

**FISCAL DEFICIT FINANCING AND INFLATION IN SUB-  
SAHARAN AFRICA**

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RQUIREMENTS FOR THE AWARD OF THE DEGREE OF  
MASTER OF ECONOMICS OF THE UNIVERSITY OF EMBU.**

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## DECLARATION

This thesis is my original work and has not been presented elsewhere for a degree or any other award.

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## **DEDICATION**

I dedicate this work to my farther, Evans Sumba, my mother Mediatrix Nabwire and my brother James Sumba for the endless support, encouragement and love throughout my academic journey.

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## ACRONYMS AND ABBREVIATIONS

|               |  |
|---------------|--|
| <b>ARDL:</b>  | Autoregressive Distributed Lag                         |
| <b>COVID:</b> | Coronavirus Disease                                    |
| <b>CPF:</b>   | Capital Formation                                      |
| <b>CPI:</b>   | Consumer Price Index                                   |
| <b>DB:</b>    | Domestic Borrowing                                     |
| <b>FB:</b>    | Foreign Borrowing                                      |
| <b>FDI:</b>   | Foreign Direct Investment                              |
| <b>FTPL:</b>  | Fiscal Theory of Price Level                           |
| <b>G7:</b>    | Group of seven   |
| <b>GDP:</b>   | Gross Domestic Product                                 |
| <b>GMM:</b>   | Generalized Method of Moments                          |
| <b>GNI:</b>   | Gross National Income                                  |
| <b>IMF:</b>   | International Monetary Fund                            |
| <b>ODA:</b>   | Official Development Assistance                        |
| <b>OECD:</b>  | Organization for Economic Co-operation and Development |
| <b>OLS:</b>   | Ordinary List Squares                                  |
| <b>SSA:</b>   | Sub-Saharan Africa                                     |
| <b>US:</b>    | United States  |
| <b>VAT:</b>   | Value Added Tax  |

## DEFINITION OF TERMS

|   |   |
|---|---|
| <b>Domestic borrowing:</b>              | It is the portion of public debt which is payable to local creditors.   |
| <b>Fiscal deficit:</b>                  | This is the shortfall of government revenue as compared to its expenditure.   |
| <b>Foreign borrowing:</b>               | Amount of money borrowed from government or private lender of another country or international monetary institutions. |
| <b>Inflation:</b>                       | This is the general increase in price level and fall of purchasing power of money over time.                          |
| <b>Official development assistance:</b> | Aid given by government agencies, monetary institutions, or friendly countries for development.                       |

## ABSTRACT

Financing fiscal deficit in any country is undertaken with the sole purpose of promoting economic growth and development. However, fiscal deficit financing can be a major source of macroeconomic instability, especially inflation, depending on how it is achieved. Inflation in sub-Saharan Africa has persistently been high, almost double-digit, and volatile compared to other areas with developing countries such as Asia and Latin America. Thus, this study aimed at analyzing the relationship between fiscal deficit financing and inflation among sub-Saharan African countries and determine whether the inflation rate depends on the mode of financing adopted. This study's initial analysis determined the relationship between fiscal deficit financing and inflation while disaggregating deficit financing into domestic and foreign borrowing. This analysis applied a two-step system Generalized Method of Moments model to the secondary panel data for 44 sub-Saharan African countries from 2005 to 2020. In its second analysis stage, this study checked whether the mode of deficit financing selected by the country matters on the inflation level. The quantity scaling analysis determined the relative effect of fiscal deficit financing tools on inflation. The findings of this study reveal that financing fiscal deficit through foreign and domestic borrowing positively influences inflation among sub-Saharan African countries, and the severity of the effects on inflation differs between domestic and foreign borrowing. Foreign borrowing was found to have less impact on increasing price levels than domestic borrowing. This is indicated by the domestic borrowing's scaling quantity analysis value of 0.210 against 0.105 for foreign borrowing. Similarly, this study found that one-year lagged inflation, official development assistance, gross domestic product, change in money supply and exchange rate have positive effect on inflation although the effect of the money supply and exchange rate were insignificant. On the other hand, real interest rates and capital formation were found to have a negative effect on inflation as well. The robustness of the test for the obtained results was checked in two ways as follows: First, the two-step system GMM analysis was conducted on the whole sample of 44 sub-Saharan African countries as well as on a sub-group of 20 low and 24 middle-income countries within the region to see whether the results obtained vary on splitting the data. In all estimation models, the results obtained show consistency across all groups of countries in terms of the coefficient sign, size, and significance level, implying that the estimated results are highly robust. Following the findings, this study recommends control of the fiscal deficit through prudent fiscal policies that minimize resource wastage and reduce the fiscal deficit. Second, the study recommends a reduction of domestic debt as a component of public debt to achieve macroeconomic goals at a lower cost to society through less inflation effect. Third, following the negative relationship between real interest rate, capital formation and inflation, the current study recommends sub-Saharan African countries to increase capital formation (domestic investment) and interest rate to achieve macroeconomic stability.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Fiscal deficit management continues to be challenging, especially in developing countries, due to their weak institutions, fiscal dominance, low tax bases, weak production capacity, and huge infrastructure deficit (Aladejare, 2022). The overreliance on the government as the primary provider of social services, such as healthcare services, poverty alleviation services, and subsidy programs, all from the fiscal budget, has made it quite challenging to control the fiscal deficit (Oyeleke, 2022). Governments have justified continuous accumulation of budget/fiscal deficit to realize the economic goal of covering revenue shortfall to adequately provide government services to people. However, according to Obinabo and Agu (2019), fiscal deficit financing is only appropriate when it is a means to an end and not an end. This means that the relevance of deficit financing is determined by the ability to achieve goals set by the policy architects.

According to Bordo and Levy (2021), in the case of a fiscally dominated government system that continuously runs a deficit, it will sooner or later land into inflation because of deficit financing. Theoretically, this is the proposition of the Fiscal Theory of Price Level, which posits that depending on how the government implements fiscal policy, it can be a major source of macroeconomic instability, especially inflation in the country (Leeper & Sims, 1994). This theory requires the confidence that the government will not default on its loans but inflate them off over time through deficit financing (Urquhart, 2022). While it is well known that there are other ways through which inflation in an economy can be fueled and become persistent, the fiscal imbalance has remained central to the most recent empirical analysis. The fiscal view of inflation has been pronounced loudly in developing economies due to these countries' socioeconomic challenges (Manasseh et al., 2022).

Although fiscal deficit financing has been noted as a major driver of inflation among developing countries, previous empirical work has yet to have much success in uncovering a robust empirical relationship between fiscal deficit and inflation among developing countries. Most available studies have concentrated on developed economies with strong

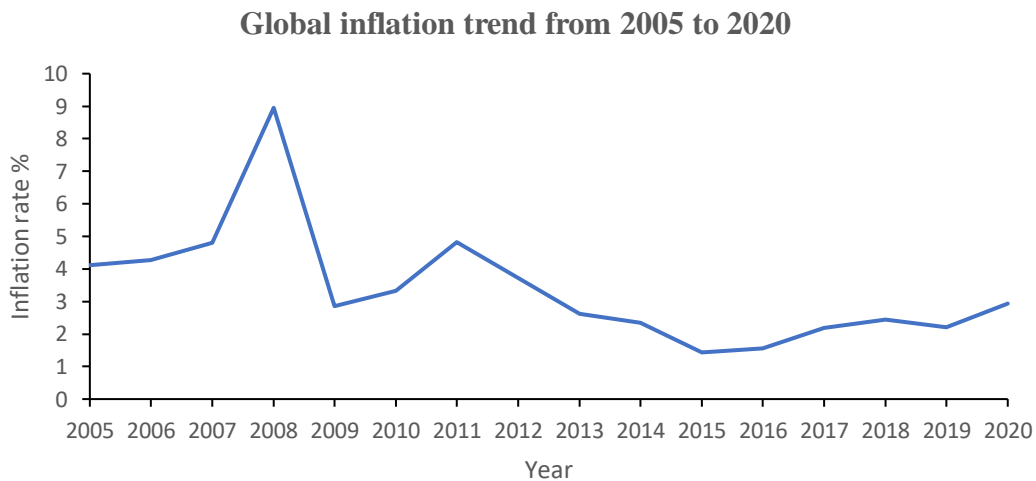
financial systems which can contain inflation dynamics. For instance, studies such as Alper et al.(2002), Ekinici (2016), Calcagno (2019), Nguyen et al. (2022), and Kaur (2018) even though they have analyzed the fiscal deficit and inflation nexus, their analysis has been based on the developed economies. Among developing countries, there also exist a number of empirical studies that have analyzed the relationship between inflation and fiscal deficit. However, this literature still needs to be explored, especially in the sub-Saharan African region, as it poses numerous gaps that call for future analysis. For instance, various variations exist in the results found regarding the relationship between inflation and fiscal deficit. Some studies have shown positive relationships, others negative, while others have found no significant relationship between these variables. The variation in results ranges from one study to another, implying there is yet to be consensus on the actual relationship between inflation and fiscal deficit. Similarly, much of the available literature has analyzed the fiscal deficit inflation nexus by looking at how the level of fiscal deficit through public debt influences inflation without looking at the potential effect of deficit financing tools in stimulating inflation as pointed out by Ojong and Owui (2013). The empirical analysis of fiscal deficit and inflation using deficit financing tools is relevant because these tools tend to carry varying macroeconomic effects whenever used; hence need to unveil them for better decision-making (Saungweme & Odhiambo, 2021).

This study, therefore, takes a new look into the subject to fill the gaps realized in the following ways: First, relative to previous studies that have done the single-country analysis, the current study used a comprehensive cross-sectional data set for 44 sub-Saharan African countries (SSA) from 2005 to 2020 to avail literature on the broader scope while using recent data sets on variables. Second, unlike the previous studies, the this analyzed the fiscal deficit inflation and nexus through deficit financing tools by disaggregating the fiscal deficit financing into domestic and foreign borrowing as the primary deficit financing tools. Third, this study also determined the relative effect of these deficit financing tools on inflation. This was done to provide information on the optimal deficit financing tool that can achieve the government's goal of resource mobilization at a low cost to society through the least inflationary effects. Lastly, this study modeled the relationship between the variables as intrinsically dynamic using the

dynamic system GMM model. This was done to capture the long-run relationship between these variables of interest. This study thus analyzed the inflation and fiscal deficit nexus among sub-Saharan African countries through deficit financing and determined whether, by using domestic or foreign borrowing, the inflation effect varies.

## 1.2 Stylized facts on inflation and fiscal deficit

Inflation worldwide continues to be a problem due to its adverse macroeconomic effects on the economy. Although the available data shows that the inflation rate worldwide has been declining over the last decade, this does not exclude the fluctuations in the inflation rate over different years. For instance, among the advanced economies, the declining trends in inflation started way back in the early 1980s, while that of emerging markets started in the 1990s. Globally, the inflation rate has fallen from 10.3% in 1994 to 8.3% in 2022, up from the lowest rate of 1.5% experienced in 2015. The declining trends globally before 2007 reflect the change in energy prices, as stated by Hakkio (2011). The trend in global inflation rate from 2005 can be visualized as in Figure 1.1.



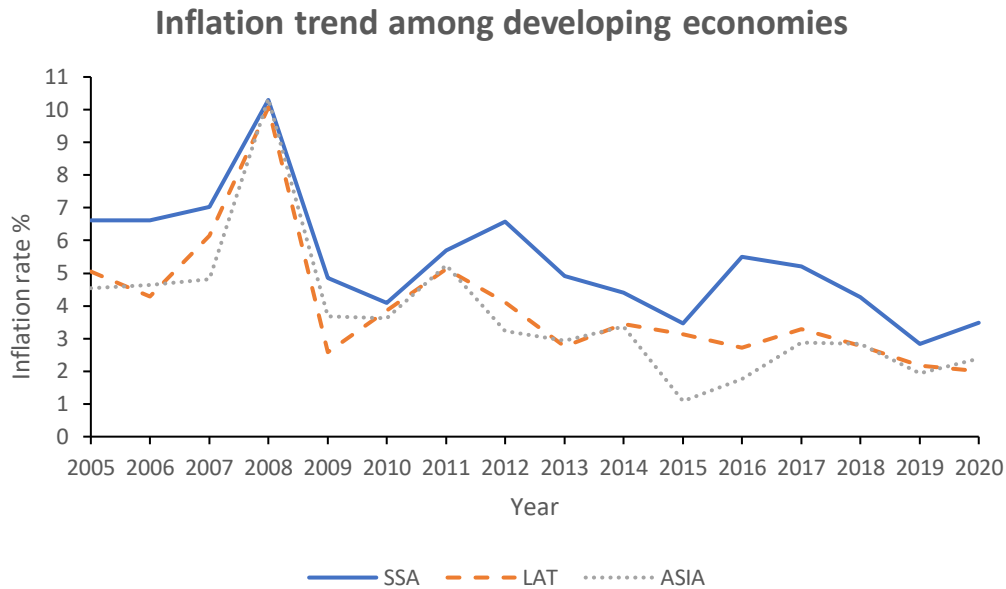
**Figure 1.1 World inflation rate**

**Source:** World Bank database



From Figure 1.1, the average inflation is low in 2005 4.1% before resuming on an upward trend reaching 8,9% in 2008 which is the highest rate over the period before it started to decline reaching the lowest rate at 1.3% in 2015 and later rises to 2.9% in 2020. From 2007, while the change in energy prices may partially explain the inflation fluctuations globally, this may not be the complete story, for it can be noted that in countries like the Group of Seven countries (G7) and Organisation for Economic Co-operation and Development (OECD), excluding high-inflation countries, fluctuations started quite earlier and persisted (Hakkio, 2011). Therefore, the inflation rate during this period can also be attributed to other factors, such as an increase in fiscal deficit which has kept increasing over the years, and later, from 2020, the COVID-19 effect. For instance, during the corona virus pandemic period, food shortage was experienced in different parts of the world due to lockdowns leading to price surges in individual countries and globally. To add on, the pandemic also disrupted many business operations and distorted households' income. This made governments design various fiscal stimuli to cushion citizens against challenging economic environment, such as a pool of funds to boost business and stimulate economic times.

Across developing economies, inflation rate trends do not differ from the global trend. For instance, from 2005 to 2019, the inflation rate in emerging economies declined from 6.6% to 2.9%. The downward trend among emerging markets and developing economies has been cutting across all regions, including those with persistently high inflation rates, such as the Caribbean, Latin America, Asia, and sub-Saharan Africa (Akyüz, 2017). The decline in the inflation rate in these countries could be attributed to improved fiscal balance prior to the 2007-2009 global financial crisis, stability in exchange rate, and macroeconomic stabilization, which reduced the external shocks on price levels thus reducing average inflation. The inflation rate over the years among emerging economies and developing countries from different regions can be visualized as in Figure 1.2.



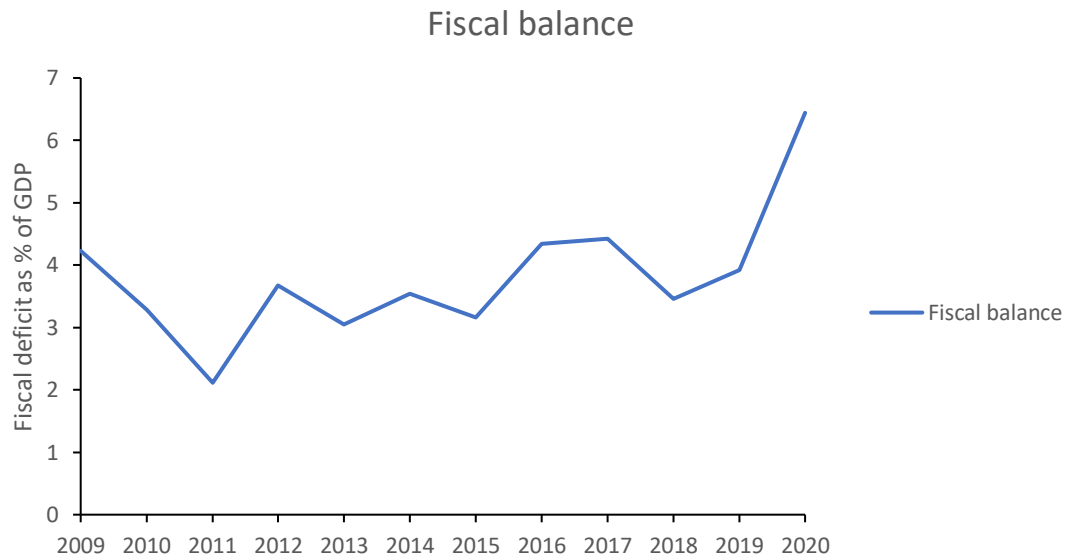
**Figure 1.2 Inflation trend among different developing regions from 2005 and 2020**

**Source:** World Bank dataset

Figure 1.2 shows that, for sub-Saharan Africa, the inflation rate has continued to be higher and volatile compared to other regions. Notably, the region continued to experience high inflation with the median inflation rate hitting a double-digit value at 10.3% in 2008. The high inflation trend is also visible in many countries, such as Ghana, Sudan, Zimbabwe, Ethiopia, and Sierra (Tiffin, 2021). The high inflation in the sub-Saharan African region and among individual countries has been attributed to demand-pull pressure, fiscal and monetary policies, supply shock, and inertia as asserted by Altaee and Saeed (2019).

Globally, fiscal deficit has persistently remained high in many countries. Continuous deficit financing for instance has seen the global public debt surge to as high as 99% of the GDP as at 2020 from 62% of the GDP as in 2007. Among the sub-Saharan African countries, the need to finance development projects, improve social amenities (schools, healthcare, among others) has contributed to the burgeoning budget deficits occasioning

governments to borrow aggressively (Sani et al., 2019). The trend in fiscal deficit among sub-Saharan African countries can be visualized in Figure 1.3.



**Figure 1.3 Median fiscal deficit in for sub-Saharan African region over time as % of GDP.**

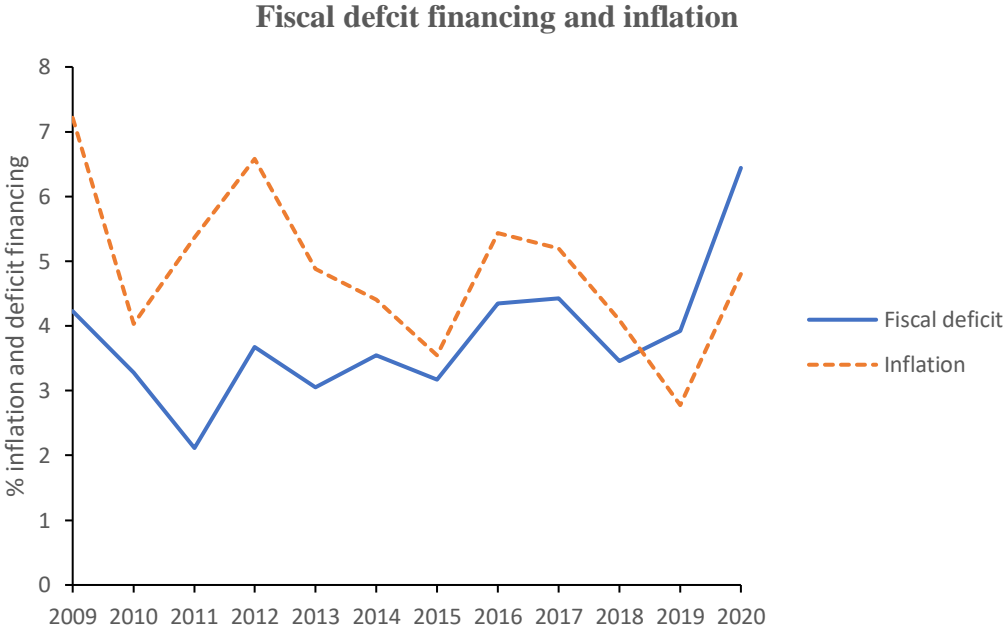
**Source:** International Monetary Fund database.

As shown in Figure 1.3, from 2015 and 2020, the median fiscal deficit as a percentage of GDP exhibits an upward trend from 3.22% to 5.3%, implying an increased need for deficit financing. This is evidenced by an elevated increase in sovereign debt that grew from 35.1% of GDP in 2014 to 55.4% in 2019 and 63.1% in 2020 (Heitzig, 2021).

The fiscal deficit in sub-Saharan African countries also portrays a wide range of variation, with some countries having very high fiscal deficits of up to double-digit values. In contrast, others have low fiscal deficits. For example, countries such as Botswana, Ghana, Zambia, and Mauritius have had high fiscal deficits ranging from 10.9% to 15.3% while Lesotho, Equatorial Guinea, the Cong Republic, and Comoros have had very low fiscal deficits ranging between 0.2% and 1.7% over the last five years.

Sub-Saharan African governments have continuously increased borrowing from local and foreign markets to finance growing deficits. For instance, commercial banks and private credit markets (bonds and bills) have been targeted for financing short-run budget deficits, mainly recurrent expenditures due to their quick access. The emergency of China also as

a major bilateral creditor to the region has brought about a sharp increase in public debt. For instance, in 2018, China-Africa unveiled about 60 billion US dollar to be disbursed into the region as grants, trade and development financing loans. This made the region's loan repayment to China alone grow to 19% of total external debt service cost in 2018, with individual countries having varying levels of loan distress. The enormous debt stock in sub-Saharan Africa has led to increased debt servicing cost, narrowing fiscal space jeopardizing macroeconomic stability in the region (Moffitt, 2022). The movement between fiscal deficit and inflation over the years in sub-Saharan African region can be visualized as in Figure 1.4.



**Figure 1.4 Trend in inflation and median fiscal deficit in sub-Saharan African region from 2009 and 2020.**

**Source:** Author’s compilation from International Monetary Fund database

Figure 1.4 shows that fiscal deficit and inflation show similarity in terms of trend over time; that is, the inflation peak resembles that of median fiscal deficit over the years. For instance, from 2009, the inflation rate shows a downward trend from 7.2% to 5.3% in 2010, followed by an upward trend until 2012 at 6.5%. From 2012 to 2015 the inflation rate in the region again shows a downward trend reaching 3.5% in 2015. The year 2019 record the least inflation rate in period at 2.8%. A similar trend is observed in the fiscal

deficit over the period. For instance, from 2009 to 2011, the region experienced a declining trend in fiscal deficit before resuming an upward trend from 2012. The fiscal deficit in the region shows a persistently rising trend though some years have fluctuations of up and downward movement. The period from 2019 to 2020 shows a sharp increase in the value of fiscal deficit which could be attributed to the effect of 2019 corona virus pandemic, which made most African countries embark on providing economic stimulus to protect citizens against the effects of the pandemic financed through public borrowing especially during lockdown period (Heitzig, 2021).

### **1.2.1 Relationship between inflation and fiscal deficit financing**

Understanding the nature as well as determinants of inflation is a critical issue that has continued to attract considerable interest among policymakers. Fiscal deficit is studied among sub-Saharan African countries because, theoretically, it could be a significant source of inflation, mainly depending on how financing is achieved. Derived from both Monetarist and Keynesian's frameworks, fiscal deficit financing will always tend to be inflationary. This is due to debt monetarization, as stated by Monetarist economists, and stimulation of aggregate demand, as provided by the Keynesian framework, in that holding all factors constant, inflation will be the result in the long run ( Gupta, 2013).

Fiscal deficit in most countries has been financed mainly from domestic and foreign borrowing sources. Domestic borrowing has been through banks and non-banks borrowing and issuance of government securities such as treasury bills and bonds. On the other hand, foreign borrowing has usually been obtained from foreign banks, international financial institutions such as IMF and World Bank, and individual lending countries (Manasseh et al., 2022).

Along with financing fiscal deficit, each deficit financing tool carries its potential macroeconomic effect on the economy. For instance, domestic borrowing can either be inflationary or non-inflationary depending on how the local lenders choose to finance government domestically issued debt instruments. Inflation occurs if banks and other local lending institutions finance government-issued debt instruments (treasury bonds and bills) through increased customer deposits. The increases in customers' deposits rises both

banks' assets and liabilities and, in turn, cause a wealth increase in the inflationary effect. Otherwise, if local lenders use maturing loan proceeds to finance debt instruments issued by the central government, the new financial securities tend to replace the old ones; hence banks' assets and liabilities remain unchanged, and no inflation is experienced (Ahmad, 2012).

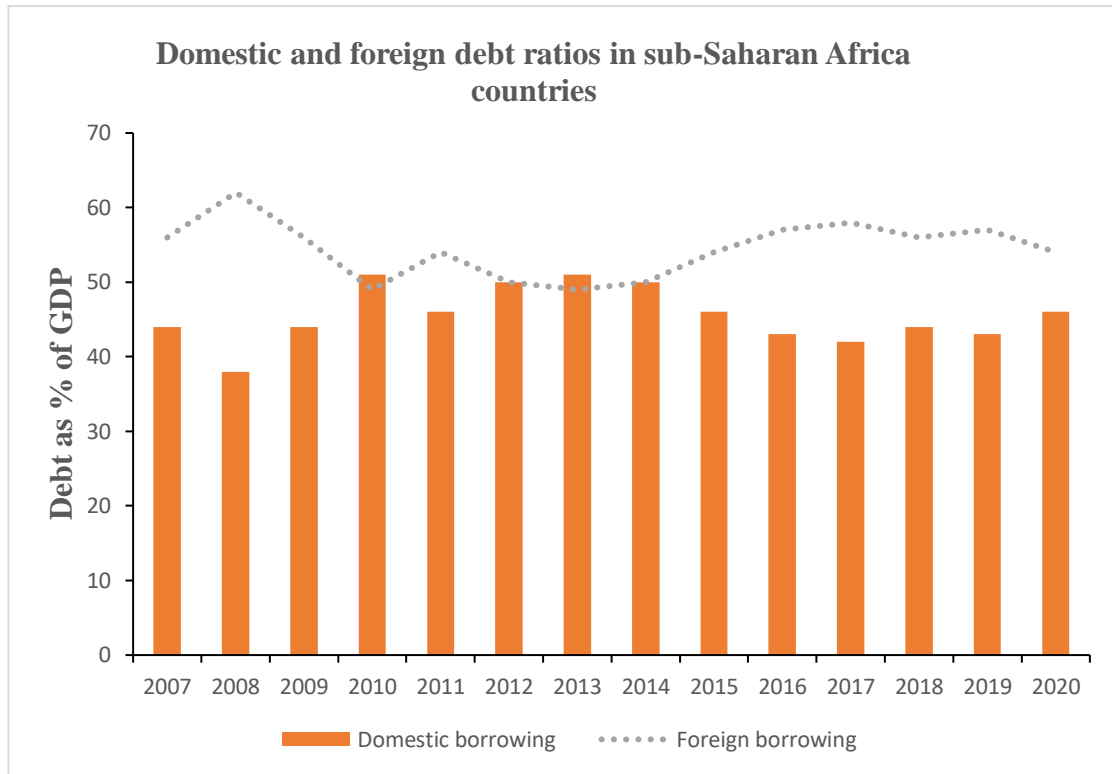
Similarly, the use of foreign borrowing to cover revenue shortfall can either cause inflation or not, depending on the choice and nature of foreign loans the government goes for. In this case, foreign borrowing will be inflationary if the borrowing country persistently goes for short-term and expensive loans to meet its financial obligations. This is the case since the increase in investments using finances sourced from foreign borrowing is subject to the law of "diminishing rate of return," that is the production volume realized from an additional investment of foreign-borrowed funds will keep reducing. The income realized from these investments thus tend to fall below the repayment interest rate and principal servicing cost, forcing the government to increase the domestic taxes on essential commodities to service the principal and interest on the borrowed funds. This action leads to an increase in domestic prices causing inflation. On the other hand, no inflation will be experienced if the borrowing government goes for long-term concessional loans and effectively utilizes foreign-borrowed funds to invest in development projects which increase productivity gradually (Ekinci, 2016). For instance, concessional loans from World Bank and International Monetary Fund are known to be obtained for prescribed development purposes. In most cases, they are accompanied by technical support, which minimizes the chances of misuse. Additionally, concessional loans carry low-interest rates usually below the market rates, a grace period for which the borrowing country does not need to pay for the loan, and longer maturity, which gives time for countries to enhance production from their investments (Roy & Sen, 2022).

Among developing countries, and sub-Saharan African countries in particular, the use of both domestic and foreign borrowing is a phenomenon that has been around for a while. The application of both deficit financing tools can be dated back to the early 1980s, and countries have kept striking a balance on the composition of domestic and foreign borrowing that can achieve macroeconomic stability (Culpeper & Kappagoda, 2016). For

instance, although the composition of domestic debt as a percentage of the total debt ratio was as low as 11% of GDP in early 1980s and 1990s, the trend in domestic debt has kept increasing recently, with some years such as 2011 and 2014 experiencing higher levels of domestic debt than foreign borrowing on average. The increase in domestic debt as a percentage of GDP has been attributed to an increase in the floating of short-term domestic borrowings instruments such as treasury bonds and bills whose maturity ranges between three to ten months on average (Heitzig, 2021). The domestic borrowing in most countries has also been accompanied with less regulations in regards to acquisition and utilization hence becoming attractive to most developing countries especially those facing insolvency due to high foreign debt stocks (Ho et al., 2021).

Figure 1.5 shows the share of domestic and foreign borrowing for the SSA from 2007 to 2020. From the figure the trend analysis shows that the domestic and foreign borrowing among African countries are almost equally utilized to finance fiscal deficit.

F



**Figure 1.5 Composition of public debt for the African countries**  
**Source:** IMF and World Bank databases.

Although from the figure, it can be visualized that the use of domestic and foreign borrowing in covering revenue shortfall is almost equal in some years, Bal et al. (2022) have pointed out a wide range of variation among countries regarding the government security markets. This is implied by over-reliance on domestic borrowing by one group of countries and foreign borrowing by the other. For instance, countries such as Kenya, Nigeria, South Africa, Nigeria, Ethiopia, Zambia, and Mauritius have been inclined more toward domestic borrowing than foreign borrowing, while Angola, Botswana and Mozambique have been termed pro-external borrowers. From the trend analysis provided, it is evident that sub-Saharan African countries have been using both domestic and foreign borrowing to finance fiscal deficit in almost same ratios. This calls for an empirical conceptualization of the macroeconomic effect of this deficit financing tool in order to justify the composition of the deficit financing tools when financing fiscal deficit hence the basis of the current study.



### **1.3 Statement of problem**

High and variable inflation has been identified as a key impediment to the realization of macroeconomic goals among developing countries (Bessane & Purifice, 2021). Whereas high inflation is well known to be detrimental to the economy, empirical evidence also relates moderate inflation to adverse macroeconomic effects on the economy. Among sub-Saharan African countries, the inflation rate has continuously exhibited a wide range of variation over the last decade, with some experiencing very high, others moderate, while others have had very low inflation rates. Inflation in this region has been cited as emanating from diverse sources, such as changes in global food prices, exchange rate fluctuation, and a recent surge in the fiscal deficit due to the countries' need to recover from the pandemic-muted economic environment. Generally, the average inflation in the sub-Saharan African region has remained relatively high compared to other regions in the same development category, such as Asia and Latin America. This is so despite numerous economic policies to curb inflation, such as raising interest rates and reducing external supply shocks by stabilizing local currencies (Nguyen et al., 2017).

Although there exists several studies on what drives inflation in SSA region among them, Nguyen et al. (2017), Bleaney and Francisco (2016), Okoye et al. (2021), Alagidede et al. (2018) and Mweni et al. (2016), there is a dearth of studies which empirically test the effect of deficit financing on inflation. With numerous countries in SSA grappling with increasing fiscal deficits, it is imperative for these countries to understand the macroeconomic implications of various sources of deficit financing. Given, little is understood regarding the relative influence of various deficit financing tools on inflation, this study sought to close this gap by examining the effect of deficit financing on inflation in SSA.

### **1.4 Objectives of the study**

This study deduced its objectives from the proposition of the Fiscal Theory of Price Level, which proposes that depending on how the fiscal deficit is financed, it can serve as a source of macroeconomic instability in the economy especially inflation.

### **1.4.1 General objective**

This study's broader objective was to determine the effect of fiscal deficit financing on inflation in sub-Saharan African countries.

### **1.4.2 Specific objectives**

The specific objectives of the study developed from the stated general objective were as follows;

1. To determine the effect of domestic borrowing on inflation among sub-Saharan African countries.
2. To assess the effect of foreign borrowing on inflation among sub-Saharan African countries.
3. To establish the relative effect of domestic and foreign borrowing on inflation in sub-Saharan African countries.

### **1.5 Research hypotheses**

The null hypotheses of this study were as follows.

1.  $H_{01}$ : Domestic borrowing does not affect inflation in sub-Saharan African countries.
2.  $H_{02}$ : Foreign borrowing does not affect inflation among sub-Saharan African countries
3.  $H_{03}$ : The relative effects of domestic and foreign borrowing on inflation among sub-Saharan African countries are similar.

### **1.6 Significance of the study**

Most of the available studies on inflation have been carried out from a monetary policy context. Available studies from the fiscal context have also concentrated heavily on advanced economies while analyzing fiscal deficit inflation nexus using the absolute public debt. Although these studies are relevant to the literature, they pose a gap on need for disaggregating fiscal deficit financing into domestic and foreign borrowing for comprehensive analysis. The current study thus analyzed inflation in the sub-Saharan

African region in a fiscal space while disaggregating deficit financing into domestic and foreign borrowing and then tested their relative effects on inflation. The two step System Generalized Method of Moments and Scaling quantity analysis were the main estimation models for the current study. This study provides a comprehensive understanding of the relative effect of fiscal deficit financing on inflation among sub-Saharan African countries since most countries do not use one deficit financing tool in isolation of the other but rather a combination of tools simultaneously. Empirically, this study provides literature on the cross-country analysis of deficit financing and inflation in sub-Saharan Africa and deficit financing tools that need to be revised from the existing literature.

This study provides the value addition to the economic research in the following ways. First, it avails literature on deficit financing and inflation using (domestic and foreign borrowing) deficit financing tools. This was relevant since most of available studies on this subject either analyzed the effect of the absolute value of fiscal deficit on inflation or did not disaggregate debt financing to capture the effect of each financing component on macroeconomic stability. Second, the current study determined the relative effect of deficit financing tools on inflation. The relative effect analysis was relevant since sub-Saharan African countries employ various mechanism to fill the fiscal deficit thus call for the need to recommend the least inflationary deficit financing tool.

### **1.7 Organization and scope of the study**

The current study is organized as follows, chapter covers introduction and background of the study, chapter two covers theoretical and empirical literature review while chapter three, four and five cover research methodology, research findings and discussion and summary conclusions and policy implications respectively. The study of covered 44 sub-Saharan African countries from 2005 to 2020. Panel data for the selected countries from 2005 to 2020 was used for analysis because some countries did not have sufficient data on the study variables especially past 2020. Sub-Saharan African region has 49 countries however; five countries were left out in the analysis because of they lacked data on the variables used in the study.



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

The literature on fiscal deficit financing and the inflation nexus is covered in this chapter. It also highlights theories upon which the relationship between variables is built and summarizes the empirical literature.

#### 2.2 Theoretical literature

Various theories have explained how inflation can emerge from fiscal space in an economy which serves as building blocks for empirical analysis. For this study, the Quantity Theory of Money, the Fiscal Theory of Price Level, the Demand-pull Theory of Inflation, and the Structural Inflation theory were explored, pointing out the critics and relevance of each.

##### 2.2.1 Quantity theory of money

This theory was developed by David Hume in 1711 who first put forward the theory's first dynamic analysis of inflation and later developed by Irving Fisher between 1876 and 1947. Irving Fisher development involved presenting the relationship between money supply and price level using the Cambridge approach as;

$$MV = PT \dots\dots\dots (2.1)$$

M represents the money supply, V represents money velocity, P is the price level or inflation, and T is the number of economic transactions. The Fisher equation assumes that the number of transactions T remains constant over time and that money supply and velocity have no composite elements; thus, a change in money supply translates to a change in the price level (inflation). This theory's main hypothesis regards the change in the value of money (purchasing power) such that a change in money circulation in the economy causes inflation. This happens when the money becomes abundant in the economy, its value declines, and more is used to purchase less, thus causing high prices for commodities. This theory implies that fixing fiscal imbalances through debt monetarization will cause inflation. According to the proponents of this theory, an

economy can achieve price stability if monetary authorities take full responsibility for controlling the money supply (Friedman, 2010). The critics of this theory argue that the assumption of a direct relationship between the money supply and the price level is unrealistic since the money supply in the economy is often unstable, and prices also tend to be constantly sticky, especially in the short run thus change in money supply does not always lead to inflation. This justifies why most macroeconomic inflation analyses use lagged price level values as a current inflation level determinant.

The Quantity Theory states that debt monetization in the economy, in this case by increasing the money supply, causes inflation. This study used the money supply as an independent variable controlling the effect of money market fluctuation on the dependent variables (inflation). Therefore, this theory was discussed due to its contribution to explaining determinants of inflation which needed to be controlled for accurate analysis.

### **2.2.2 Fiscal theory of price level**

This theory was proposed by Leeper (1991) and later expanded by Eeper et al. (1994). The theory suggests that persistent fiscal deficit financing may cause macroeconomic instability, depending on how the government finances revenue shortfalls. In this case, deficit financing can be a source of high inflation, depending on how the government finances the revenue shortfall. First, suppose the government opts for domestic borrowing to cover the revenue shortfall; inflation will follow if commercial banks and other lending institutions finance government-issued treasury bonds and bills by increasing customers' deposits. This is so because increasing customers' deposits with commercial banks raise banks' assets and liabilities, which results in the wealth effect inflationary pressure. Otherwise, if commercial banks instead use maturing loan proceeds to finance central government borrowing, their assets and liabilities remain unchanged, hence no wealth effect (Afful, 2021).

Second, suppose foreign borrowing used to cover the fiscal deficit, it will cause inflation or not, depending on how the government's foreign debt is acquired. For instance, inflation will occur if the government persistently uses short-term and expensive loans to meet its financial obligations. This is because short-term foreign loans attract high-interest rates,

which raises the cost of debt servicing using domestic taxes and thus enhances the price level in the economy (inflation). On the other hand, if governments go for long-term and concessional loans, inflation will not occur because these loans have a low-interest rate and better service terms, thus, they do not cause a tax burden in servicing the debt (Roy & Sen, 2022). Buiters (2002) has criticized this theory, arguing that it makes the invalid assumption that two components of a market model budget constraints and market clearing conditions—are satisfied in the same way which is not the case. In the current study, the Fiscal Theory of Price level helped select the main independent variables for the analysis as deficit financing tools (domestic and foreign borrowing).

### **2.2.3 Demand pull theory of inflation**

Demand-pull Theory of Inflation is mainly the work of Schumpeter and Keynes (1936) in the book "The general theory of employment, interest rate, and money." According to Keynes, a fiscal deficit affects inflation due to an increase in the money supply in the economy. Initial version of this theory suggested that inflation is a product of an increase in aggregate demand caused by a supply shortage in an economy. A further advancement in the theory in 1940 by Keynes, using the price rigidity assumption, took it to the labor market side. In the theory's advancement, Keynes argued that unanticipated increases in aggregate demand caused by factors such as war financing or salvaging calamities which lead to increased consumption, thus, upward pressure on price levels. As the price level rises, firms tend to produce more, increasing labor demand and incentivizing firms to raise wages in the long run, causing inflation. Similarly, as the government finances war and other calamities, its expenditure increases thus causing more fiscal deficit. Financing the increased fiscal deficit gap by the government will always tend to crowd out private investment. This is because government fiscal deficit financing will lead to less financial resources being left available for the private sector.

Therefore, this theory proposes that fiscal deficit financing is a significant source of inflation, because it combines the increase in money supply and the effects of crowding out private investments (Totonchi, 2011.). This theory further posits that fiscal deficit could also stabilize the price level (inflation), as explained by the positive change in the trade balance. However, this is only possible if an economy has capacity to absorb the

additional liquidity by expanding the output. As the economy channels the borrowed funds into development and production economic activities, the output/domestic aggregate supply increases, which lowers the price level (Musa, 2021).

The main proposition of the Demand-pull Theory of Inflation is that the fiscal deficit financing causes inflation depending on how it is financed and borrowed funds are utilized. This theory was used in this study to strengthen the argument that it is the mode of fiscal deficit financing that matters on inflation.

#### **2.2.4 Structural theory of inflation**

This theory was first put forward by the Mexican economist Juan Noyola in 1956 when analyzing Chile and Mexico's cases of inflation. The theory later was adopted and reinforced in official publications, such as a study on inflation and growth by the Social and Economic Council of the United Nations (Totonchi, 2011.). The structural theory of inflation dismissed the Keynesian approach and analysis of inflation as not working for Latin America's case. It argued that the Keynesian argument on inflation was formulated as a frontal attack on the IMF stabilization proposal for emerging economies. The central proposition of this theory is that inflation in most developing economies is due to their incapacity to produce enough goods and services to meet demand at low prices. The theory's proponents suggest that in developing countries, the question of why aggregate demand, especially for food commodities, has not sometimes increased to meet the increased aggregate demand should be answered when analyzing inflation. It further argues that investment expenditure in emerging economies cannot be fully financed by voluntary savings but by deficit financing, which further fuels inflation (Calcagno, 2019).

The main critique of the structural theory of inflation is anchored on rigidity of wages that do not adjust even when the demand and supply change, which may lead to high wages for the declining industry, thus reducing its competitiveness. The relevance of this theory in the current study is based on its strong argument that inflation in developing countries is caused by increased demand in a specific sector of the economy which can be controlled through raising sectoral outputs. Since sectoral investment in emerging countries cannot be financed fully by national savings, to cure demand pull inflation problem, governments



tend to finance the shortfall through domestic and foreign borrowing which further causes the inflation.

### **2.2.5 Cost push theory of inflation**

The cost push theory of inflation was first proposed by John Maynard Keynes during medieval period and later reviewed 1950s and 1970s as major cause of inflation. The theory posits that inflation in an economy is function of increase in the cost of production independent of change in demand of goods and services under consideration. The inflation phenomenon in this case is a function of wage and profit upward push which lead to a rapid rise in cost of wages than the labor productivity. In some case the increase in the domestic or imported raw material prices may also lead to the cost push inflation since the finished good carry the component of high material cost that is transmuted to increased price level in order to maintain profit margin. The cost push inflation is well explained under monopoly and oligopoly market structures where the manufacturers raise the price of products in order to offset the production cost rise and maintain higher profit or increase the pay cheque for the employees. As the wages paid to employees increases their demand for goods as wells as services increase in the economy thus further causing inflation, but in this case a demand pull inflation phenomenon. In general cost push inflation arise from the labour union push for increase in salaries and wages without considering the impact of this action to the production cost. Since the employers on their path are rational, they pass the increase in production cost to consumer through increased prices which brings inflation (Schwarzer, 2018). Therefore, forming strong employer and labor unions to spearhead mutual understanding will insulate the economy from this type of inflation. In the public sector demand for pay cheque rise by labour unions is met through increased government borrowing to finance recurrent expenditure thus casing inflation (Marshal, 2020).

### **2.3 Empirical literature**

This study reviewed previous studies relating to fiscal deficit financing and inflation. The studies reviewed were classified according to the mode of deficit financing used as domestic and foreign borrowing for analysis.

### **2.3.1 Domestic borrowing and inflation**

Ahmad (2012) conducted a study on domestic borrowing and its inflationary effects in Pakistan. Consumer price index was the dependent variable, while domestic debt, money supply, investment, direct tax, and export were independent variables. The study used secondary time series data between 1972 and 2009 with the ordinary least square regression model and found that domestic debt and domestic debt servicing are primary determinants of rising inflation in Pakistan. The author argues that domestic debt financed through floating short-term debt instruments (treasury bills and bonds) usually has high interest. The income earned through higher interest rates stimulate aggregate demand causing inflation.

Similar findings are put forward by Yien et al. (2017) in Malaysia, who studied the causality between debt, inflation, and exchange rate. This study used the consumer price index as the dependent variable, while domestic borrowing, exchange rate, and foreign borrowing were used as explanatory variables. Secondary time series data between 1960 and 2014 was analyzed using the Granger causality and Johansen Cointegration test and found that local and foreign borrowing cause inflation due to an increase in the cost of interest premiums. The difference between the study by Yien et al. (2017) and the current study lies in the scope and relative effect analysis test.

Another study by Ahmad et al. (2012) examined sources of fiscal deficit financing and their impact on Pakistan. This study decomposed fiscal debt into domestic and foreign borrowing as the main explanatory variables and inflation as the dependent variable and found that domestic debt causes inflation in the long-run. The study by Ahmad, proposes that domestic borrowing will be inflationary as it increases the income and the assets and liabilities of the lending entities within the country. The difference between this study and the current one lies in the scope, that is, while Ahmad et al. (2012), considered impact of fiscal deficit financing in a single-country, this current study uses a cross-country analysis with a larger scope. Similarly, although the study former study disaggregated the data on public borrowing into domestic and foreign borrowing, it did not test for the relative effect of each deficit financing tool on inflation which is done by the later because it helps in designing the optimal deficit financing tool which has minimal inflationary effect.

Marshal (2020), analyzed the granger causality between domestic debt and inflation in Nigeria using time series data between 1960 to 2016. In the study, inflation was the dependent variable while long and short-term domestic debt, money supply and GDP growth formed the independent variables. Both descriptive and granger causality were used for analysis and found that domestic borrowing causes inflation in Nigeria.

On the other hand, some studies have also found no significant relationship between fiscal deficit and inflation. For instance a Ogochukwu (2016), analyzed the public debt and its macroeconomic impact in Nigeria using the granger causality test and vector autoregressive framework and study found no significant relationship between public debt and inflation. The study used public debt, interest rate, and output as explanatory variables, while price level was the dependent variable. The data for this study was secondary time series data ranging between 1970 and 2014. The study implied that debt levels in Nigeria were manageable over the study period and could not cause macroeconomic instability. The study by Ogochukwu, used public debt as a percentage of GDP was the dependent variable without considering disaggregating public debt into respective foreign and domestic debt components since it theoretically argued that depending on how debt is financed it can be source of macroeconomic instability in the country. This formed the basis of difference with the current study which disaggregates public.

### **2.3.2 Foreign borrowing and inflation**

Khan et al. (2020) examined the fiscal deficit on inflation in Malaysia with consumer price index as the dependent variable and deficit financing tools as the main explanatory variables. The study used quarterly time series data between 2000Q1 and 2018Q4 with fully modified OLS, dynamic OLS and autoregressive distributed lag models. The study revealed that foreign borrowing causes inflation in the short run. In contrast, domestic borrowing causes inflation in the long run. The study by Khan motivated the current study to analyze the relationship between domestic and foreign borrowing and inflation on a different scope and also use different methodology to check whether the findings hold.

Onafowora and Owoye (2019) studied how external borrowing influences economic growth and inflation in Nigeria. The study used a structural vector autoregressive model with external borrowing as the main explanatory variable to analyze the dynamic impact of external debt innovation on GDP growth, trade openness, investment and inflation. The data for this study was time series spanning from 1970 to 2014. The findings revealed that increasing external debt stock positively affected inflation in the short run in Nigeria over the study period.

In Kenya, Mweni et al. (2016) studied the effect of foreign borrowing on inflation and documented a positive relationship between these variables. The study used time series secondary data between 1972 and 2012 with a single variables ordinary least squares (OLS) regression in the analysis. In this study foreign borrowing was the independent variable while inflation was the dependent variable. The study motivated the current study to analyze the relationship between the variables on a wider scope while also including more independent variables in the analytical model.

A study by Ekinici (2016) on the effect of external borrowing on inflation in Turkey also found that foreign borrowing negatively influences consumer and producer indices. This study applied a simple linear regression model using time series data between 2003 and 2015 while estimating two separate equations. The first simple linear regression equation analyzed the external debt and consumer price index nexus while the second one used producer price index as dependent variable.

Helmy (2021) analyzed the external debt-inflation nexus in Egypt. The study used ARDL cointegration analysis using monthly time series data between 2000M1 and 2020M1. The consumer price index was the dependent variable while foreign debt, money supply and interest rate were independent variables. The study concluded that external borrowing causes inflation in both long and short-run in Egypt.

To add on, Urquhart (2022) did a study on the effect public debt and inflation, while testing the fiscal theory of price level in Paraguay and found that increase in the public debt stock positively affects inflation. The relationship between these variables was analyzed while considering different monetary policy regimes in the country with the

vector autoregressive model. The variables in the model were interpreted using the impulse response.

Another study by Nguyen et al. (2022) analyzed the effect of fiscal and monetary policies on inflation in Vietnam and found that fiscal policy is the primary determinant of inflation in the country. The study used fiscal policy, money supply, interest rate, exchange rate and GDP growth as independent variables, while consumer price was the dependent variable. The data for the study was secondary data spanning between 1997 and 2020, while vector autoregressive framework was the analytical model.

Dumitrescu et al. (2022) studied the non-linear public borrowing effect of inflation in emerging economies. The study used the panel smooth transition model to analyze and determine the threshold public level that could cause inflation and found that an increase in public borrowing does not cause inflation among countries with low shadow economies. For the countries with high shadow economies above 24.3%, the study found that an increase in public debt causes inflation. The group of emerging countries in the study was analyzed for the period between 2006 and 2015, with government debt, GDP growth, exchange rate, and foreign aid inflow and consumer price index as variables.

#### **2.4 Summary of literature review.**

The analysis of literature review presents numerous theories that have described the mechanism through which fiscal deficit financing translates to inflation in an economy. Some theories support a negative relationship, while others support positive relationship between fiscal deficit and inflation. The theories discussed by this study were relevant in selecting the study's explanatory variables classified as main and control variables during econometric modeling. The relationship between fiscal deficit financing and inflation has been analyzed by a number of studies. However, there still exist considerable gaps ranging from scope, methodology, and different combinations of study variables. The variation in findings of these studies implies that there is yet to be a consensus regarding the role of deficit financing on inflation. For instance a studies such Urquhart (2022), Ogochukwu (2016) and Nguyen et al. (2022) although analyzed the fiscal deficit and inflation nexus they did not disaggregate the fiscal deficit financing into its respective financing tools. Similarly, although other studies such as Yien et al. (2017), Ahmad et al. (2012), Marshal

(2020), Helmy (2021) and Khan et al. (2020) analyzed fiscal deficit and inflation using deficit financing tools as foreign and domestic borrowing, the studies did not consider analyzing the relative effect of these tools on inflation. The relevance of testing the relative effect of deficit financing tools on inflation is based in the proposition by Afonso and Ibraimo (2020) who argued that deficit financing tools have varying vulnerability on macroeconomic variables hence relative effect test is of essence.

This study contributes to the literature by carrying out a cross-country analysis on a broader scope (sub-Saharan Africa) while applying GMM methodology, which is scanty from previous studies. Second, this study disaggregated public debt data into domestic and foreign borrowing to capture the actual effect of each variable on inflation. Lastly, this study also tested the relative effect of deficit financing tools on inflation; this is based on the fact that countries use various deficit financing tools to cover revenue shortfall. Therefore, there is a possibility that these tools carry varying potential effects on the macroeconomic variables of interest (inflation) hence relative analysis is appropriate in selecting an optimal tool.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter provides the study research design, the target population, study variables descriptions, the specification of the study model, data sources, and data analysis steps.

#### **3.2 Research design**

The causal research design was employed to model the relationship between inflation and fiscal deficit financing in sub-Saharan African countries. The causal research design research was selected because it has the ability to build the cause-and-effect link between two or more variables under consideration. The study design determines the changes which occur to the dependent variable when the predictor variable changes (Kraft, 2018). In the case of the current study, the cause and effect of fiscal deficit financing tools on inflation are determined.

#### **3.3 Target population**

This study considered a group of 44 sub-Saharan African countries from 2005 to 2020. The whole sample (44 sub-Saharan African countries) was further subdivided into two groups, namely 20 low-income and 24 middle-income, for testing for empirical results' consistency and robustness. The list of sampled countries is provided in Appendix I.

#### **3.4 Variable measurement and data**

In analyzing fiscal deficit financing and inflation nexus, this study used the inflation (change in consumer price index) as the dependent variable while domestic and foreign borrowing were the main explanatory variables (deficit financing tools). Inflation was calculated as change in consumer price index by taking the prices of a basket/group of consumable goods and then compared to the previous period's price mostly over the year.

The consumer price index was selected as a measure for inflation since it reflects the variation in the cost of living and also easily calculated (Sarangi et al., 2022). The main independent variables are domestic and foreign borrowing, representing deficit financing tools. Foreign borrowing data collected was measured as the total debt stock as percentage

of gross domestic product. The external debt stock comprised of the total financial obligations owed to non-residents of a country, that are payable either in currency, in goods, or in form of services. The financial obligations owed to the country comprise public guaranteed debt, private nonguaranteed long-term debts, IMF and World Bank credits, and other short-term loans from non-residents (Nguyen et al., 2017). The study measured domestic borrowing as total public debt owed to lenders within the borrowing country, excluding shares issued and increases in equity. It includes credits obtained from local financial institutions such as banks and the issuance of government securities such as bonds and bills. This study used the percentage of total domestic debt in local currencies and divided it by the total GDP in that particular year. Other variables used by the current study are official development assistance, gross domestic product, capital formation, interest rate and exchange rate. This set of variables served as control variables in the analytical modeling. The official development assistance was measured as total grants equivalent less disbursement for private sector use, while the gross capital formation was measured as a country's total private investment as a percentage of gross domestic product. Real interest rate and exchange rate were measured as the observed market interest rate adjusted for inflation effect and local currency per unit US dollar.



**Table 3.1 Description of study variables**

| <b>Variable name</b>            | <b>Acronym</b> | <b>Variable description</b>            | <b>Measurement</b>         |
|---------------------------------|----------------|--|----------------------------|
| Inflation                       | CPI            | Consumer price index                   | Annual % change            |
| Domestic borrowing              | DB             | Net annual domestic borrowing          | Annual % of GDP            |
| Foreign borrowing               | FB             | Foreign borrowing                      | Annual % of GDP            |
| Official development assistance | ODA            | Official development assistance inflow | Annual % of GDP            |
| Gross domestic product          | GDP            | GDP growth                             | Annual % change            |
| Foreign Direct investment       | FDI            | Net FDI inflow                         | Annual % of GDP            |
| Capital formation               | CPF            | Gross domestic investment value        | Annual % of GDP            |
| Money supply                    | M2             | Broad money supply                     | Annual % of GDP            |
| Real interest rate              | RIR            | Real interest rate                     | Annual %                   |
| Exchange rate                   | EXR            | Local currency relative to 1 US dollar | Annual value per US dollar |

**Source:** Author 2023

### **3.5 Empirical model**

The data for this study was annual time serial and cross-sectional collected from World Development Indicators and World Economic Outlook databases. Some missing values of the data set in some countries were obtained from individual countries' central banks and [www.tradingeconomics.com](http://www.tradingeconomics.com) databases. All variables' data except foreign borrowing, domestic borrowing and foreign direct investment were collected directly from the databases. The data on three variables was calculated by expressing the annual value of the variable in local currency as percentage of GDP value. The sampled period was between 2005 and 2020 for 44 sub-Saharan African countries. Although there are long

panels for some countries, this study selected the period from 2005 to 2020 to have uniform coverage for all selected countries.

### 3.6 Data analysis

Following the Keynesian expenditure approach and the Fiscal Theory of Price Level, it can be deduced that inflation in an economy is a function of government spending financed through deficit financing tools (Bolarinwaa & Olubiyi, 2018). Through this proposition, the current study chose to build up on the analytical inflation model by Arif and Ali (2012). It specified the relationship between inflation and deficit financing as in Equation 3.1.

$$INF_t = f(FDF_t) \dots \dots \dots 3.1$$

This equation implies that fiscal deficit financing is inflationary. The extension of model 3.1 by including the main explanatory variables (deficit financing tools commonly used in developing countries as stated by Sutihar (2016) gave rise to Equation 3.2.

$$INF_{it} = (DB_{it}, FB_{it}) \dots \dots \dots 3.2$$

Where  $INF_{it}$  is the current inflation level,  $DB_{it}$  is domestic borrowing and  $FB_{it}$  is foreign borrowing. In further modeling, the study assumed that inflation is persistent, such that the previous period inflation level influences current period inflation, and the current inflation level is heterogeneous across countries. Equation 3.2 was then extended to include lagged inflation values and the study control variables to give Equation 3.3.

$$INF_{it} = (INF_{it-1}, DB_{it}, FB_{it}, Z_{it}) \dots \dots \dots 3.3$$

Where  $INF_{it-1}$  denotes previous period's inflation rate and  $Z_{it}$  represents a set of other variables supported by the theory as determinants of inflation, accounting for inflation heterogeneity between countries. The variables include; official development assistance, gross domestic product, foreign direct investment, nominal exchange rate, money supply, and real interest rate.

Theoretically, it is assumed that all explanatory variables included in this model is positively influence inflation level. Therefore, by including all study variables and their coefficients, this study specified Equation 3.4 as the final model for estimation.

$$INF_{it} = \beta_1 INF_{it-1} + \beta_2 DB_{it} + \beta_3 FB_{it} + \beta'_4 Z_{it} + \gamma_i + v_t + \varepsilon_{it} \dots \dots \dots \dots \dots \dots \dots \dots 3.4$$

The variables  $\gamma_i$  represents country fixed effect,  $v_t$  is the time effect variables and  $\varepsilon_{it}$  is error term. Including the lagged inflation rate on as predictor variable in the equation controls the previous period's inflation effect on the on the current.

To realize the first two objectives of this study, the two step system Generalized Method of Moments (GMM) by Blundell and Bond (1998) and Arellano and Bover (1995) model was selected as the empirical model of estimation. The model was chosen for its appropriateness when dealing with the following phenomena: First, it is appropriate when dealing with short panels, that is, the data with few time series and many cross-sectional units. Second, the model is appropriate when dealing with linear functional relationships between variables of interest and third, when dealing with one dependent variable, which is dynamic and depends on its past values (lagged values) and is not strictly exogenous. That is, the current values of variables are correlated with their past values or even current values of the error term. The GMM model also has an inbuilt dynamic structure that offers robust estimates and deals with endogeneity and fixed effects problems simultaneously while avoiding dynamic biases. The two-step system GMM was also preferred over the one-step and the different GMM due to its high efficiency. The model uses an orthogonality matrix condition which improves the GMM estimators by eliminating bias and squared errors.

From the specified model in Equation 3.4, the Arellano and Bond estimation was applied by transforming all regressors through taking the first difference and then applying the generalized method of moments (Roodman, 2009).

Equation 3.5 shows the GMM model for estimation.

$$\Delta INF_{it} = \beta_1 \Delta INF_{it-1} + \beta_2 \Delta DB_{it} + \beta_3 \Delta FB_{it} + \beta'_4 \Delta Z_{it} + \Delta \gamma_i + \Delta v_t + \Delta \varepsilon_{it} \dots \dots \dots 3.5$$

Where  $\Delta$  denotes the first difference operator. Taking the first difference as in Equation 3.5 removes the country-specific effects but, in the process, induces endogeneity between the disturbance term and the lagged dependent variable (Schultz et al., 2010). The inclusion of lagged values inflation as predictors variables accounts for the fact that inflation in one period causes inflation in the future because of sticky prices in the economy. Moreover, since including lagged inflation values might result in inconsistent estimates, the dynamic model generated in Equation 3.5 is best estimated using the system GMM model.

To deal with the induced endogeneity problem, Arellano and Bond (1991) and Blundell and Bond (1998) suggest using the generalized method of moments (GMM) approach. In this procedure, an endogenous explanatory variable is instrumented by its lagged values at levels or first difference. The problem of instrument proliferation is dealt with through the system using the matrix collapse option during analysis, as Roodman (2009) suggested.

To ascertain the consistency of the GMM estimators, the Arellano and Bond test for the first and second-order autocorrelation as well as the Sagan-Hansen test for instrument over-identification were used. To show that the model is free from the serial autocorrelation, the study sought to reject null hypothesis for first order autocorrelation AR(1) and fail to reject the null hypothesis for Arellano and Bond test (AR2) as well as the Sagan-Hansen test, as stated by Roodman (2009).

### **3.7 Scaling quantity analysis technique**

The third objective of the current study was to analyze the relative effect of deficit financing tools on inflation. To achieve the objective scaling quantity analysis test was used to measure the relative effect of the tools on inflation. The rationale for checking for the relative effect of fiscal deficit instruments is that most sub-Saharan African countries do not finance fiscal deficits using one tool in isolation of other tools. In most cases, countries use deficit financing tools simultaneously hence need to ascertain the relative importance of each one of them. The scaling quantity formula is presented as in Equation 3.6.

$$(S_I/S_D) * |\beta_i| \dots\dots\dots 3.6$$

Where,  $S_I$  is the standard deviation of the independent variable in this case domestic and foreign borrowing,  $S_D$  is the standard deviation for dependent variable (consumer price index) and  $|\beta_i|$  is the absolute value of the explanatory variable coefficient. According to Abai et al. (2019), the variable with the highest scaling quantity has the greatest impact on the macroeconomic variable of interest. This means that the debt financing tool that give a greater scaling quantity value is the most inflationary.

### 3.8 Diagnostic tests

To ensure robust results are obtained, this study conducted numerous pre-estimation diagnostic tests, including a unit root test, a heteroscedasticity test, and a cross-sectional dependency test.

#### 3.8.1 Panel test for unit root

Since most time series variables tend to be non-stationary in long-run, it was important to test for the presence of unit roots to prevent experiencing the problem of spurious regression results. The current study used a Fisher-type test to check whether the data used for the econometric modeling is stationery. One main advantage of the Fisher type is that it does not require the panel data to be balanced and allows time variables to have different lag lengths. In the current study, Fisher test was selected because the panel data collected was unbalanced. The Fisher-type test assumes a null hypothesis of panels being non-stationarity while the alternative hypothesis assumes that panels are stationary across countries (Khraief et al., 2020).

#### 3.8.2 Test for cross-sectional dependence

Due to increased economic and financial integration among countries, common economic shock, and other unobserved elements, it was important for this study to check whether the study variables cross-sectionally depended on each other among error terms at different times in the model. The main consequence of cross-sectional dependence

among panel data is inefficient estimators in the case of short panels as the number of cross-sections grows large (Sarafidis & Wansbeek, 2012). The Pesaran's CD test was used to test for this property between variables using the average absolute value of residual specification to deal with the type (I) error. The type (I) error in Persaran test arises from adding negative and positive correlations and then rejecting the null hypothesis even when there is plenty of evidence for cross-sectional dependency among residuals at different times (Hoyos & Sarafidis, 2006).

### **3.8.3 Multicollinearity test**

In statistics, multicollinearity refers to a situation where two or more explanatory variables tend to be highly correlated in a linear multiple regression model. When there is high multicollinearity in the linear regression model, the confidence interval widens, which produces less reliable results in terms of probability testing of the effect of the predictor variable on the variable to be predicted. Curto and Pinto (2011) provided a rule of thumb which states that incase of estimated variance inflation factors coefficient is greater than 10, then multicollinearity problem is a severe.

## **CHAPTER FOUR**

### **RESEARCH FINDINGS AND DISCUSSIONS**

#### **4.1 Introduction**

This chapter presents the research findings discussions as per the study objectives.

#### **4.2 Relationship between deficit financing and inflation pre-estimation tests**

The main tests conducted by the current study were descriptive analysis, panel stationery test and correlation analysis.

##### **4.2.1 Descriptive statistics results**

The results in Table 4.1 show a summary of descriptive statistics of the deficit financing tools and inflation. The results show that all variables have large standard deviations, implying weak stability. Similarly, the difference between maximum and minimum values is large, suggesting heterogeneity in the sampled data. Therefore, the dynamic GMM model by Arellano and Bond (1991) was selected as an appropriate analytical model because it accounts for random and fixed effects simultaneously, which is common in panel data with the possibility of heterogeneity across countries.

Additionally, it is clear from this table that domestic borrowing has a mean value of 25.44 while foreign borrowing has a mean value of 42.42, suggesting that foreign borrowing accounts for the majority of sub-Saharan African countries' fiscal deficit. The inflation rate has a maximum value of 557.28, the minimum as -72.73, and the average as 8.25, implying that inflation in sub-Saharan African countries is dissimilar.

**Table 4.1 Analysis of variables descriptive statistics**

| Variable name | Observations | Mean   | Std. Dev. | Min    | Max     |
|---------------|--------------|--------|-----------|--------|---------|
| INF           | 693          | 8.25   | 25.49     | -72.73 | 557.20  |
| ODA           | 673          | 8.13   | 8.67      | .003   | 92.14   |
| FB            | 717          | 42.43  | 38.83     | .46    | 497.93  |
| GDP           | 709          | 4.14   | 4.64      | -36.39 | 20.72   |
| DB            | 683          | 25.45  | 22.23     | -23.20 | 142.64  |
| CPF           | 702          | 23.37  | 10.45     | -3.94  | 79.40   |
| M2            | 682          | 32.94  | 22.19     | 4.53   | 163.84  |
| RIR           | 597          | 8.21   | 11.08     | -79.81 | 65      |
| EXR           | 699          | 713.49 | 1396.65   | 0.91   | 9829.93 |

**Source:** Author's computation 2023

#### **4.2.2 Panel test for stationarity**

A Fisher-type test was used to check whether the variables used in the model were stationarity. This test was conducted because time series data is usually analyzed in terms of trends, which are usually non-stationary. The test was conducted for all variables at level form with zero lags and found that all except domestic borrowing and money supply were stationary. Non-stationary variables were then transformed to their first difference to become stationary.

The Fisher-type test for beta is based on the augmented Dickey-Fuller test and it gives the null hypothesis for the test as all panel are non-stationary panels, while the alternative hypothesis states that at least one of the panel is stationary. The test's null hypothesis is expected to be rejected if all test statistics are less than 1%, 5% and 10% probability values. Table 4.2 shows stationarity test results for this study's variables.



**Table 4.2 Stationarity test results**

| Variable | Lags | Number of panels | P-value (L*) | P-value (P) | P-value (Z) | P-value (Pm) |
|----------|------|------------------|--------------|-------------|-------------|--------------|
| ln.INF   | 0    | 44               | 0.000        | 0.000       | 0.000       | 0.000        |
| ODA      | 0    | 44               | 0.000        | 0.000       | 0.000       | 0.000        |
| FB       | 0    | 44               | 0.000        | 0.000       | 0.004       | 0.000        |
| DB       | 0    | 44               | 0.032        | 0.982       | 0.921       | 0.036        |
| dDB      | 0    | 43               | 0.001        | 0.000       | 0.000       | 0.0005       |
| GDP      | 0    | 44               | 0.000        | 0.000       | 0.000       | 0.000        |
| CPF      | 0    | 42               | 0.009        | 0.054       | 0.042       | 0.005        |
| M2       | 0    | 44               | 0.914        | 0.921       | 0.912       | 0.907        |
| dM2      | 0    | 44               | 0.000        | 0.000       | 0.000       | 0.000        |
| RIR      | 0    | 43               | 0.000        | 0.000       | 0.000       | 0.000        |
| EXR      | 0    | 44               | 0.597        | 0.999       | 0.998       | 0.614        |
| dEXR     | 0    | 44               | 0.000        | 0.000       | 0.000       | 0.000        |

**Source:** Author's computation. Note, ln.INF is the natural logarithm of consumer price index. The variables, dDB, dM2 and dEXR are the first difference forms of, domestic borrowing, money supply and exchange rate respectively.

#### 4.2.3 Correlation analysis

This study's correlation analysis results are presented in Table 4.3. According to Akoglu (2018), correlation problem is severe if pairwise correlation coefficient is close to +1 and -1 while the pairwise correlation coefficient values close zero signifies no correlation problem between variables under consideration. The study findings as presented in Table 4.3 provides all variables with pairwise correlation rho values less than 0.5, implying that there no serious correlation problem between independent variables and hence can suitably be used in multivariate regression analysis.

**Table 4.3 Pearson correlation for independent variables**

| Variables | ODA    | FB     | dDB    | GDP    | dM2   | CPF   | RIR   | dEXR  |
|-----------|--------|--------|--------|--------|-------|-------|-------|-------|
| ODA       | 1.000  |        |        |        |       |       |       |       |
| FB        | -0.408 | 1.000  |        |        |       |       |       |       |
| Ddb       | -0.304 | 0.306  | 1.000  |        |       |       |       |       |
| GDP       | 0.114  | -0.222 | -0.185 | 1.000  |       |       |       |       |
| dM2       | 0.028  | 0.044  | 0.336  | -0.135 | 1.000 |       |       |       |
| CPF       | -0.107 | 0.167  | 0.117  | 0.020  | 0.006 | 1.000 |       |       |
| RIR       | 0.044  | 0.008  | 0.115  | 0.018  | 0.152 | 0.088 | 1.000 |       |
| Dexr      | 0.157  | -0.005 | 0.025  | -0.029 | 0.017 | 0.002 | 0.089 | 1.000 |

**Source:** Author's computation

### **4.3 Fiscal deficit and inflation among sub-Saharan African countries regression analysis**

Most sub-Saharan African countries analyzed in this study have continued to suffer from social and political instability, which has affected their development for a long time. Thus, in addition to the main analytical model of 44 sub-Saharan African countries, the current study also divided the countries into two groups, namely middle and low-income countries and analyzed them separately to test the robustness of the obtained results from the main analytical model. The classification by income level followed World Bank's 2020 classification, based on the countries' gross national income per capita. Sub-Saharan African countries are classified into three income groups in regard to country's gross national income per capita. This includes high-income economies whose per capita GNI is from \$12,535 and above, middle-income economies whose per GNI capita ranges from \$1,036 and \$12,535, and lower-income countries whose per capita GNI income is between \$1,036 and below. The year 2020 was selected as the reference year for the classification. The distribution of countries following their level of GNI per capita is presented in Appendix II.

### **4.3.1 Fiscal deficit financing and inflation in 44 sub-Saharan African countries-GMM analysis**

The system GMM result for the 44 sub-Saharan African countries is presented in Table 4.4. In this estimation technique, the main predictor variables are domestic borrowing (dDB) and foreign borrowing (FB), representing deficit financing tools, while the consumer price index at level was the dependent variable. Other variables in the model included lagged inflation (l.lnCPI), official development assistance, capital formation (CPF), real interest rate (RIR), money supply (dM2), gross domestic product (GDP) and exchange rate (dEXR). This set of variables served as control variables, accounting for price rigidity in the economy and individual country-specific effects.

The results in Table 4.4 presents the ordinary least square model (OLS) and fixed effect model (FEM) estimated results in second and third columns respectively, while the fourth and fifth columns represent the two-step difference(DIF-GMM) and system GMM (SYS-GMM) results. Both GMM estimators are two-step, hence asymptotically more efficient than the one-step GMM estimators. However, the analysis considered the system GMM as the final model for analysis. The selection of the system GMM model was validated by the fact that the difference GMM model is sometimes downward biased, especially when the time series (T) is small as stated by the Blundell and Bond (1998) study.

According to Bond et al. (2001), in case of variable omission, the difference GMM model when used it tends to give estimates of the lagged variable, which has either an upward or downward bias. The OLS estimation gives estimates that have an upward bias, while the fixed effect model gives the estimates which are downward bias creating the upper and lower bound estimator. The true sample estimator's coefficient is therefore expected to lie between the two bounds to reflect the true population estimator.

**Table 4.4 Model estimation results in the 44 sub-Saharan African countries**

| Variable name                   | OLS                | FEM                | DIF-GMM            | SYS-GMM            |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|
| ln.Infltaion(-1)                | .576***<br>(0.000) | .150**<br>(0.001)  | .153**<br>(0.010)  | .362***<br>(0.000) |
| Domestic borrowing (d)          | .016**<br>(0.044)  | .311<br>(0.146)    | 146**<br>(0.010)   | .241*<br>(0.013)   |
| Foreign borrowing               | .0002<br>(0.157)   | .001**<br>(0.013)  | .008**<br>(0.026)  | .069**<br>(0.002)  |
| Official development assistance | .010**<br>(0.021)  | .020**<br>(0.005)  | .068**<br>(0.012). | .061**<br>(0.003)  |
| Capital formation               | -.002**<br>(0.032) | -.0003<br>(0.945)  | -.025**<br>(0.029) | -.323**<br>(0.000) |
| Real interest rate              | -.001*<br>(0.083)  | -.018**<br>(0.001) | -.042**<br>(0.001) | -.033*<br>(0.003)  |
| Money supply (d)                | .030**<br>(0.024)  | .024**<br>(0.053)  | .032<br>(0.743)    | .0150<br>(0.171)   |
| Gross domestic product          | -.002<br>(0.831)   | .007<br>(0.441)    | .035**<br>(0.048)  | .052**<br>(0.006)  |
| Exchange rate (d)               | .0006<br>(0.143)   | .0009*<br>(0.059)  | .0001<br>(0.109)   | .0009<br>(0.144)   |
| AR(1)                           |                    |                    | 0.012              | 0.009              |
| AR(2) test                      |                    |                    | 0.527              | 0.386              |
| Sagan test                      |                    |                    | 0.551              | 0.514              |

\*\*\*, \*\* and \* denote 1%, 5% and 10% level of significance respectively. OLS, FEM, DIF-GMM and SYS-GMM represents ordinary least squares, fixed effect model, difference GMM model, and system GMM model respectively. The syntax used for estimating GMM model is xtabond2 (Roodman, 2009). Both GMM estimators are two-step.

In order to choose between the system and difference GMM models, Bond et al. (2001) proposed the following steps to be followed. First, is to run a pooled OLS model and determine the upper bound. Second the fixed estimation model is estimated and the lower bound of estimation determined. The lower and upper bound follow from the coefficients of lagged dependent variables. The third step is to run a difference GMM and determine the coefficient as well. The difference GMM is unsuitable if the model' lagged value estimator is below or closely above that of fixed effect model (lower bound). In this case the difference GMM model is said to be suffering from a downward bias problem.

From the results presented in Table 4.4, the OLS model has an upper bound lagged inflation estimate as 0.576 significant while the fixed effect lower bound estimate is 0.150 equally significant. The difference GMM estimator for the lagged dependent variable is 0.153 which is significant and is close to the fixed effect model estimator implying that the difference GMM is biased downward. The system GMM was then estimated which gave the lagged dependent variable estimator of 0.362 which lies between the upper and lower bounds.

The GMM estimation procedure employed also detected that the money supply and lagged inflation variables were endogenous, thus used them in GMM style, while capital formation, GDP growth, and real interest rate value were exogenous and hence used as instruments in the IV-style.

The system GMM analysis estimation for the 44 sub-Saharan African countries show that fiscal deficit financing is inflationary. The results provide the domestic borrowing ( $\beta = 0.241, p = 0.013$ ) and foreign borrowing ( $\beta = 0.69, p = 0.002$ ) both with a positive and significant effect on inflation. This implies that holding any other factor constant, one unit change in the value of domestic borrowing as percentage of GDP increases inflation by 0.241 units while foreign borrowing increases inflation by 0.159 units on average. Similarly, lagged inflation ( $\beta = 0.362, p < 0.001$ ), official development assistance ( $\beta = 0.061, p = 0.003$ ), money supply ( $\beta = 0.150, p = 0.171$ ), GDP growth ( $\beta = 0.052, p = 0.006$ ) and exchange rate ( $\beta = 0.0009, p = 0.144$ ) positively influence inflation in region, although the effect of money supply and exchange rate are insignificant. On the other hand, capital formation ( $\beta = -0.323, p < 0.001$ ) and real interest rates ( $\beta = -0.033, p = 0.003$ ), were found to have a negative and significant effect on inflation in the region over the period.

The study's empirical findings support the work of scholars such as Aladejare (2022), Fasanya and Fajobi (2021), and Bolarinwaa and Olubiyi (2018), who found a positive relationship between public debt, foreign and domestic borrowing and inflation. These studies propose that using foreign

and domestic borrowing in financing fiscal deficit causes price fluctuation in the long run. For instance, Aladejare's (2022), who studied deficit financing, capital formation and inflation in Nigeria stated that the inflationary effect of debt financing in the country was due to the debt burden different government regimes have brought since the 1970s. In Nigeria, various government regimes in the country kept justifying the need for borrowing to stimulate economic growth and investment in infrastructure. The debt burden in the economy was normally financed through an inflationary tax, which led to increase in the domestic price levels. Fasanya and Fajobi (2021), also state that deficit financing causes inflation, because much of the inflation among developing countries is both homemade and foreign such that both local and foreign borrowing causes inflation. Bolarinwaa and Olubiyi (2018) also suggest that depending on how the government decides to spend the borrowed funds, inflation either arises or not. For instance, if the government chooses to finance recurring expenditures through borrowing, it increases the money circulation in the short run, causing inflation. The action also creates a debt burden in the long run that is financed by tax revenue, further causing inflation. The study also suggests that inflation in the economy tends to be persistent such that current inflation can influence the future or previous year inflation has an effect on the current as indicated by the lagged inflation.

The current study also found that lagged inflation rate, official development assistance and GDP growth positively influence inflation. This is in support of the works of researchers such as Umaru and Zubairu (2012), Nguyen (2015), Arif and Ali (2012), and Moreira (2019). For instance, a study by Nguyen (2015) stated that an increase in aggregate demand due to welfare rise due to economic growth is the source of inflation in most developing economies. Umaru and Zubairu (2012) on the other hand argue that inflation in an economy causes economic growth by encouraging productivity based on the evolution of total factor productivity. As the economic growth is stimulated, it results into an increase in the income per capita which raises aggregate demand and further causing inflation. Sethi et al. (2019), also state that development assistance/foreign aid causes inflation because much of it is channeled into countries to promote social welfare through alleviating hunger, and fighting diseases. The increase in domestic aggregate demand due foreign aid inflow exerts an upward pressure on the price level.

The negative relationship between capital formation (private investment) and real interest rate and inflation is also supported the studies as Aimola and Odhiambo (2021) who found that capital formation (private investment) and real interest rate negatively influences inflation. This study argues that an increase in private investment raises the output in the country availing goods and services for consumption hence lowering demand pull pressure thus lowering the price level. Similarly, interest rate growth stimulates national saving, which reduces aggregate consumption, which also exerts a downward pressure on the price level (inflation). According to (Okwoche & Iheonu, 2021) the relationship between interest rate and inflation is more of a theoretical relationship such that as interest rate increases, borrowing becomes expensive thus people stop borrowing to spend lowering the aggregate demand and inflation.

The validity of the GMM estimation model's estimates was tested using Arellano-Bond and the Sargan-Hansen post-estimation tests. The former tested for the problem of autocorrelation, while the latter tested for the endogeneity phenomenon in the model. The Arellano-Bond test has a null hypothesis, which provides that both first and second-order serial autocorrelation are absent in the model, while the Sargan-Hansen test has a null hypothesis of joint validity of instruments, that is, the used model instruments are uncorrelated with the error term. Both tests are not to be rejected to confirm the suitability of the model estimates. According to Asongu et al. (2020), while the first-order autocorrelation test (AR1) can be ignored, the emphasis is given to the second-order test (AR2) since it can detect autocorrelation in difference. This hypothesis is strictly not to be rejected (Okwoche & Iheonu, 2021).

The estimation results in Table 4.4 fail to reject the null hypotheses with the Arellano-Bond (AR2)  $p=0.386 > 0.05$  test as well as the Sargan-Hansen test for GMM validity of instruments at a  $p$ -value  $0.514 > 0.05$  from Table 4.4 column five. These results imply that the estimation results obtained are suitable. The first-order autocorrelation AR(1) ( $p=0.009 < 0.05$ ) is significant implying that the first-order autocorrelation is present in the study model. The presence of first-order autocorrelation is expected due to the inclusion of lagged dependent variables in the model which may cause first-difference errors to be related (Saini & Singhania, 2018). This analysis results, therefore, mean that the model

does not have an autocorrelation problem and all assumptions of over-identification are valid as expected by the GMM assumptions.

#### 4.3.2 Fiscal deficit financing and inflation among 24 middle income countries sample in sub-Saharan African region

The GMM estimation result for the 24 middle-income countries in the sub-Saharan African region is presented in Table 4.5.

**Table 4.5 GMM estimation for 24 middle-income countries sub-Saharan Africa**

| Variable name                   | OLSM               | FEM                 | DIF-GMM             | SYS-GMM             |
|---------------------------------|--------------------|---------------------|---------------------|---------------------|
| ln. Inflation(-1)               | .633***<br>(0.000) | .140**<br>(0.023)   | .164**<br>(0.006)   | .453**<br>(0.001)   |
| Domestic borrowing (d)          | .236<br>(0.624)    | .212<br>(0.792)     | .359**<br>(0.021)   | .496***<br>(0.001)  |
| Foreign borrowing               | .007*<br>(0.055)   | .003**<br>(0.015)   | .002<br>(0.610)     | .023**<br>(0.002)   |
| Official development assistance | .006*<br>(0.086)   | .044**<br>(0.006)   | .048**<br>(0.002)   | .024<br>(0.104)     |
| Capital formation               | -.003*<br>(0.089)  | -.0005**<br>(0.046) | -.007**<br>(0.044)  | -.016***<br>(0.000) |
| Real interest rate              | -.005<br>(0.285)   | -.019**<br>(0.002)  | -.040***<br>(0.000) | -.043***<br>(0.000) |
| Gross domestic product          | -.005<br>(0.301)   | -.018<br>(0.129)    | .0037*<br>(0.057)   | .081**<br>(0.006)   |
| Exchange rate (d)               | .0009<br>(0.234)   | .0004<br>(0.546)    | .007<br>(0.130)     | .005<br>(0.232)     |
| Money supply (d)                | -.023*<br>(0.082)  | -.016<br>(0.204)    | .196**<br>(0.044)   | .122***<br>(0.001)  |
| AR(1) test                      |                    |                     | 0.015               | 0.002               |
| AR(2) test                      |                    |                     | 0.652               | 0.283               |
| Sagan test                      |                    |                     | 0.414               | 0.431               |

\*\*\*, \*\* and \* represent 1%, 5% and 10% significance levels. OLS, FEM, DIF-GMM and SYS-GMM represents ordinary least squares, fixed effect model, difference GMM model, and system GMM model respectively. Both GMM estimators are two-step

This estimation model used similar variables as in the previous model, and just as the whole sample result, the finding from Table 4.5 shows that fiscal deficit financing among middle-income countries in the sub-Saharan African region is inflationary. This is implied by the positive significant coefficients of domestic borrowing ( $\beta = 0.496$ ,  $p=0.001$ ) and



foreign borrowing ( $\beta = 0.023$ ,  $p = 0.002$ ). Similarly, lagged inflation ( $\beta = 0.453$ ,  $p = 0.001$ ), gross domestic product ( $\beta = 0.081$ ,  $p = 0.006$ ), and broad money supply ( $\beta = 0.122$ ,  $p = 0.001$ ) positively influence inflation in the region. Official development assistance ( $\beta = 0.024$ ,  $p = 0.104$ ) and exchange rate ( $\beta = 0.005$ ,  $p = 0.232$ ) also have a positive effect on inflation, although their effects are statistically insignificant. This analysis also found that real interest rate ( $\beta = -0.043$ ,  $p < 0.001$ ) and capital formation ( $\beta = -0.016$ ,  $p < 0.001$ ) were also found to influence inflation level negatively in this group of countries just as in the whole sample case.

The analysis for the middle-income countries was also subjected to a relevant GMM post-estimation test. The Arellano-Bond and Sargan-Hansen post-estimation tests confirmed the validity of the estimates obtained. The results for the post-estimation analysis confirm the suitability of the estimates by failing to reject both the Arellano-Bond and Sargan-Hansen post-estimation tests. These tests provided AR (2) ( $p = 0.283 > 0.05$ ) and the Sargan-Hansen test ( $p = 0.431 > 0.05$ ) which in both cases led to the null hypothesis being not rejected. This model does not suffer from autocorrelation and that the assumption of instrument identification is valid. The AR(1) ( $0.001 < 0.005$ ) test is also significant as expected. The system GMM selected is validated by the fact that the difference GMM model suffers from downward bias problem implied by the estimated coefficient of lagged inflation rate ( $\beta = .164$ ) which is close to the fixed effect model estimate ( $\beta = .140$ ).

#### **4.3.3 Fiscal deficit financing and inflation among 20 low income countries**

A similar analysis for low-income countries was done on the nexus between deficit financing and inflation, and the findings are presented in Table 4.6. In this group of countries, just like in the previous two groups of the whole sample and the middle-income countries, fiscal deficit financing is inflationary. This is indicated by the positive and statistically significant effect of domestic borrowing ( $\beta = .027$ ,  $p = 0.041$ ) and foreign borrowing ( $\beta = .009$ ,  $p = 0.039$ ) on inflation.

**Table 4.6 GMM for the 20 low-income countries in sub-Saharan Africa**

| Variable name                   | OLS                | FEM                 | DIF-M              | SYS-M              |
|---------------------------------|--------------------|---------------------|--------------------|--------------------|
| ln. Inflation(-1)               | .536***<br>(0.000) | .154**<br>(0.072)   | .193**<br>(0.023)  | .371***<br>(0.001) |
| Domestic borrowing (d)          | .006*<br>(0.082)   | .006*<br>(0.085)    | .147**<br>(0.009)  | .027**<br>(0.041)  |
| Foreign borrowing               | .004*<br>(0.099)   | .009<br>(0.586)     | .008**<br>(0.021)  | .009**<br>(0.039)  |
| Official development assistance | .0152**<br>(0.014) | .010<br>(0.291)     | .064**<br>(0.008)  | .051***<br>(0.000) |
| Capital formation               | .004<br>(0.035)    | .002<br>(0.084)     | -.007<br>(0.110)   | .034<br>(0.107)    |
| Real interest rate              | .004<br>(0.489)    | -.034***<br>(0.000) | -.021<br>(0.166)   | .016**<br>(0.001)  |
| Money supply (d)                | .130**<br>(0.002)  | .201*<br>(0.094)    | .086**<br>(0.022)  | .032***<br>(0.000) |
| Gross domestic product          | .010<br>(0.608)    | .009<br>(0.615)     | .049**<br>(0.034)  | .029**<br>(0.018)  |
| Exchange rate (d)               | .0005**<br>(0.045) | .0002<br>(0.475)    | .0002**<br>(0.007) | .001***<br>(0.000) |
| AR(1)                           |                    |                     | 0.042              | 0.026              |
| AR(2) test                      |                    |                     | 0.302              | 0.352              |
| Sagan test                      |                    |                     | 0.611              | 0.716              |

\*\*\*, \*\* and \* denote 1%, 5% and 10% significance levels respectively. OLS, FEM, DIF-GMM and SYS-GMM represents ordinary least squares, fixed effect model, difference GMM model, and system GMM model respectively. Both GMM estimators are two-step

Lagged inflation rate ( $\beta=.371$ ,  $p=0.001$ ), gross domestic product ( $\beta=.029$ ,  $p=0.018$ ), exchange rate ( $\beta=.001$ ,  $p<0.001$ ), official development assistance ( $\beta=.051$ ,  $p<0.001$ ) and money supply ( $\beta=.032$ ,  $p<0.001$ ) equally have a positive and significant effect on inflation in this group of countries.

Capital formation ( $\beta=.034$ ,  $p=0.049$ ) and interest rate ( $\beta=.016$ ,  $p=0.001$ ), also have a positive effect on inflation, as opposed to the negative effect found in the analysis of the 44 sub-Saharan African countries and the 24 middle-income countries. This is because it is perceived that the income earned in the countries is just enough for consumption; hence an increase in interest rate cannot stimulate national savings to reduce consumption and inflation. Similarly, a rise in capital formation (private investment) raises aggregate

income for capital owners, yet output does not grow too much the growth in the aggregate demand thus creating inflation. This is a common phenomenon when capital formation (domestic investment) is dependent on the interest rate such that during high inflation periods, the interest rate becomes weaker thus not encouraging investment (Okwoche & Iheonu, 2021).

The Arellano-Bond test for the serial autocorrelation and the Sargan-Hansen test for endogeneity phenomenon was also conducted on these estimated results. Both post-estimation tests are satisfied (AR(2)  $p=0.256 > 0.05$ ) and Sargan-Hansen, ( $p=0.806 > 0.05$ ) implying that the model has no second-order autocorrelation problems and that the instruments employed by the model are valid. The test for first-order autocorrelation (AR(1),  $p=0.047$ ) is equally significant as expected and system GMM model selection over the difference model is also justified since the latter suffers from downward biases.

#### **4.3.4 Multi-collinearity tests**

The test for multicollinearity among the predictor variables used in the main GMM estimation model for the 44 sub-Saharan African countries was done by the variance inflation factor (VIF). This test is important because it makes the estimated coefficients parameters to be precise estimators of the population coefficients. Table 4.7 provides the multicollinearity test results. From Table 4.7 the test results give the variance inflation factor ranging from 1.06 to 1.48 with a mean VIF of 1.25, implying no severe multicollinearity problem. This means that the explanatory variables used in this model can be combined in a multiple linear regression model without influencing each other's test power.

**Table 4.7 Multi-collinearity tests**

| Variable | VIF | 1/VIF |
|----------|-----|-------|
|----------|-----|-------|

|          |      |       |
|----------|------|-------|
| l.lnCPI  | 1.08 | 0.925 |
| ODA      | 1.48 | 0.675 |
| FB       | 1.46 | 0.684 |
| RIR      | 1.06 | 0.944 |
| CPF      | 1.07 | 0.934 |
| GDP      | 1.08 | 0.923 |
| Ddb      | 1.36 | 0.742 |
| dM2      | 1.20 | 0.836 |
| Mean VIF | 1.25 |       |

**Source:** Author's computation.

#### 4.3.5 Panel cross-sectional dependency test

The Pesaran CD test was conducted to check whether errors are cross-sectionally dependent in this study. The test was chosen because it does not necessarily need the panel data to be strongly balanced, which suits our data set. This test provides a null hypothesis of no inter-dependency across residual country variables which ought not to be rejected. The alternative hypothesis provides the evidence of cross-sectional dependence across individuals/countries (Alsayed, 2021). From Table 4.8, this study fails to reject the null hypothesis as expected estimated errors are not cross-sectionally dependent at a test statistic of 0.525 and a probability value of 0.6. This means there is no correlation in error terms between countries hence the model generates guaranteeing efficient estimation parameters using the data set.

#### **Table 4.8 Pesaran CD test results**

H0: Errors are not cross-sectional dependent.

CD statistic = 0.525

CD p-value = 0.600

**Source:** Author's computation

#### **4.4 Test for relative effect of deficit financing tools on inflation among 44 sub-Saharan countries**

For policy a maker choosing between foreign and domestic deficit financing is not just clear-cut but rather based on performance and role of some market variables such as interest rate, debt repayment period, and options, among others. For instance, one main macroeconomic difference between foreign and domestic debt financing which influences choices of financing is that in the short-run, when the government borrows from domestic sources it raises interest rates which crowds out private investment. Foreign borrowing in the short run does not have such effects, although the continuous accumulation of foreign debt increases the debt repayment cost, which hinders economic development (Saungweme & Odhiambo, 2021). Similarly, a high-interest rate (above international rates) charged by local lenders serve as an incentive for most developing countries to go for foreign borrowing.

The foreign debt problem among developing countries, especially in Africa and the sub-Saharan African region, however, arises from overdependence on commodity exports. Commodity exports are easily affected by the sluggish aggregate demand response and exchange rate volatility, which increase the cost of debt repayments in foreign currencies. High foreign debt levels can also frighten local and international investors in the country due to the fear of future increase in taxes to pay off debt. This will in turn has a negative impact on the country's macroeconomic variables, especially economic growth (Culpeper & Kappagoda, 2016).

The varying effect of debt instruments on the macroeconomic variables especially among developing countries such as sub-Saharan African countries have made striving to strike a balance between various deficit financing options to become a subject of great interest the recent past (Culpeper & Kappagoda, 2016). It was therefore necessary for this study to determine the relative effect deficit financing tool on inflation. The relative effect of these tools on inflation, and the results are presented in Table 4.9. The scaling quantity analysis techniques were used for this purpose which suggests that the variable with the largest absolute scaling quantity values is the most inflationary.

**Table 4.9 Scaling quantity analysis**

| Variable           | $S_d$  | $S_i$  | $ \beta_i $ | $(S_i/S_d) *  \beta_i $ |
|--------------------|--------|--------|-------------|-------------------------|
| CPI (Inflation)    | 25.487 |        |             |                         |
| Foreign borrowing  |        | 38.829 | .069        | 0.105                   |
| Domestic borrowing |        | 22.233 | .241        | 0.210                   |

**Source:** Author's computation based on regression analysis and descriptive statistics results.

From Table 4.9, domestic borrowing has a scaling quantity value of 0.210, while foreign borrowing has a scaling quantity value of 0.105, implying that domestic borrowing financing causes more inflation than foreign borrowing. This is expected since too much domestic borrowing crowds out domestic investment from the private sector, which hinders economic growth and causes a reduction in aggregate supply, thus putting upward pressure on the price of commodities. Similarly, a relatively low effect of foreign debt on inflation could be that most African debt has been from international monetary institutions such as IMF and World Bank, which provide prescribed conditions on using borrowed funds to minimize wastage (Thomson et al., 2017).

## **CHAPTER FIVE**

### **SUMMARY CONCLUSIONS AND POLICY IMPLICATIONS**

#### **5.1 Introduction**

This chapter summarizes the study, provides conclusion, policy implications as well as suggestions for future studies.

#### **5.2 Summary of findings**

The current study sought to analyze effect of fiscal deficit financing on inflation in sub-Saharan Africa and assessed whether the mode of financing fiscal deficit selected in a country matters on the inflation level realized. The study used consumer price index as the dependent variable while foreign and domestic borrowing (deficit financing tools) were the main independent variables. Other variables in the model included; lagged inflation rate official development assistance, capital formation (domestic investment), real interest rate, money supply, gross domestic product and exchanger rate. In line with the first two objectives, the obtained results confirm the hypothesis that fiscal deficit financing is inflationary. This is evidenced by a positive significant relationship between domestic and foreign borrowing on inflation in the pooled group of 44 sub-Saharan African countries as well as in the sub-groups of 20 low and 24 middle-income countries.

Likewise, lagged inflation, official development assistance, money supply, gross domestic product and exchange rate were found to have a positive effect on inflation across all groups of countries. Although the effect of exchange rate is insignificant for the group of 44 and 24 countries analysis while money supply and official development assistance were also insignificant in the group of 44 and 24 countries analysis respectively. Capital formation and real interest rate on the hand had a negative effect on inflation in the pooled groups analysis as well as in the middle-income countries (24 counties sample) and positive for the low income countries (20 countries sample). The effect of capital formation is however insignificant for the low income countries data set.

In order to realize the third objective, the current study employed scaling quantity analysis to assess the relative effect of fiscal deficit financing tools on inflation. The rationale for

conducting the test is that most governments formulate and implement fiscal policies simultaneously. Therefore, there is a possibility that one deficit financing tool would have more impact on macroeconomic stability than the other, hence the need to ascertain the relative effect for optimal policy decisions (Abai et al., 2019). From the scaling quantity results in Table 4.9, domestic borrowing has a higher scaling quantity value at 0.210 against 0.105 for the foreign borrowing meaning that it domestic borrowing causes more inflation than foreign borrowing in an economy whenever the two are used to finance fiscal deficit.

### **5.3 Conclusions**

This study examined the effect of fiscal deficit financing on inflation among sub-Saharan African countries and determined whether the mode of financing deficit selected matters on the level of inflation realized. Following the results, the current study concluded that fiscal deficit (domestic and foreign borrowing) positively influences inflation, as stated by the Fiscal Theory of Price Level. The study further concludes that the inflationary effect of deficit financing tools varies from one tool to another, and domestic borrowing causes more inflationary than foreign borrowing when used by the government to cover the revenue shortfall.

### **5.4 Policy implications**

This study puts forward the following policy recommendation based on its findings. First, governments in the region need to control fiscal deficit through prudent fiscal policies that minimize resource wastage by controlling government expenditures to keep fiscal deficit in these countries as low as possible. Second, this study recommends sub-Saharan African countries to reduce on the domestic debt composition of public debt. This is because excessive domestic borrowing crowds out private investment, reduces productivity and aggregate supply, thus causing more inflation. Third, since capital formation and real interest rates reduce inflation, governments should consider increasing domestic private investment (capital formation) to increase the capital base. This will reduce the need for excessive borrowing hence lowering inflation. Policy makers should also consider increasing interest rate to encourage national saving which broadens a country's financial



base and avails financial resources for domestic investment. Lastly, this study found that real interest rate and exchange rate have positive and significant effect on inflation among low income countries. Therefore, this study recommends low countries to control exchange rate as well as interest rate to reduce the effect on inflation.

### **5.5 Suggestions for future studies**

The current study analyzed the effect of fiscal deficit financing on inflation while considering domestic and foreign borrowing as the main independent variable and determined the relative impact of these variables on inflation. Future studies are urged to determine the optimal level of fiscal deficit below which deficit financing will be macroeconomic goal enabling. Similarly, the current study used annual data set, which takes the average values of variables under consideration. The variable measurement of this kind might not capture well inter-month fluctuation that can play an essential role in influencing inflation from time to time. Future studies can also duplicate the current research but use either monthly or quarterly datasets to check whether the results hold.

## REFERENCES

- Abai, U., Itoro, Daniel, & Ekere. (2019). Fiscal Policy, Monetary Policy and Economic Growth in Sub-Saharan Africa. *University of Uyo*, 91950. <https://ideas.repec.org/p/pramprapa/91950.html>.
- Afful, K. B. (2021). Economies Financial structure gap and bank lending-deposit rate spread in Sub-Saharan Africa : a panel analysis. *Macroeconomics and Finance in Emerging Market Economies*, 00(00), 1–19. <https://doi.org/10.1080/17520843.2021.2012966>.
- Ahmad, M. J., Sheikh, M. R., & Tariq, K. (2012). Domestic Debt and Inflationary Effects: An Evidence from Pakistan. In *International Journal of Humanities and Social Science* (Vol. 2, Issue 18). [www.ijhssnet.com](http://www.ijhssnet.com).
- Aimola, A. U., & Odhiambo, N. M. (2021). Public debt and inflation nexus in Nigeria: An ARDL bounds test approach. *Cogent Economics and Finance*, 9(1). <https://doi.org/10.1080/23322039.2021.1921905>.
- Akoglu, H. (2018). User's guide to correlation coefficients. *Turkish Journal of Emergency Medicine*, 18(3), 91–93. <https://doi.org/10.1016/j.tjem.2018.08.001>.
- Akyüz, Y. (2017). Global Economic Prospects: In *The Financial Crisis and the Global South* (Issue June). <https://doi.org/10.2307/j.ctt183pb3w.5>.
- Aladejare, S. A. (2022). Deficit Financing Components, Inflation and Capital Formation in Nigeria: Evidence from a Direct and Indirect Analysis. *Asian Journal of Economic Modelling*, 10(1), 27–42. <https://doi.org/10.55493/5009.v10i1.4454>.
- Alagidede, P., Mensah, J. O., & Ibrahim, M. (2018). Optimal Deficit Financing in a Constrained Fiscal Space in Ghana. *African Development Review*, 30(3), 291–303. <https://doi.org/10.1111/1467-8268.12337>.
- Alper, C. E., Fund, I. M., Berument, M. H., Dibooglu, S., & Erlat, H. (2002). Inflation and Disinflation in Turkey. *May* 2014. <https://ideas.repec.org/b/zbw/esmono/110203.html>.
- Altaee, H. H. A., & Saeed, S. T. (2019). inflation. *International Journal of Monetary Economics and Finance*, 12(3), 180–195. <https://doi.org/10.1504/IJMEF.2019.100618>.
- Arellano, M., & Bond, S. (1991). Employment Equations Some Tests of Specification for Panel Data : Monte Carlo Evidence and an Application to Employment Equations. 58(2), 277–297. <https://ideas.repec.org/a/oup/restud/v58y1991i2p277-297..html>.
- Asongu, S. A., Uduji, J. I., & Okolo-Obasi, E. N. (2020). Fighting African capital flight: trajectories, dynamics, and tendencies. *Financial Innovation*, 6(1). <https://doi.org/10.1186/s40854-020-00179-0>.
- Bal, H., Esaa, A. A. S., & Erdoğan, E. (2022). The Foreign Debt and Economic Growth in Sub-Saharan Africa. *International Conference on Eurasian Economies 2022*, 1–6.

<https://doi.org/10.36880/c14.02622>.

- Bessane, M., & Purifice, O. (2021). *The Disparity in Inflation Rates between the Group of Twenty ( G20 ) and the Sub-Saharan Africa ( SSA )*. 196–216. <https://doi.org/10.4236/ti.2021.124012>.
- Bleaney, M., & Francisco, M. (n.d.). Inflation and Fiscal Deficits in Sub-Saharan Africa.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8).
- Bolarinwaa, M. A., & Olubiyi, B. E. A. (2018). *Turkish Economic Review*. 5(1).
- Bond, S. S., Hoeffler, A., & Temple, J. (2001). GMM Estimation of Empirical Growth Models. *Economics Papers*, 01, 33. <https://ideas.repec.org/p/nuf/econwp/0121.html>.
- Bordo, M. D., & Levy, M. D. (2021). Do enlarged fiscal deficits cause inflation? The historical record. *Economic Affairs*, 41(1), 59–83. <https://doi.org/10.1111/ecaf.12446>.
- Calcagno, A. (2019). The structuralist theory of inflation , an analysis rooted in the socioeconomic reality of Latin America. May, 1–22.
- Culpeper, R., & Kappagoda, N. (2016). The new face of developing country debt. *Third World Quarterly*, 37(6), 951–974. <https://doi.org/10.1080/01436597.2016.1138844>.
- Curto, J. D., & Pinto, J. C. (2011). The corrected VIF (CVIF). *Journal of Applied Statistics*, 38(7), 1499–1507. <https://doi.org/10.1080/02664763.2010.505956>.
- De Hoyos, R. E., & Sarafidis, V. (2006). Testing for cross-sectional dependence in panel-data models. *Stata Journal*, 6(4), 482–496. <https://doi.org/10.1177/1536867x0600600403>.
- Dumitrescu, B. A., Kagitci, M., & Cepoi, C. O. (2022). Nonlinear effects of public debt on inflation. Does the size of the shadow economy matter? *Finance Research Letters*, 46(March), 102255. <https://doi.org/10.1016/j.frl.2021.102255>.
- Durguti, E. A. (2020). How Does the Budget Deficit Affect Inflation Rate – Evidence from Western Balkans Countries. *International Journal of Finance & Banking Studies (2147-4486)*, 9(1), 01–10. <https://doi.org/10.20525/ijfbs.v9i1.526>.
- Eeper, E. M. L., Sims, C. A., & Leeper, E. M. (1994). Toward a modern macroeconomic model usable for policy analysis. *NBER Macroeconomics Annual*, June.
- Ekinci, M. B. (2016). External borrowing and inflation in Turkey between 2003 and 2015: A simple linear regression analysis. *International Journal of Economics and Financial Issues*, 6(1), 45–54.
- Fasanya, I. O., Fajobi, A., & Adetokunbo, A. (2021). Are fiscal deficits inflationary in nigeria? new evidence from bounds testing to cointegration with structural breaks. *Economic Annals*, 66(228), 123–147. <https://doi.org/10.2298/EKA2128123F>.

- Friedman, M. (2010). Quantity Theory of Money. *Monetary Economics*, 299–338. [https://doi.org/10.1057/9780230280854\\_35](https://doi.org/10.1057/9780230280854_35).
- Hakkio, C. S. (2011). Global Inflation Dynamics. *SSRN Electronic Journal*, January. <https://doi.org/10.2139/ssrn.1335348>.
- Heitzig, C. (2021). Sub-Saharan Africa ' s debt problem Mapping the pandemic ' s effect and the way forward. October. <https://africaportal.org/publication/sub-saharan-africas-debt-problem-mapping-pandemics-effect-and-way-forward/>.
- Helmy, H. E. (2021). The external debt-inflation nexus in Egypt. December, 1–18. <https://doi.org/10.1002/pa.2802>.
- Ho, T. T., Nguyen, V. B., & Nguyen, T. B. N. (2021). The different role of governance in the fiscal deficit–inflation between developed and developing countries. *Macroeconomics and Finance in Emerging Market Economies*, 00(00), 1–12. <https://doi.org/10.1080/17520843.2021.1973787>.
- Khan, H., Marimuthu, M., & Lai, F. W. (2020). Fiscal deficit and its less inflationary sources of borrowing with the moderating role of political instability: Evidence from Malaysia. *Sustainability (Switzerland)*, 12(1), 1–16. <https://doi.org/10.3390/su12010366>.
- Khraief, N., Shahbaz, M., Heshmati, A., & Azam, M. (2020). Are unemployment rates in OECD countries stationary? Evidence from univariate and panel unit root tests. *North American Journal of Economics and Finance*, 51. <https://doi.org/10.1016/j.najef.2018.08.021>.
- Kraft, M. A. (2018). Interpreting Effect Sizes of Education Interventions Matthew A. Kraft Brown University December 2018. *Brown University Working Paper, December*, 1–28. <https://journals.sagepub.com/doi/abs/10.3102/0013189X20912798>.
- Leeper, E. M. (1991). Equilibria under “active” and “passive” monetary and fiscal policies. *Journal of Monetary Economics*, 27(1), 129–147. [https://doi.org/10.1016/0304-3932\(91\)90007-B](https://doi.org/10.1016/0304-3932(91)90007-B).
- Leeper, E. M., & Sims, C. A. (1994). Model Usable for Policy Analysis. *NBER Macroeconomics Annual 1994*, 9(January), 81–140.
- Lim, Y. C., & Sek, S. K. (2015). An Examination on the Determinants of Inflation. *Journal of Economics, Business and Management*, 3(7), 678–682. <https://doi.org/10.7763/joebm.2015.v3.265>.
- Manasseh, C. O., Abada, F. C., Okiche, E. L., Okanya, O., Nwakoby, I. C., Offu, P., Ogbuagu, A. R., Okafor, C. O., Obidike, P. C., & Nwonye, N. G. (2022). External debt and economic growth in Sub-Saharan Africa: Does governance matter? *PLoS ONE*, 17(3 March), 1–28. <https://doi.org/10.1371/journal.pone.0264082>.
- Marshal, I. (2020). Granger Causality Analysis between Domestic Debt and Inflation in Nigeria. *c. I(1)*, 135–149.

- Moffitt, A. H. (2022). February 2022. *American Journal of Orthodontics and Dentofacial Orthopedics*, 161(2), 318.e1-318.e2. <https://doi.org/10.1016/j.ajodo.2021.12.008>.
- Mostafa Arif, K., & Murtoza Ali, M. (2012). Determinants of Inflation in Bangladesh: An Empirical Investigation. In *Journal of Economics and Sustainable Development www.iiste.org ISSN* (Vol. 3, Issue 12). Online. [www.iiste.org](http://www.iiste.org).
- Musa, B. K. (2021). Theoretical Review of the Impact of Fiscal Deficits on Economic Growth in Nigeria. *European Scientific Journal ESJ*, 17(1), 310–334. <https://doi.org/10.19044/esj.2021.v17n1p310>.
- Mweni, F. T., Njuguna, A., & Oketch, T. (2016). The Effect of External Debt on Inflation Rate in Kenya, 1972-2012. *International Journal of Financial Research*, 7(4). <https://doi.org/10.5430/ijfr.v7n4p198>.
- Nguyen, A. D. M., Dridi, J., Unsal, F. D., & Williams, O. H. (2017). On the Drivers of Inflation in Sub-Saharan Africa On the drivers of in fl ation in Sub-Saharan Africa ☆. *International Economics*, 151(May), 71–84. <https://doi.org/10.1016/j.inteco.2017.04.002>.
- Nguyen, A. D. M., Dridi, J., Unsal, F. D., Williams, O. H., & Tsikata, T. M. (2015). On the Drivers of Inflation in Sub-Saharan Africa IMF Working Paper African Department On the Drivers of Inflation in Sub-Saharan Africa Authorized for distribution. <https://ideas.repec.org/a/eee/inteco/v151y2017icp71-84.html>.
- Nguyen, T. T., Phan, T. D., & Tran, N. A. (2022). Impact of fiscal and monetary policy on inflation in Vietnam. *Investment Management and Financial Innovations*, 19(1), 201–209. [https://doi.org/10.21511/imfi.19\(1\).2022.15](https://doi.org/10.21511/imfi.19(1).2022.15).
- Obinabo, C. R., & AGU, B. O. (2019). Effect of Fiscal Deficit on Selected Macroeconomic Variables in Nigeria: A Time Series Analysis, 1986-2018. *International Journal of Academic Research in Economics and Management Sciences*, 8(2), 78–91. <https://doi.org/10.6007/ijarems/v8-i2/6276>.
- Ogochukwu, G. (2016). An empirical analysis of the macroeconomic impact of public debt in Nigeria. [www.econstor.eu](http://www.econstor.eu).
- Ojong, C. M., & Owui, H. O. (2013). Effect of f Budget Deficit Financing on the he Development of the Nigerian Economy : 1980-2008. *1905(3)*, 61–84. <https://iiste.org/Journals/index.php/EJBM/article/view/4445>.
- Okoye, L. U., Olokoyo, F. O., Evbuomwan, G. O., Okoye, L. U., Olokoyo, F. O., Ezeji, F. N., & Okoh, J. I. (2021). “ Determinants of behavior of inflation rate in Nigeria ” Determinants of behavior of inflation rate in Nigeria. [https://doi.org/10.21511/imfi.16\(2\).2019.03](https://doi.org/10.21511/imfi.16(2).2019.03).
- Okwoche, P. U., & Iheonu, C. O. (2021). Determinants of fiscal effort in sub-Saharan African countries: Does conflict matter? *Economics and Business Review*, 7(2), 50–73. <https://doi.org/10.18559/ebv.2021.2.5>.
- Oyeleke, O. J. (2022). On the Non-Linear Relationship between Fiscal Deficit and Inflation : The Nigeria Experience. June 2021. <https://doi.org/10.1007/s11294-021->

[09822-7](#).

- Roodman, D. (2009). How to do xtabond2 : An introduction to difference and system GMM in Stata. *1*, 86–136. <https://ideas.repec.org/a/tsj/stataj/v9y2009i1p86-136.html>.
- Roy, S., & Sen, C. (2022). Economies Role of debt in emerging economies : a re-examination of the debt-growth nexus. *Macroeconomics and Finance in Emerging Market Economies*, 00(00), 1–22. <https://doi.org/10.1080/17520843.2022.2028381>.
- Saini, N., & Singhania, M. (2018). Determinants of FDI in developed and developing countries: a quantitative analysis using GMM. In *Journal of Economic Studies* (Vol. 45, Issue 2). <https://doi.org/10.1108/JES-07-2016-0138>.
- Sani, A., Said, R., Ismail, N. W., & Mazlan, N. S. (2019). Public debt, institutional quality and economic growth in sub-saharan Africa. *Institutions and Economies*, 11(3), 39–64. <https://ijie.um.edu.my/index.php/ijie/article/view/18613>.
- Sarafidis, V., & Wansbeek, T. (2012). Cross-Sectional Dependence in Panel Data Analysis. *Econometric Reviews*, 31(5), 483–531. <https://doi.org/10.1080/07474938.2011.611458>.
- Sarangi, P. K., Sahoo, A. K., & Sinha, S. (2022). Modeling Consumer Price Index: A Machine Learning Approach. *Macromolecular Symposia*, 401(1), 1–6. <https://doi.org/10.1002/masy.202100349>.
- Saungweme, T., & Odhiambo, N. M. (2021). Relative Impact of Domestic and Foreign Public Debt on Economic Growth in South Africa. *Journal of Applied Social Science*, 15(1), 132–150. <https://doi.org/10.1177/1936724420980414>.
- Schultz, E. L., Tan, D. T., & Walsh, K. D. (2010). Endogeneity and the corporate governance - performance relation. *Australian Journal of Management*, 35(2), 145–163. <https://doi.org/10.1177/0312896210370079>.
- Schumpeter, J. A., & Keynes, J. M. (1936). The General Theory of Employment, Interest and Money. *Journal of the American Statistical Association*, 31(196), 791. <https://doi.org/10.2307/2278703>.
- Schwarzer, J. A. (2018). Retrospectives Cost-Push and Demand-Pull Inflation : Milton Friedman and the “ Cruel Dilemma .” 32(1), 195–210. <https://ideas.repec.org/a/aea/jecper/v32y2018i1p195-210.html>.
- Sethi, N., Bhujabal, P., Das, A., & Sucharita, S. (2019). Foreign aid and growth nexus: Empirical evidence from India and Sri Lanka. *Economic Analysis and Policy*, 64, 1–12. <https://doi.org/10.1016/j.eap.2019.07.002>.
- Sutihar, D. N. (2016). An Analysis of Trend and Sources of Deficit Financing in Nepal. *Economic Literature*, 12(December), 8. <https://doi.org/10.3126/el.v12i0.14881>.
- Tapering Talk: The Impact of Expectations of Reduced Federal Reserve Security Purchases on Emerging Markets Barry Eichengreen and Poonam Gupta 1 December 12, 2013. (2013). 1–21.

- Thomson, M., Kentikelenis, A., & Stubbs, T. (2017). Structural adjustment programmes adversely affect vulnerable populations: A systematic-narrative review of their effect on child and maternal health. In *Public Health Reviews* (Vol. 38, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s40985-017-0059-2>.
- Tiffin, A. (2021). Regional Economic Outlook. Sub-Saharan Africa: navigating a long pandemic. <https://www.elibrary.imf.org/display/book/9781513575735/front-1.xml>.
- Totonchi, J. (2011). Macroeconomic Theories of Inflation.
- Umaru, A., & Zubairu, A. A. (2012). Effect of Inflation on the Growth and Development of the Nigerian Economy (An Empirical Analysis). In *International Journal of Business and Social Science* (Vol. 3, Issue 10). [www.ijbssnet.com](http://www.ijbssnet.com).
- Urquhart, M. D. (2022). Public debt, inflation, and the Fiscal Theory of Price Level in emerging markets: the case of Paraguay. *Macroeconomics and Finance in Emerging Market Economies*, 15(3), 246–272. <https://doi.org/10.1080/17520843.2021.1927128>.
- Yien, L. C., Abdullah, H., & Azam, M. (2017). Granger Causality Analysis between Inflation, Debt and Exchange Rate: Evidence from Malaysia. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 7(1). <https://doi.org/10.6007/ijarafms/v7-i1/2624>.

## APPENDICES

### Appendix I Sampled countries

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|                         |                   |
|-------------------------|-------------------|
| Angola                  | Comoros           |
| Benin                   | Congo Dem Rep     |
| Botswana                | Congo Rep         |
| Burkina Faso            | Cote D'ivoire     |
| Burundi                 | Djibouti          |
| Cabo Verde              | Equatorial Guinea |
| Cameroon                | Ethiopia          |
| Central Africa Republic | Gabon             |
| Chad                    | Gambia            |
| Mauritius               | Sierra Leone      |
| Mozambique              | South Africa      |
| Namibia                 | Sudan             |
| Niger                   | Swaziland         |
| Nigeria                 | Tanzania          |
| Rwanda                  | Togo              |
| Sao Tome and Principe   | Uganda            |
| Senegal                 | Zambia            |
| Ghana                   | Zimbabwe          |
| Guinea                  | Madagascar        |
| Guinea-Bissau           | Malawi            |
| Kenya                   | Mali              |
| Liberia                 | Mauritania        |

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## **Appendix II Income based classification of sub-Saharan African countries.**

Distribution of sub-Saharan countries according to the level of income (GNI per capita (current US\$ for 2020 World Bank database record))

| <b>S/N</b> | <b>Low income countries</b> | <b>GNI Per capita</b> |
|------------|-----------------------------|-----------------------|
| 1          | Burundi                     | 240                   |
| 2          | Central Africa Republic     | 480                   |
| 3          | Chad                        | 690                   |
| 4          | Gambia                      | 810                   |
| 5          | Congo Dem Rep               | 590                   |
| 6          | Mali                        | 850                   |
| 7          | Mozambique                  | 500                   |
| 8          | Ethiopia                    | 1020                  |
| 9          | Sudan                       | 760                   |
| 10         | Guinea-Bissau               | 820                   |
| 11         | Liberia                     | 680                   |
| 12         | Madagascar                  | 510                   |
| 13         | Malawi                      | 640                   |
| 14         | Rwanda                      | 930                   |
| 15         | Niger                       | 610                   |
| 16         | Sierra Leone                | 510                   |
| 17         | Uganda                      | 930                   |
| 18         | Togo                        | 990                   |
| 19         | Burkina Faso                | 840                   |
| 20         | Guinea                      | 1026                  |

**Source;** World Bank data 2020

| S/N | Middle income countries | GNI Per capita |
|-----|-------------------------|----------------|
| 1   | Angola                  | 1,900          |
| 2   | Benin                   | 1,400          |
| 3   | Zambia                  | 1,170          |
| 4   | Zimbabwe                | 1,500          |
| 5   | Cameroon                | 1,520          |
| 6   | Cabo Verde              | 2,920          |
| 7   | Congo Rep               | 1,760          |
| 8   | Cote D'ivoire           | 2,620          |
| 9   | Gabon                   | 7,540          |
| 10  | Comoros                 | 1,610          |
| 11  | Ghana                   | 2,350          |
| 12  | Kenya                   | 2,170          |
| 13  | Equatorial Guinea       | 5,320          |
| 14  | Mauritania              | 2,160          |
| 15  | Djibouti                | 3,180          |
| 16  | Namibia                 | 4,880          |
| 17  | Nigeria                 | 2,140          |
| 18  | Mauritius               | 10,760         |
| 19  | Sao Tome and Principe   | 2,410          |
| 20  | Senegal                 | 1,640          |
| 21  | Botswana                | 7,350          |
| 22  | South Africa            | 6,780          |
| 23  | Swaziland               | 3,800          |
| 24  | Tanzania                | 1,200          |

**Source;** World Bank data 2020

