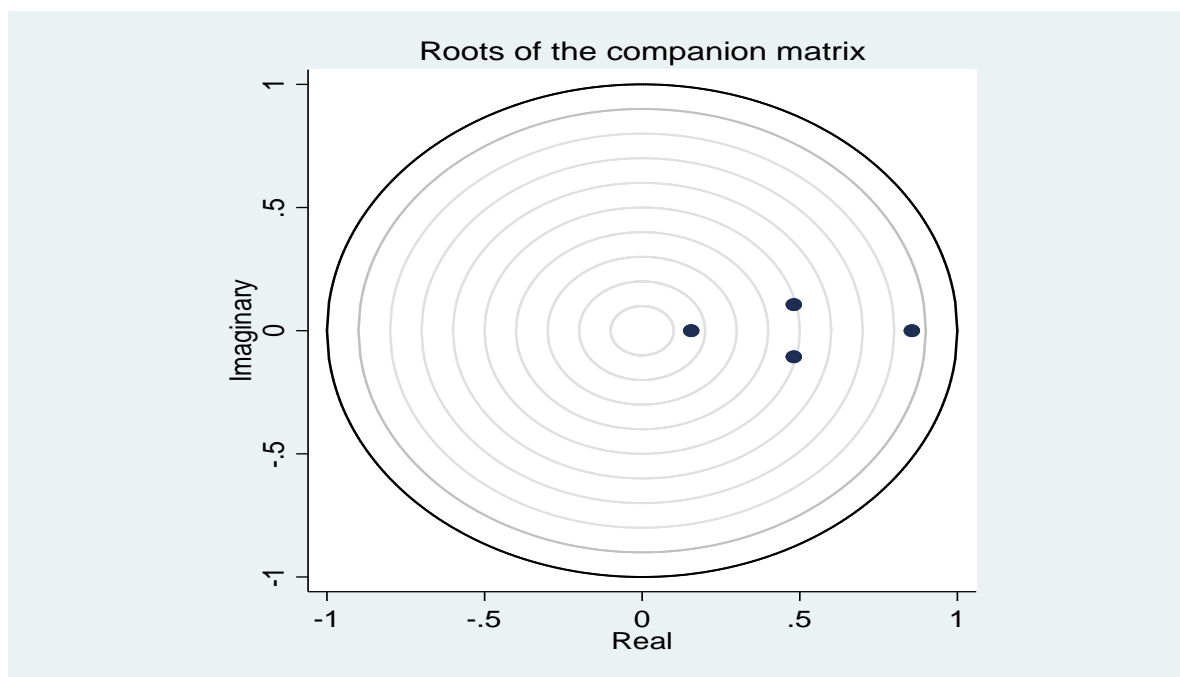
As a rule of thumb, we can reject the null hypothesis and infer that  $x$  Granger causes  $y$  if the  $p$ -value is less than the significance level (0.05). According to the results of the granger causality test, economic growth has no causal relationship with inflation, but does have a unidirectional causal relationship with external debt and unemployment that goes from unemployment to growth and from GDP per capita growth to external debt at 5% significance level. There was a two-way causation between inflation and external debt at 5% level of significance. There is no causation between external debt and unemployment and between unemployment and inflation at 5% significance level. This may be due to the effects of the other factors. But, there is a one way

causal association between unemployment and inflation at 10 % significance level that runs from inflation to unemployment.

## 4.5 Impulse Response and the Variance Decomposition

In order to conduct panel granger causality test we must first check whether all of the variables are lie inside the unit circle or not in order to know whether each of the variables are stable and can be used for forecasting the future values of the other variables.

Figure 4.5. Roots of composition matrices of variables



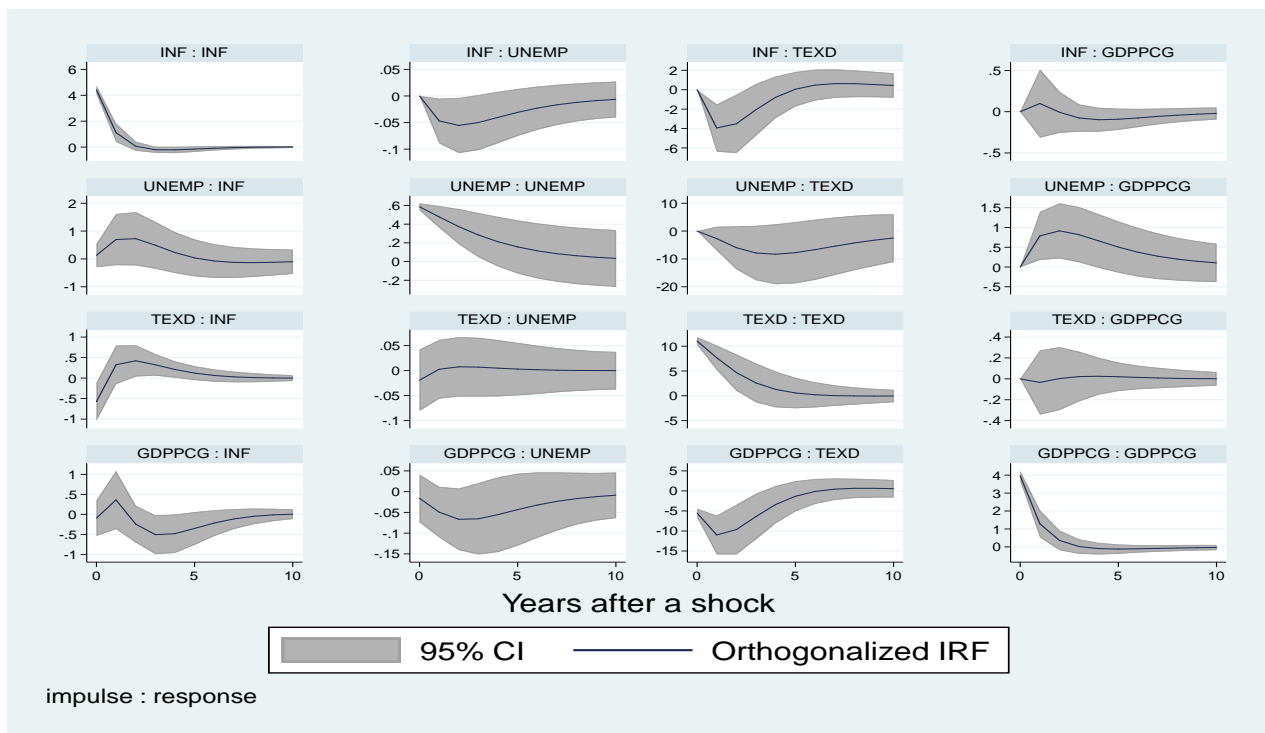
As can be seen from the composition matrix above, all of the four variables of interest economic growth, external debt, unemployment and inflation are contained within the unit circle. As a result, we can conclude that the panel is stable and that each of these variables can be used to forecast the future values of the other variables.

### 1.5.1. Impulse response function results

The responsiveness of the dependent variables in a VAR to a unit shock to each of the variables in the system is described by Impulse Response Modeling (Brooks, 2008: 299). The impulse response functions determine the transmission of the shock in the economic variables. The change of the variable of interest over a particular time period after a shock in a certain moment

is described by an impulse-response function. Individual coefficient estimates provide only limited information on the system's reaction to a shock because all variables in a VAR model are interdependent. Impulse responses (IR) are utilized to acquire a better understanding of the model's dynamic characteristics. The analysis was carried out on each variable from each independent VAR equation, noting the impact of a one-unit shock to each variable's error term on the VAR system over time. The extent to which the shock's effects fade away in impulse responses indicates the system's stability. The system will be regarded stable if the shock gradually fades away (*ibid*). In this section, the results of the impulse response analysis include a graphical evaluation of the dependent variables' reactions to changes in the explanatory factors, the sign, magnitude, and rate of decay of the reactions was examined. And, it presented as follows.

Figure 4.5.1 Impulse responses of variables



Accordingly, figure 4.5.1 above shows the results of the impulse response functions i.e. the response of a variable for a one unit standard deviation shock of itself and shock of the other variables for next 10 years. The variable on the left represents the impulse variable and the right variable shows the response variable. It can be interpreted as follows: As can be observed from the above orthogonal impulse response function, on the first graph a response of inflation to a

1% shock of inflation itself, and it reflects that when inflation is shocked by 1%, inflation itself responds by an increase of itself a jump up start around 4% and then declines up to the third year and continues stable up to ten year. A one unit shock on inflation results in a slight decrease on both unemployment and external debt on the first two years. But, after that its shock causes both external debt and unemployment to increase for ten years after a shock. A one unit shock to inflation results in a very small positive shock on GDP per capita on the first two years but, after the second year it resulted in reduction of GDP per capita until it reaches back to equilibrium on the fifth year. A unit standard deviation shock to unemployment results in a positive on inflation around the initial periods and inflation stabilize itself fast. Unemployment responds negatively to a one unit standard deviation shock of itself starting from jump start at 6%. A one unit standard deviation shock to unemployment results in a negative shock to external debt up to the fifth year but a positive shock after that. A one unit standard deviation shock in unemployment results in small initial positive shock to GDP per capita around the beginning of the forecasting horizon but its shock result a negative shock after that till the end of the horizon.

For the next 10 years, for a one unit standard deviation shock of external debt, inflation responds by rising from its beginning of - 4% and then reaches its equilibrium in year six and afterwards. a one unit shock in external debt results an increase of unemployment starting from negative. External debt responds through declining from a jump start of 10% to equilibrium for a one unit shock of itself and the shock created on GDP per capita growth due to a unit shock of external debt is almost nil. For a one unit standard deviation shock in GDP per capita growth inflation initially increases then it decreases to negative 5 in the third year and then it increases up to the end of forecast horizon until the effect of the shock feds away. For a one unit standard deviation shock on GDP per capita growth both external debt and unemployment decreases. The response of GDP per capita growth for a unit standard deviation shock of self is to decrease starting from a jump up start of 4 then its shock feds away.

Generally, as compared to the responsiveness of GDP per capita growth, unemployment and inflation to their shocks, external debt is more responsive to its shock.

#### **4.5.2. Forecast Error variance decomposition (FEVD)**

Variance decompositions assess how much of a variable's projected variance is explained by changes in explanatory factors (Brooks, 2008: 300). It also reveals which independent variable is

bigger and more powerful in explaining the variability in the dependent variables across time. Because, VAR models are dynamic, a shock to one variable in the model will affect others to differing degrees. Variance decompositions were used to calculate the proportion of variation in the GDP per capita growth owing to 'own' shocks and shocks to the external debt, unemployment and inflation. This also helps to determine the variables relative endogeneity.

The following table shows the variation of the variable explained by their own shock and the shock of the other variables with in the forecast horizon of five years.

Table: 4.5.2. Forecast error variance decomposition (FEVD) result

Response variables and forecast horizon		Impulse variables			
Response Variables	Forecast horizon	GDP per capita	External debt	Unemployment	Inflation
GDP per capita	0	0	0	0	0
	1	1	0	0	0
	2	0.964248	0.000221	0.035147	0.000384
	3	0.930297	0.000224	0.069085	0.000394
	4	0.906950	0.000236	0.092022	0.000792
	5	0.892227	0.000282	0.106057	0.001434
External debt	Impulse variables				
	0	GDP per capita	External debt	Unemployment	Inflation
	1	0	0	0	0
	2	0.155635	0.844366	0	0
	3	0.23122	0.66222	0.0206	0.08596
	4	0.237406	0.564054	0.0725	0.12604
Unemployment	Impulse variables				
	0	GDP per capita	External debt	Unemployment	Inflation
	1	0	0	0	0
	2	0.001182	5.59E-05	0.998763	0
	3	0.008101	0.000719	0.984379	0.006802
	4	0.013995	0.001548	0.969848	0.014609
Inflation	Impulse variables				
	0	GDP per capita	External debt	Unemployment	Inflation
	1	0	0	0	0
	2	0.010627	0.003053	0.000454	0.985867
	3	0.009831	0.006984	0.004626	0.978559
	4	0.010794	0.013245	0.009241	0.966719
5	0.013478	0.017322	0.011073	0.958127	
5	0.015579	0.019232	0.011267	0.953923	

As can be observed from the above table 4.5.2 the coefficient of GDP per capita is 1 in the first year and it represents the variation of GDP per capita in the first period fully explained by its shock. And then it decreases up to the fifth year to 89% as the other three variables explain 11 % of its shock.

Out of 11% shock of GDP per capita that explained by shock of other variables 10.6% explained by unemployment followed by inflation 0.14% and debt 0.02%. This indicates that the largest portion of shock in GDP per capita is explained by its own shock. And, even if their sum is very small as compared to inflation and debt unemployment have more power to explain the shock of GDP growth. At the first year of forecast horizon majority of shock of external debt is explained by itself i.e. 84% and the remaining 16 % by GDP per capita. But at the fifth year of the forecast horizon only 46% its shock explained by its own shock and 21% by shock of GDP, 20% by the shock of unemployment and 13% by shock of inflation .it reflects compared with the first year at the fifth year the variable become more endogenous as the part of its shock explained by other variables increased. The shock of unemployment 99.8 % is explained by its own shock at the first year of forecast and it shows the variable is highly exogenous. At the fifth year of forecast horizon still 95 % of its shock explained by itself and only 5 % explained by shocks of the other variables, inflation 2.5%, GDP per capita growth 2.1% and external debt shares the remaining. It reflects the shock of unemployment is highly endogenous and inflation is relatively endogenous with unemployment. From the shock of inflation 98.6 % is explained by shock of itself and the sum of shocks of GDP per capita, unemployment and debt explained only 1.4 % of its shock.

In general forecast error variances decomposition result of variables shows that the variables are highly exogenous especially at the initial periods of the forecast horizon but latter on when the forecast horizon increases the portion of their shock explained by their own shock decreases and the variables becomes relatively more endogenous.

## **CHAPTER FIVE: CONCLUSIONS AND POLICY IMPLICATIONS**

### **5.1. Conclusions**

This study aims to investigate the impact of external debt, unemployment, and inflation on economic growth in Sub-Saharan African countries, which is an important economic topic that continues to trouble policymakers, with the goal of extending precise policy measures to improve economic growth. It also intends to explore the causal relationship between foreign debt, unemployment, inflation, and economic growth in SSA nations, as well as determine which variable among external debt, unemployment, and inflation has the greatest impact on economic growth in SSA countries.

In this study, strongly balanced panel data were used which contained 30 SSA countries and covers the period from 2005 to 2019. Secondary data from the World Bank data base were used for this study. Economic growth was the study's dependent variable, with external debt, unemployment, and inflation as the main independent variables, and foreign investment, debt servicing, population growth, gross capital formation, gross domestic saving, money supply, export, import, and lagged GDP growth as the control variables. Dynamic panel regression model and system generalized method of moments (GMM) estimation technique were employed to estimate the impact of total external debt stock, unemployment, inflation and other variables on economic growth of sub Saharan African countries and the VAR granger causality test were used to test the relationship between the variables.

The estimation result has shown that our primary variables of interest, external debt, unemployment, and inflation, as well as debt servicing, gross domestic savings, and import, all have negative impacts on SSA economic growth, but domestic and foreign direct investments, money supply, and export all have positive impacts. And population growth were found insignificant. In addition, the debt overhang theory, which asserts that debt hinders investment by instilling dread of future tax increases to service the debt, was applicable to SSA based on the findings of the estimated coefficients. However, the Philips curve theory, which claims that as inflation rises, unemployment falls, did not hold true for SSA as evidenced by both descriptive studies of data distribution patterns and GMM regression results.

Both theoretical and empirical literature supports that if the debt services payment exceeds form 50 percent of GDP a country may face debt overhang situation. Since debt service payment of Pakistan also increase form 50 percent of GDP and the empirical findings of the study also suggest that the debt-servicing has negative impact on the productivity of labor and investment that in turn has adversely affected the economic growth that severely constrains the ability of the country to service debt and thus lending support to debt-overhang hypothesis in Pakistan.

The panel VAR granger causality test result has shown that economic growth has unidirectional causation with unemployment and external debt, with unemployment leading to GDP per capita growth and GDP per capita growth leading to external debt. However, economic growth and inflation do not cause each other. On the basis of this link, it is feasible to conclude that while foreign debt and inflation cannot be used to forecast economic growth in SSA, unemployment can. Similarly, economic growth in SSA countries cannot be used to forecast unemployment or inflation, but it can be used to predict the region's external debt.

## **5.2. Policy Implication**

Our empirical findings have identified the significant negative impacts of external debt, unemployment and inflation on SSA economic growth, as explained in the conclusion section of this chapter. And, the following policy implications are proposed as a result of these findings.

Sub Saharan African countries governments should decrease the level of external debt stock, level of unemployment and level of inflation rate. To do this we recommend those countries governments, to supplement external revenue streams, state-of-the-art mechanisms for collecting domestic revenue be implemented. Sub-Saharan African countries should strengthen the quality of their institutions in order to effectively and efficiently use foreign loans and avoid unproductive loan allocation. We also advocate for a strong macroeconomic climate in SSA so that debt yield negotiations do not empty the treasuries of SSA governments due to high debt servicing expenses. We also recommend SSA governments to use different price controls mechanisms in order to keep inflation at a minimum. Furthermore, the government should use effective macroeconomic policies and improvements in the structure and functioning of the governance system to stabilize economic growth and employment creation. As a result, the

government must develop flexible labor market policies or legislation, as well as create a conducive environment for new small businesses and private sector businesses to enter the economy, as well as consolidate existing entrepreneurship activity with new entrepreneurs who absorb a large pool of unemployed people in order to create more jobs. We also urge that governments in SSA countries place a strong emphasis on technical and vocational training as it encourages unemployed workers to become at least self-employed, hence lowering unemployment.

Finally, according to the study's findings, of the three primary macroeconomic problems of external debt burden, unemployment, and inflation, unemployment has the greatest impact on SSA countries' economic growth, followed by inflation and external debt. As a result, SSA policymakers should prioritize the decrease of unemployment. Because there will be more goods and services produced and supplied to the market if more people are employed. As a result, inflation will be reduced (according to the law of supply), and external debt will be decreased as revenue rises as the tax base expands.

### **5.3. Future Research Directions**

The study sought to analyze the effect of external debt, unemployment, inflation on economic growth using a sample of 30 Sub-Saharan African countries from 2005 to 2019. The study is limited by reliable data unavailability for some sub Saharan African countries. In addition, the variables used in the statistical analysis did not include all of the factors that can affect sub Saharan African countries economic growth. Thus, future researchers may include the rest unseen factors specially social and political variables to study SSA growth.

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# Appendices

## Appendix 1: Dynamic system GMM (one step) regression result

Dynamic panel-data estimation, one-step system GMM

Group variable: c_Id	Number of obs	=	390
Time variable : Year	Number of groups	=	30
Number of instruments = 28	Obs per group: min	=	13
Wald chi2(12) = 162.52	avg	=	13.00
Prob > chi2 = 0.000	max	=	13

GDPPCG	Robust		z	P> z	[95% Conf. Interval]	
	Coef.	Std. Err.				
GDPPCG						
L1.	.0532194	.0301251	1.77	0.077	-.0058247	.1122634
TEXD	-.05876	.0319485	-1.84	0.066	-.1213778	.0038578
UNEMP	-.3255141	.1038101	-3.14	0.002	-.5289781	-.1220501
INF	-.0760736	.035738	-2.13	0.033	-.1461188	-.0060285
FDI	.2248557	.1228621	1.83	0.067	-.0159496	.465661
TDSERV	-.1228086	.0743864	-1.65	0.099	-.2686032	.022986
POPG	-.9960192	.6399993	-1.56	0.120	-2.250395	.2583564
GCF	1.072181	.4705759	2.28	0.023	.1498691	1.994493
GDSAV	-1.070206	.4553864	-2.35	0.019	-1.962747	-.1776655
M2	.099611	.0375506	2.65	0.008	.026013	.1732089
EXP	1.135672	.4394123	2.58	0.010	.2744395	1.996904
IMP	-1.131323	.4577261	-2.47	0.013	-2.02845	-.2341965
_cons	5.946538	2.489649	2.39	0.017	1.066916	10.82616

Instruments for first differences equation

Standard

D.(TDSERV GOVSPEND POPG L2.FDI D.GCF L2.GDSAV L.M2 L.FINDEV EXP IMP L2.HUMCAP)

GMM-type (missing=0, separate instruments for each period unless collapsed)

L(1/3).(L.GDPPCG TEXD UNEMP INF) collapsed

Instruments for levels equation

Standard

TDSERV GOVSPEND POPG L2.FDI D.GCF L2.GDSAV L.M2 L.FINDEV EXP IMP L2.HUMCAP \_cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

D.(L.GDPPCG TEXD UNEMP INF) collapsed

Arellano-Bond test for AR(1) in first differences: z = -2.02 Pr > z = 0.043

Arellano-Bond test for AR(2) in first differences: z = -0.44 Pr > z = 0.661

Sargan test of overid. restrictions: chi2(15) = 24.36 Prob > chi2 = 0.059

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(15) = 19.29 Prob > chi2 = 0.201

(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(11) = 16.66 Prob > chi2 = 0.118

Difference (null H = exogenous): chi2(4) = 2.63 Prob > chi2 = 0.622

iv(TDSERV GOVSPEND POPG L2.FDI D.GCF L2.GDSAV L.M2 L.FINDEV EXP IMP L2.HUMCAP)

Hansen test excluding group: chi2(4) = 7.21 Prob > chi2 = 0.125

Difference (null H = exogenous): chi2(11) = 12.08 Prob > chi2 = 0.358

## Appendix 2: Dynamic system GMM (two step) regression result

Dynamic panel-data estimation, two-step system GMM

Group variable: c_Id	Number of obs	=	390
Time variable : Year	Number of groups	=	30
Number of instruments = 30	Obs per group: min	=	13
Wald chi2(12) = 145.27	avg	=	13.00
Prob > chi2 = 0.000	max	=	13

GDPPCG	Coef.	Corrected Std. Err.	z	P> z	[95% Conf. Interval]	
GDPPCG						
L1.	.0728838	.0388549	1.88	0.061	-.0032705	.149038
TEXD	-.1044689	.0408111	-2.56	0.010	-.1844573	-.0244806
UNEMP	-.2888943	.0929998	-3.11	0.002	-.4711705	-.1066182
INF	-.0839851	.0420089	-2.00	0.046	-.166321	-.0016492
FDI	.277533	.1301412	2.13	0.033	.022461	.5326051
TDSESV	-.0991373	.0571148	-1.74	0.083	-.2110803	.0128058
POPG	-.7183041	.7636589	-0.94	0.347	-2.215048	.7784398
GCF	1.61071	.6526117	2.47	0.014	.3316143	2.889805
GDSAV	-1.572056	.6085237	-2.58	0.010	-2.76474	-.3793713
M2	.1419003	.0548683	2.59	0.010	.0343605	.2494401
EXP	1.594545	.5906613	2.70	0.007	.4368706	2.75222
IMP	-1.62757	.6248217	-2.60	0.009	-2.852198	-.4029423
_cons	5.20286	2.582727	2.01	0.044	.1408081	10.26491

Instruments for first differences equation

Standard

D.(D.TDSESV GOVSPEND L2.POPG L2.FDI D.GCF L.GDSAV L.M2 FINDEV EXP IMP  
L.HUMCAP CONCORRUP Year)

GMM-type (missing=0, separate instruments for each period unless collapsed)

L(1/3).(L.GDPPCG TEXD UNEMP INF) collapsed

Instruments for levels equation

Standard

D.TDSESV GOVSPEND L2.POPG L2.FDI D.GCF L.GDSAV L.M2 FINDEV EXP IMP  
L.HUMCAP CONCORRUP Year

\_cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

D.(L.GDPPCG TEXD UNEMP INF) collapsed

Arellano-Bond test for AR(1) in first differences: z = -2.27 Pr > z = 0.023

Arellano-Bond test for AR(2) in first differences: z = -0.31 Pr > z = 0.756

Sargan test of overid. restrictions: chi2(17) = 30.10 Prob > chi2 = 0.026

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(17) = 17.92 Prob > chi2 = 0.394

(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(13) = 14.95 Prob > chi2 = 0.311

Difference (null H = exogenous): chi2(4) = 2.97 Prob > chi2 = 0.563

gmm(L.GDPPCG TEXD UNEMP INF, collapse lag(1 3))

Hansen test excluding group: chi2(1) = 0.19 Prob > chi2 = 0.667

Difference (null H = exogenous): chi2(16) = 17.73 Prob > chi2 = 0.340

iv(D.TDSESV GOVSPEND L2.POPG L2.FDI D.GCF L.GDSAV L.M2 FINDEV EXP IMP L.HUMCAP CONCORRUP Year)

Hansen test excluding group: chi2(4) = 5.86 Prob > chi2 = 0.210

Difference (null H = exogenous): chi2(13) = 12.06 Prob > chi2 = 0.523

### Appendix 3 Panel VAR lag length selection criterion table

```
. pvarsoc GDPPCG TEXD UNEMP INF , maxlag(4) pvaropts(instl(1/4))
Running panel VAR lag order selection on estimation sample
....
```

Selection order criteria

```
Sample: 2009 - 2018
No. of obs = 300
No. of panels = 30
Ave. no. of T = 10.000
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.9997642	41.15056	.7474362	-232.631	-54.84944	-125.9979
2	.9997844	26.6013	.7364186	-155.9197	-37.3987	-84.831
3	.9997537	12.50567	.7084989	-78.75485	-19.49433	-43.21047
4	.9970225	.	.	.	.	.

### Appendix 4: Panel VAR Granger causality test result

```
. pvargranger
```

panel VAR-Granger causality Wald test

Ho: Excluded variable does not Granger-cause Equation variable

Ha: Excluded variable Granger-causes Equation variable

Equation \ Excluded	chi2	df	Prob > chi2	
GDPPCG	TEXD	0.001	1	0.973
	UNEMP	5.356	1	0.021
	INF	0.209	1	0.647
	ALL	5.375	3	0.146
TEXD	GDPPCG	9.342	1	0.002
	UNEMP	1.556	1	0.212
	INF	10.802	1	0.001
	ALL	27.692	3	0.000
UNEMP	GDPPCG	1.756	1	0.185
	TEXD	0.706	1	0.401
	INF	3.511	1	0.061
	ALL	5.808	3	0.121
INF	GDPPCG	2.485	1	0.115
	TEXD	5.989	1	0.014
	UNEMP	2.377	1	0.123
	ALL	10.833	3	0.013



## Appendix 7: Difference GMM regression result

Dynamic panel-data estimation, one-step difference GMM

```

Group variable: c_Id                Number of obs   =    390
Time variable : Year                Number of groups =    30
Number of instruments = 23          Obs per group: min =    13
Wald chi2(0) = .                    avg =    13.00
Prob > chi2 = .                    max =    13
  
```

GDPPCG	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
GDPPCG						
L1.	.0067688	.0404719	0.17	0.867	-.0725547	.0860924
TEXD	-.0380728	.0390547	-0.97	0.330	-.1146185	.038473
UNEMP	-.7229581	.9913665	-0.73	0.466	-2.666001	1.220084
INF	-.0455336	.0531793	-0.86	0.392	-.1497632	.058696
FDI	.0541884	.0288663	1.88	0.060	-.0023885	.1107653
TDSERV	-.0836328	.0594785	-1.41	0.160	-.2002085	.0329429
POPG	2.942134	2.399959	1.23	0.220	-1.7617	7.645968
GCF	.5447297	.1828227	2.98	0.003	.1864039	.9030556
GDSAV	-.3685918	.1764704	-2.09	0.037	-.7144674	-.0227163
M2	-.2264193	.0928502	-2.44	0.015	-.4084022	-.0444363
EXP	.5886245	.1949497	3.02	0.003	.20653	.9707189
IMP	-.5303472	.1869913	-2.84	0.005	-.8968434	-.1638509

Instruments for first differences equation

Standard

D.(TDSERV GOVSPEND POPG FDI GCF GDSAV M2 FINDEV EXP IMP HUMCAP)

GMM-type (missing=0, separate instruments for each period unless collapsed)

L(1/3).(L.GDPPCG TEXD UNEMP INF) collapsed

Arellano-Bond test for AR(1) in first differences: z = -2.23 Pr > z = 0.026

Arellano-Bond test for AR(2) in first differences: z = -1.89 Pr > z = 0.058

Sargan test of overid. restrictions: chi2(11) = 33.23 Prob > chi2 = 0.000

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(11) = 16.89 Prob > chi2 = 0.111

(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

iv(TDSERV GOVSPEND POPG FDI GCF GDSAV M2 FINDEV EXP IMP HUMCAP)

Hansen test excluding group: chi2(0) = 0.00 Prob > chi2 = .

Difference (null H = exogenous): chi2(11) = 16.89 Prob > chi2 = 0.111

## Appendix 8: list of sampled SSA countries

1	Angola	16	Kenya
2	Benin	17	Madagascar
3	Botswana	18	Mali
4	Burkina Faso	19	Mauritania
5	Burundi	20	Mauritius
6	Cameroon	21	Mozambique
7	Central African	22	Niger
8	Chad	23	Nigeria
9	Congo, Rep.	24	Rwanda
10	Eswatini	25	Senegal
11	Gabon	26	South Africa
12	Gambia	27	Sudan
13	Ghana	28	Tanzania
14	Guinea	29	Togo
15	Guinea-Bissau	30	Uganda