ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

The Effect of Exchange Rate Fluctuation on Economic Growth in Selected Sub - Saharan African Countries

By

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A Thesis Submitted to the Graduate Studies of Addis Ababa University in partial fulfillment of the Requirements for the Degree of Master of Science in International Economics

Addis Ababa University

Addis Ababa, Ethiopia

June 2026

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Declaration

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature……..Date……

Name: Eden Yihunie Birhan

Abstract

Exchange rate fluctuation remains a major macroeconomic challenge in Sub-Saharan African (SSA) countries due to its potential effects on trade, investment, and economic growth. Although economic theory suggests that exchange rate movements influence growth performance, empirical evidence from SSA remains mixed and inconclusive. Moreover, many previous studies focused on individual countries, earlier periods, or broader regional samples without adequately accounting for recent economic developments and cross-country differences in exchange rate regimes. This study therefore examined the effect of exchange rate fluctuations on economic growth in selected Sub-Saharan African countries and sought to answer the question: How do exchange rate fluctuations affect economic growth in SSA countries? The study used balanced panel data from 2014–2024 for eleven SSA countries: Ethiopia, Burundi, Kenya, Rwanda, Djibouti, Tanzania, Uganda, Seychelles, Madagascar, Mauritius, and Sudan. The study period was selected to capture recent macroeconomic developments, exchange rate reforms, and external shocks affecting African economies. The selected countries were chosen because they represent different exchange rate regimes and economic conditions while maintaining data availability throughout the study period. Descriptive statistics, correlation analysis, and the Panel-Corrected Standard Errors (PCSE) estimation technique were employed. Real GDP growth rate was used as the dependent variable, while exchange rate volatility, inflation, government expenditure, and political stability were included as explanatory variables. The results revealed that exchange rate volatility has a negative and statistically significant effect on economic growth. Government expenditure also showed a statistically significant negative effect on growth, whereas inflation and political stability were statistically insignificant. The study concludes that exchange rate instability constrains economic growth in the selected SSA countries. Therefore, policymakers should strengthen foreign exchange market management, maintain prudent monetary policies aimed at reducing excessive exchange rate volatility, improve foreign reserve management, and enhance coordination between monetary and fiscal policies. In addition, governments should improve the efficiency of public expenditure by prioritizing productive investments in infrastructure, education, and health sectors to support sustainable economic growth.

Key words:- exchange rate volatility, economic growth, sub-Saharan Africa, Panel-Corrected Standard Errors

Acknowledgment

First and foremost, I would like to praise and thank God for providing me with the strength, courage, and health to successfully complete this study. I am deeply grateful to my advisor, Dr. Sisay Regassa, for his invaluable guidance and constructive feedback throughout the research process. I would also like to express my sincere thanks to my family for their unwavering support and encouragement. Finally, I would like to acknowledge everyone who has played a role in making this work a success.

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List of acronyms

EXV- Exchange rate volatility

FE-Fixed effect

GDP – Gross domestic product

GOVE- Government expenditure

IMF- International monetary fund

INFR-Inflation rate

OLS-Ordinary least square

PCSE- Panel-Corrected Standard Errors

POLS-Political stability

RE-Random effect

SADC -Southern African Development Community

SSA- Sub Saharan African

STATA - Statistics and Data Analysis Software

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Chapter One

1. Introduction

1.1 Background of the study

Exchange rate fluctuation, defined as major changes in the value of one currency relative to another, has become an important macroeconomic issue worldwide. Investment flows, trade competitiveness, and economic stability are affected by such fluctuations. In an environment where economies are increasingly interconnected through trade and investment, exchange rate fluctuations have become more pronounced, thereby affecting economic stability and development. Exchange rate fluctuations have various effects on the economy. As a result, exchange rate fluctuations and their impact on economic growth have received increasing attention in recent policy discussions.

Achieving sustained economic growth in Sub-Saharan Africa remains a major developmental challenge. This challenge has attracted the attention of researchers interested in economic growth in the region. However, issues such as low investment, terms of trade volatility, external debt, and inappropriate economic policies have received considerable attention in studies of Sub-Saharan Africa (Mazorodze, 2021).

Sub-Saharan African countries have experienced global economic changes that have exerted considerable pressure on their currencies, which in turn have negatively affected their economic activities. Consequently, the analysis of exchange rate fluctuations and their effect on economic growth has received significant attention in recent years, although substantial disagreement remains among policymakers regarding the exact effect of exchange rate changes. Economic theory suggests that currency devaluation is likely to improve a nation's economic growth. However, earlier studies, such as Hussaini and Davies (2018) and Ghura and Grennes (1993), which examined the relationship between exchange rate volatility and economic growth in 15 and 33 Sub-Saharan African countries, respectively, found evidence of a negative relationship between real exchange rate volatility and economic growth. Hence, the lack of conclusive evidence in the literature served as a primary motivation for this study. The main question was

whether the theoretical assumption regarding exchange rates holds true in the context of Sub-Saharan African countries.

1.2 Statement of the problem

In an open economy, the exchange rate plays a major role in macroeconomic performance, particularly in Sub-Saharan Africa. Exchange rate policy can affect economic growth by improving short-run competitiveness, increasing incentives for investment, and fostering technological development. Through differences in price elasticities and their impact on export and import income elasticities, the level of the exchange rate can also influence long-term economic growth (Missio et al., 2015). Exchange rate fluctuations have the potential to hinder economic growth in Africa. African economies are largely dependent on agriculture and primarily serve as suppliers of raw materials to developed countries while importing finished products. This implies that exchange rate fluctuations may negatively affect African economies by reducing the volume of international trade (Lawal et al., 2022).

Empirical studies analyzing the relationship between exchange rate fluctuations and economic growth in Sub-Saharan Africa have produced mixed results. While some studies, such as Yensu et al. (2022), indicated that exchange rate fluctuations had a negative effect on economic growth in countries such as Ghana, the effect of currency fluctuations remains inconsistent across Sub-Saharan African countries. For instance, Meniago and Eita (2017), in their study on the impact of exchange rate changes on imports, exports, and trade balances in Sub-Saharan Africa, found that although there was a positive relationship between exchange rate changes and imports, the degree of responsiveness was very small. The study also found a negative relationship between exchange rate changes and exports, while no significant relationship was observed between exchange rates and trade balances.

Although economic theory suggests that exchange rate depreciation should improve export performance and strengthen the balance of payments, empirical evidence from Sub-Saharan African countries remains mixed and sometimes contradictory. As indicated above, exchange rate movements have shown negative and statistically insignificant effects on exports and trade balances, contrary to theoretical expectations. Therefore, it remains unclear whether exchange rate fluctuations promote or hinder economic growth in the region. The existing inconsistency

between theoretical predictions and empirical findings regarding the relationship between exchange rate fluctuations and economic growth calls for further investigation. In addition, unlike previous studies that focused on individual countries or earlier periods, this study addressed the research gap by examining the impact of exchange rate fluctuations on economic growth in selected Sub-Saharan African countries using recent balanced panel data from 11 countries and employing the Panel-Corrected Standard Errors (PCSE) estimation technique.

1.3 Objective of the study

1.3.1 General objective

- To examine the impact of exchange rate fluctuation on economic growth in selected sub Saharan African countries.

1.3.2 Specific objectives

- To investigate trends in exchange rates and economic growth in the region.
- To compare growth outcomes across different exchange rate regimes.
- To analyze the relationship between exchange rate volatility and economic growth.

1.4 Research questions

- What are the patterns of exchange rates and GDP in the region?
- Do exchange rate regimes influence the effect of exchange rate fluctuation on economic growth?
- What is the effect of exchange rate fluctuation on economic growth?

1.5 Research hypothesis

H0: Exchange rate fluctuations have no significant effect on economic growth of Sub Saharan Africa countries.

H1: Exchange rate fluctuations significantly affect economic growth of Sub Saharan Africa countries.

1.6 Scope and limitation of the study

This study examined the impact of exchange rate fluctuations on economic growth in eleven selected Sub-Saharan African countries from 2014 to 2024. The countries included Ethiopia, Burundi, Kenya, Rwanda, Djibouti, Tanzania, Uganda, Seychelles, Madagascar, Mauritius, and Sudan. The selection of these countries was based on differences in exchange rate regimes and economic contexts, as well as the availability of consistent data throughout the study period. The selected countries adopt different exchange rate regimes, including a managed floating exchange rate system (Burundi), a currency board pegged system (Djibouti), and relatively market-based exchange rate systems in Ethiopia, Kenya, Rwanda, Seychelles, Madagascar, Mauritius, Tanzania, Uganda, and Sudan (IMF, 2024). This diversity allows for the examination of the relationship between exchange rate fluctuations and economic growth across different economic environments. Despite its contributions, the study has certain limitations. It focused only on eleven Sub-Saharan African countries and may not fully represent all countries in the region. In addition, the study considered only exchange rate volatility, inflation rate, government expenditure, and political stability as explanatory variables. Other factors that may influence economic growth were not included due to data limitations and the scope of the study.

1.7 Organization of the study

The study is organized into five chapters. Chapter One presents the introduction, including the background of the study, statement of the problem, research objectives, research questions, significance of the study, scope and limitations of the study, and organization of the study. Chapter Two reviews the relevant theoretical and empirical literature related to exchange rate fluctuations and economic growth. Chapter Three describes the research methodology, including data sources, model specification, variable measurement, and estimation techniques. Chapter Four presents the data analysis, empirical results, and discussion of findings. Finally, Chapter Five provides the conclusions and policy implications of the study.

Chapter Two

2. Literature review

2.1 Theoretical literature review

2.1.1 Relationship between Exchange rate and economic growth

Exchange rate is defined as the price of one currency in terms of another currency. Exchange rate policy and currency devaluation are among the macroeconomic policy tools used to influence the overall economy. There is mixed evidence regarding the impact of exchange rates on economic growth. In fact, there is a difference between theoretical predictions and empirical evidence. This inconsistency may arise for several reasons. Exchange rate movements tend to affect developing countries more than developed countries, and their effects may vary across regions. Although researchers generally agree that poorly managed exchange rates can negatively affect economic growth, policymakers continue to disagree on whether a significant relationship exists between exchange rates and economic growth (Aman et al., 2017).

From a theoretical perspective, poorly managed exchange rates can negatively affect economic growth. Various economic growth theories suggest that avoiding significant currency overvaluation is an important policy tool for promoting economic growth. Most studies indicate that persistent slow economic growth is associated with macroeconomic instability. Currency overvaluation is also linked to foreign exchange shortages, rent-seeking behavior, corruption, unsustainable current account deficits, balance of payments crises, and stop-and-go macroeconomic cycles, all of which can adversely affect economic growth (Rodrik, 2008).The relationship between exchange rate fluctuations and economic growth has been explained through several theoretical perspectives. These include the Keynesian Open Economy Model, the Marshall-Lerner Condition, and the Absorption Approach. These theories provide a comprehensive foundation for understanding how exchange rate fluctuations affect trade balances, output, and the balance of payments.

2.1.2 Keynesian Open economy model

According to the Keynesian Open Economy Model, two types of policies are used to achieve internal and external balance: expenditure-switching policies and expenditure-reducing policies. Expenditure-switching policies shift spending from foreign goods to domestic goods, while expenditure-reducing policies aim to reduce domestic spending in order to decrease imports. Exchange rate policy is the primary expenditure-switching policy, whereas monetary and fiscal policies are the main expenditure-reducing policies. Exchange rates are among the most important economic factors affecting international trade and a country's overall economic performance. A country's international trade position is significantly influenced by fluctuations in exchange rates. Exchange rate depreciation may positively affect international trade by reducing the relative price of domestic goods compared to foreign goods and by increasing the international competitiveness of domestic products. However, the positive effects of currency depreciation largely depend on the responsiveness of demand and the productive capacity of the country (Fofanah, 2022)

2.1.3 The Marshall-Lerner Condition (Elasticity Approach)

The Marshall-Lerner Condition, also known as the elasticity approach, explains the impact of exchange rate changes through the price responsiveness of imports and exports. It states that, starting from an initial equilibrium position, currency devaluation will improve the trade balance only if the sum of the price elasticities of exports and imports is greater than one. Currency depreciation makes imports more expensive and exports relatively cheaper in international markets.There are two main effects of currency devaluation: the price effect and the volume effect. The price effect makes imports more expensive and may initially worsen the current account balance. In contrast, the volume effect increases the volume of exports and reduces the demand for imports, thereby improving the current account balance. The elasticity approach also explains the J-curve effect, which describes why a country's trade balance may initially deteriorate following currency devaluation before improving over time. This occurs because prices adjust more rapidly than quantities. Imports become more expensive immediately, whereas exports require time to respond to changes in prices and demand due to production rigidities and time lags in the responses of consumers and producers (Pilbeam, 2023).

2.1.4 Absorption approach

The Absorption Approach focuses on the effect of currency devaluation on national income and domestic absorption. According to this approach, the impact of currency devaluation on the current account depends on its effect on national income relative to domestic absorption (Pilbeam, 2023).

$$Y = C + I + G + (X - M)$$

Where Y represents national income, C represents consumption, I represents investment, G represents government expenditure, and (X − M) represents net exports. Since domestic absorption (A) is defined as:

$$A = C + I + G$$

The equation can be rewritten as:

$$CA = Y - A = X - M$$

Where, CA represents the current account balance.

- A current account surplus occurs when domestic output exceeds domestic absorption.
- A current account deficit occurs when domestic absorption exceeds domestic output.

The implication of the Absorption Approach is that exchange rate depreciation can improve the current account balance and support economic growth only if it increases national income relative to domestic absorption. If currency depreciation stimulates domestic production, exports, and income more than domestic spending, economic growth may improve. However, if domestic absorption rises at the same rate or faster than national income, the positive effects of depreciation may be limited. Therefore, the theory suggests that the impact of exchange rate fluctuations on economic growth depends on how exchange rate changes influence production, income, and domestic spending. The Absorption Approach provides a useful framework for understanding how exchange rate fluctuations affect trade balances, current account positions, and economic growth. The theory is particularly relevant to this study because it explains the channels through which exchange rate fluctuations may influence economic growth in Sub-Saharan African countries.

2.1.2 Linkage between economic growth theories and exchange rate fluctuations

Various economic growth theories that emphasize the impact of macroeconomic instability on investment, productivity, and long-term economic performance can also be used to explain the relationship between exchange rate fluctuation and economic growth.

2.1.2.1 Neoclassical growth theory

According to Mankiw (2010), the Solow growth model, also referred to as the neoclassical growth theory, uses labor growth, capital accumulation, and technological advancement to explain long-term economic expansion. According to this concept, labor and capital are used to produce output, which is represented by a production function where increases in either input result in higher output levels. The model, however, places a strong emphasis on diminishing returns to capital, which means that as capital per worker rises, the extra output produced by new capital units progressively decrease. Therefore, in the absence of technical advancement, an economy eventually reaches a steady state where long-term growth stops and output per worker stays constant. The model further contends that since technological advancement always raises productivity and moves the production function upward, it is the only source of long-term, sustainable economic growth. Contrarily, capital accumulation primarily influences output levels rather than long-term growth rates. The model also shows that while population increase can reduce capital per worker and slow down growth, countries with higher rates of savings and investment typically reach higher levels of income per capita in the steady state. According to this theory, changes in exchange rates can have an indirect impact on growth by influencing investment choices and capital accumulation in open economies. High exchange rate volatility makes the economy more unpredictable, which prevents both foreign and local investment and lowers the importation of capital goods and cutting-edge technology needed to boost productivity. Thus, the Solow model offers a helpful framework for understanding how macroeconomic instability might impact the factors that determine economic growth, especially investment and capital formation, even though it does not specifically account for changes in exchange rates.

2.1.2.2 Endogenous growth theory

According to endogenous growth theory, rather than external technology shocks, economic growth is caused by internal factors like innovation, human capital, and research efforts. Based on Romer's contribution, Jones (2019) asserts that intentional efforts by firms and researchers generate technical advancement inside the economy. The basis of this theory is that ideas are no rival, which means that many people can utilize them simultaneously without depleting them, resulting in higher returns and long-term economic growth. Because innovation boosts productivity and makes money, firms and researchers invest in it.

Endogenous growth theory does not specifically address exchange rate volatility, but the theory implies that any element that raises economic uncertainty could lead to a decrease in investment in research and innovation. Therefore, by discouraging investment, innovation, and capital accumulation the primary forces behind endogenous growth exchange rate volatility can indirectly slow economic expansion.

The long-term economic growth can be explained in complementary ways by the endogenous growth theory and the Solow neoclassical growth model. While endogenous growth theory emphasizes innovation, human capital, and knowledge production as the primary drivers of sustainable growth, the Solow model places more emphasis on capital accumulation, labor growth, and exogenous technological advancement. Both theories indicate to significant transmission channels through which macroeconomic instability can impact growth by influencing investment, capital creation, and innovation, even though neither theory directly explains exchange rate volatility. Consequently, the combination of these two ideas offers a solid theoretical framework for examining how exchange rate fluctuation affects economic growth.

2.2 Empirical literature review

2.2.1 Empirical evidence on exchange rate fluctuation and economic growth

The results of empirical research on the relationship between economic growth and exchange rate changes are conflicting and ambiguous. Exchange rate stability may boost growth through increased trade and investment, according to theory, but empirical results differ between nations and areas.

2.2.1.1 Global experience

A number of cross-country empirical studies provide more comprehensive evidence on the relationship between exchange rate movements and economic performance. Using a co integration and error correction approach, Choudhry (2005) investigates the impact of exchange rate volatility on U.S. real exports to Canada and Japan over the flexible exchange rate period (1974–1998). The findings demonstrate that actual exports are significantly and mostly negatively impacted by exchange rate volatility, suggesting that increased volatility lowers trade flows. The study comes to the conclusion that trade dynamics and export performance are significantly influenced by exchange rate volatility.

Habib, Mileva, and Stracca (2017) examine how changes in real exchange rates affect economic development using a panel of around 150 countries during the post-Bretton Woods period. The study finds that real appreciation lowers economic growth, while real depreciation significantly boosts it, using an instrumental variable approach to address endogeneity. However, these effects are small or negligible in advanced economies and floating exchange rate regimes, and are mainly observed in developing countries and fixed exchange rate regimes. Overall, the study concludes that the real exchange rate significantly influences economic growth, particularly in developing economies.

The study on exchange rate volatility and productivity growth by Aghion et al. (2009) Using cross-national panel data, The Role of Financial Development investigates the connection between productivity growth, financial development, and exchange rate volatility. The findings demonstrate that whereas exchange rate volatility has little or no impact on growth in financially

developed nations, it has a detrimental effect on long-term productivity growth in nations with low financial development. The results also show that the degree of financial development has a significant impact on how exchange rate volatility affects economic performance.

In a broader cross country perspective, Ameziane and Benyacoub (2022) investigated the impact of exchange rate volatility on economic growth under various regimes in 14 emerging countries using cross sectional ARDL model. The paper was found that exchange rate volatility imposes both direct and indirect costs on economic growth. Also the negative effect of exchange rate volatility on economic growth are weaker in countries which operated under intermediate exchange rate regimes compared to purely fixed and fully flexible regimes.

These results give support to the idea that the effects of exchange rate volatility vary by nation and are influenced by macroeconomic and institutional frameworks, especially the exchange rate regime that is in effect.

2.2.1.2 Experience from emerging and developing economies

Edwards and Levy Yeyati (2005) investigated the impact of terms of trade shocks on economic development under various exchange rate regimes using cross-country data from both developing and industrial nations. According to the study, flexible exchange rate regimes are better at absorbing shocks from the outside world than fixed regimes. The findings indicate that in nations with strict exchange rate systems, terms of trade shocks have a greater adverse impact on growth. The study also discovers evidence of asymmetric impacts, in which output is more negatively impacted by negative shocks than positively. Overall, the results show that nations with flexible exchange rate policies typically have faster economic growth than those with fixed regimes.

Carranza, Galdon-Sanchez, and Gomez-Biscarri's (2009) study examines at the connection between inflation and exchange rate depreciation in 15 emerging market economies with varying degrees of dollarization. According to the study, more dollarized economies have a stronger exchange rate pass-through to inflation than less dollarized nations. The findings do, however, also demonstrate that pass-through is unbalanced, especially in times of economic recession when the benefits of depreciation may be outweighed by negative economic impacts.

Furthermore, in heavily dollarized economies, significant exchange rate depreciations typically result in a stronger increase in inflation. The analysis comes to the conclusion that exchange rate policy effectiveness and inflation dynamics are significantly influenced by the level of dollarization.

The study by Kayani et al. (2023) examined the asymmetric impact of exchange rate on trade flows in selected Asian countries i.e. Pakistan, Korea, Japan, and Malaysia using both linear and nonlinear autoregressive distributed lag (ARDL) models, and the results shown that increased Exchange rate volatility negatively affects export and imports, while low volatility support trade flows.

Similarly, research on relationship between exchange rate volatility, export competitiveness, and trade balance in emerging markets reviles that exchange rate depreciation does not improved trade balance contrary to what traditional theoretical model expectations. Rather it depends on other factors such as export elasticity, import dependency, currency mismatch, and macroeconomic stability. Countries characterized by structural rigidities experience limited gains, whereas countries with diversified export bases and value-added production capacities benefited more (Umeaduma and Dugabartey, 2023).

2.2.1.3 Experience from Sub-Saharan African countries

Sub-Saharan Africa has attracted considerable empirical attention regarding the impact of exchange rate fluctuations on macroeconomic performance, with most studies reporting results that deviate from traditional economic theory.

A large body of evidence highlights the adverse effects of exchange rate instability on trade and economic performance. For example, Meniago and Eita (2017), using data from 39 Sub-Saharan African countries between 1995 and 2012, found that exchange rate fluctuations are positively associated with imports, contrary to theoretical expectations. This outcome is largely attributed to the region's high dependence on imported goods. In addition, Dada (2021), examining 17 Sub-Saharan African countries, reported that exchange rate volatility significantly reduces trade flows due to asymmetric exchange rate movements.

Evidence focusing on economic growth also indicates negative effects. Mazorodze (2021), using OLS and GMM techniques for 13 Sub-Saharan African countries, found that exchange rate misalignment negatively affects economic growth, with stronger effects in fragile states. Consistent with this, Olamide et al. (2022), studying SADC countries, concluded that exchange rate instability reduces economic growth, while cost-push inflation further worsens growth performance. More recent evidence by Chinyere et al. (2024) also confirms that exchange rate volatility reduces real GDP and GDP growth across Sub-Saharan African countries. The literature suggests that although theoretical models predict that exchange rate depreciation should improve trade and stimulate growth, empirical evidence in Sub-Saharan Africa generally shows the opposite. This divergence is mainly explained by structural constraints such as import dependence, weak financial markets, limited export diversification, and macroeconomic instability. However, the literature is not fully consistent, as the magnitude and direction of the effect vary across countries depending on institutional quality, exchange rate regimes, and economic structure.

Chapter Three

3. Methodology

3.1 Research method

This study examined the effect of exchange rate fluctuations on economic growth in selected Sub-Saharan African countries using panel data. Panel data consists of observations across different cross-sectional units (countries) over a specified time period. The use of panel data allows the study to capture both cross-country variations and time-series dynamics, thereby improving the efficiency and reliability of the estimates (Torres-Reyna, 2010).

The study employed annual data covering the period from 2014 to 2024 for eleven Sub-Saharan African countries. These countries are: Ethiopia, Burundi, Kenya, Rwanda, Djibouti, Seychelles, Madagascar, Mauritius, Tanzania, Uganda, and Sudan. The selection of these countries and variables are based on data availability and their economic relevance within the region. The study employed secondary data collected from national bank of Ethiopia, World Bank, world development indicators and from international monetary fund.

3.2 Model specification

Following the standard linear panel data framework (Vijayamohanan, 2016) stated on his paper, the general form of the model is specified as:

GDPit = f (EXVit, INFRit, GOVEit, POLSit) ……..1

Where, i indicates entity i.e. country and t, denotes time i.e. year to the entity

GDP=economic growth (real GDP growth rate)

EXV=exchange rate volatility

INFR=inflation rate

GOVE=government expenditure

POLS=political stability

GDP= βo+ β1 EXVOLit + β2 INFRit + β3 GOVEit + β4 POLSit + Σit, i.e. Σit= μi + vit unobserved country specific effect…….2

Where, βo= constant term; which measures the average values of GDP when other explanatory variables are zero

- β1, β2, β3 and β4 are a slope coefficient that measures the effect of exchange rate volatility, inflation rate, government expenditure and political stability on economic growth while holing other variables constant.
- Σit = μi + vit

- μ_i = Unobserved country-specific effect (time-invariant characteristics of each country).
- ν_{it} = random error term varying across countries and time.

3.3 Definition of variables

The paper analyzed the effect of exchange rate fluctuation on economic growth in selected sub Saharan African countries by using panel data in selected sub Saharan African countries and the variables are defined as follows.

3.3.1 Dependent variable

GDP**:** Economic growth was dependent variable to the model and measured by annual percentage of gross domestic product. It represented the annual percentage change in market value of all the final goods and services produced in a country in a given period measured at constant price.

3.3.2 Independent variable

Exchange rate fluctuation (volatility): Exchange rate fluctuation (volatility) was the main explanatory variable for the model. In this study, exchange rate fluctuation is peroxide by exchange rate volatility, measured as the standard deviation of the exchange rate. A common quantitative indicator of currency instability is volatility, which measures the degree to which the exchange rate fluctuates over time.

As stated by Taylor (1987), exchange rate volatility was calculated as the standard deviation of the logarithmic changes in the nominal exchange rate series, calculated by using the following formula,

EXVt = SD [ln (OEXRt/OEXRt-1)], where

- EXVt = Exchange rate volatility at time t
- SD= Standard deviation
- OEXRt =Official exchange rate at time t

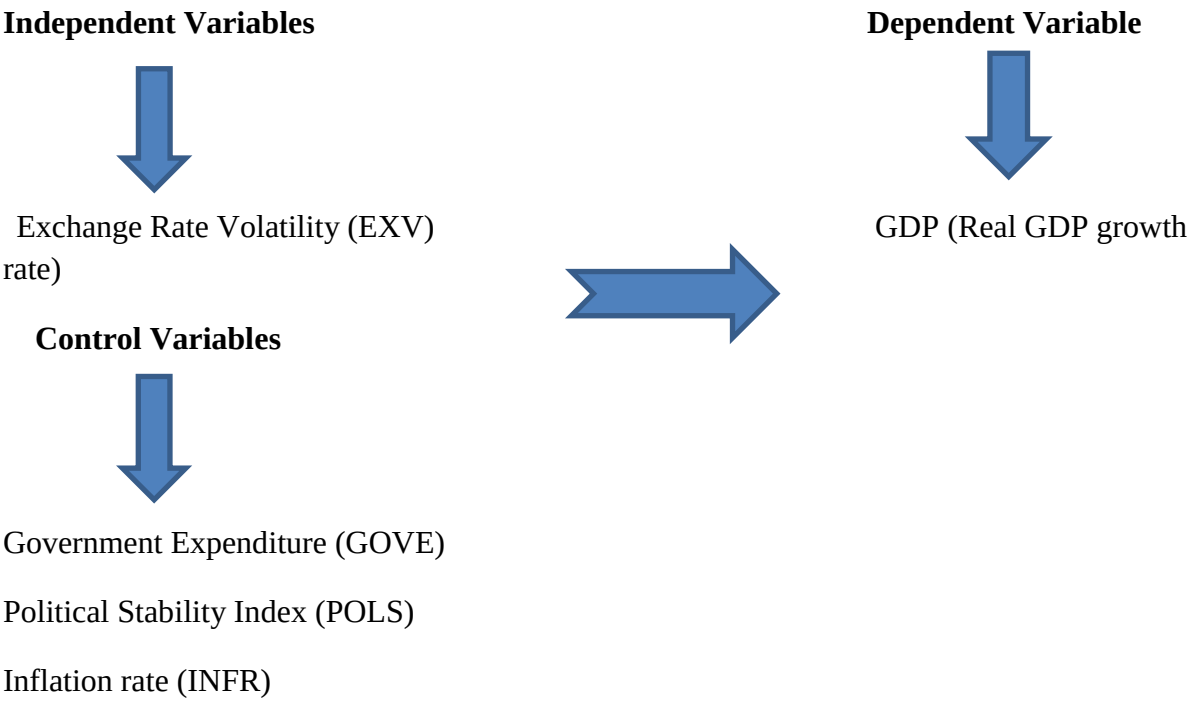
3.3.3 Control variables

Inflation rate: Inflation represented as the rate at which the average price of a basket of goods and services increases over a period of time, causing a decrease in the purchasing power of a currency. It was measured as annual percentage change in consumer price index (CPI).

Government expenditure: Government expenditure referred as one of the fiscal policy measurement and the final spending on goods and services by the government and it measured as a percent of gross domestic product (GDP).

Political stability: Political stability captured the institutional quality of the government and the likelihood of political stability, and it was measured by political stability and absence of violence /terrorism index.

3.4 Conceptual frame work



Scope

11 Selected Sub-Saharan African Countries (Balanced Panel Data: 2014–2024)

Estimation Technique

Panel-Corrected Standard Errors (PCSE)

3.5 Estimation technique

To estimate the relationship between exchange rate fluctuations and economic growth, the study utilized three panel data estimation techniques: the pooled Ordinary Least Squares (Pooled OLS) model, the Fixed Effects (FE) model, and the Random Effects (RE) model.

The pooled OLS model assumes that all countries are homogeneous and that there are no country-specific effects influencing economic growth. In other words, it ignores individual country characteristics and treats the data as a simple combined cross-sectional time series. In contrast, the fixed effects model assumes heterogeneity across countries. It controls for unobserved country-specific characteristics that may influence economic growth and that are correlated with the explanatory variables. This model allows each country to have its own intercept, thereby capturing time-invariant structural differences such as institutional quality, policy environment, and economic structure. The random effects model also recognizes the presence of country-specific effects; however, it assumes that these effects are random and not correlated with the explanatory variables (Torres-Reyna, 2010).

To determine the most appropriate model for the study, statistical tests were conducted. First, the F-test was used to decide between the pooled OLS model and the fixed effects model. If the test result was statistically significant, the fixed effects model was preferred over the pooled model (Vijayamohanan, 2016). Second, the Hausman test was employed to choose between the fixed effects and random effects models. If the Hausman test was significant, the fixed effects model was selected; otherwise, the random effects model was considered appropriate (Torres-Reyna, 2010).

To ensure the robustness of the model there was autocorrelation (is used to test whether the error term in a given country is correlated across time or not), heteroskedasticity (the variance of the error term was not constant across countries and over time) and cross sectional dependence tests (was used to test whether the residuals are correlated across entities). The panel was assumed to be balanced and estimation was conducted through STATA software.

Chapter Four

4. Results and discussions

4.1 Descriptive statistics

The descriptive statistics presents mean, standard deviation, minimum and maximum of variables in the model.

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	121	4.043	5.196	-29.433	12.71
EXV	121	.09	.189	0	.959
INFR	121	15.257	41.429	-2.815	359.093
GOVE	121	14.88	5.825	5.516	26.377
POLS	121	-.634	.921	-2.363	1.283

Table 4.1: Descriptive statistics

Source: Author's own computation using STATA software

As we observed from the table 4.1 it represents the characteristics of the variables in the model including economic growth (GDP), exchange rate volatility (EXV), inflation rate (INFR), government expenditure (GOVE) and political stability index (POLS) across 11 countries and 121 observations.

1. Economic growth (GDP

From the table GDP has mean of 4.043 and standard deviation of 5.196 respectively. This indicates the variability in economic growth rates across countries and years in the study. Also the maximum (12.71) and minimum (-29.433) values indicates strong economic expansion and severe economic growth periods in the study period and country respectively.

2. Exchange rate volatility(EXV)

The average value of EXV is 0.09, it represents there was relative low average exchange rate fluctuations during the period and across countries in the study. Also there was moderate standard deviation 0.189 (low variability) around the mean. The maximum and minimum values 0.959 and 0 respectively shows there was stable exchange rates in some countries while significant volatility in others. This variation may influence economic growth across countries.

3. Inflation rate (INFR)

There was high average inflation 15.257 in the study and high variability 41.429 in inflation rates across countries. The negative minimum value -2.815 and maximum value 359.093 indicates deflation and hyperinflation respectively. These two values implies about macro-economic instability across countries.

4. Government expenditure (GOVE)

The mean value of government expenditure 14.88 and the standard deviation 5.825 implies there was variation in government expenditure across countries. Also the maximum and minimum values indicate there was a gap in government expenditure across sampled countries.

5. Political stability index (POLS)

The negative mean value of political stability (-0.634) on average indicates there was a relatively political instability across countries and a moderate standard deviation (0.921). Also the maximum (1.283) and minimum (-2.363) values reflect relatively stable economic environments and unstable political conditions respectively across countries.

4.2 Correlation analysis

Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) GDP	1.000				
(2) EXV	-0.508	1.000			
(3) INFR	-0.393	0.672	1.000		
(4)GOVE	-0.129	-0.178	-0.100	1.000	
(5) POLS	0.157	-0.381	-0.348	0.313	1.000

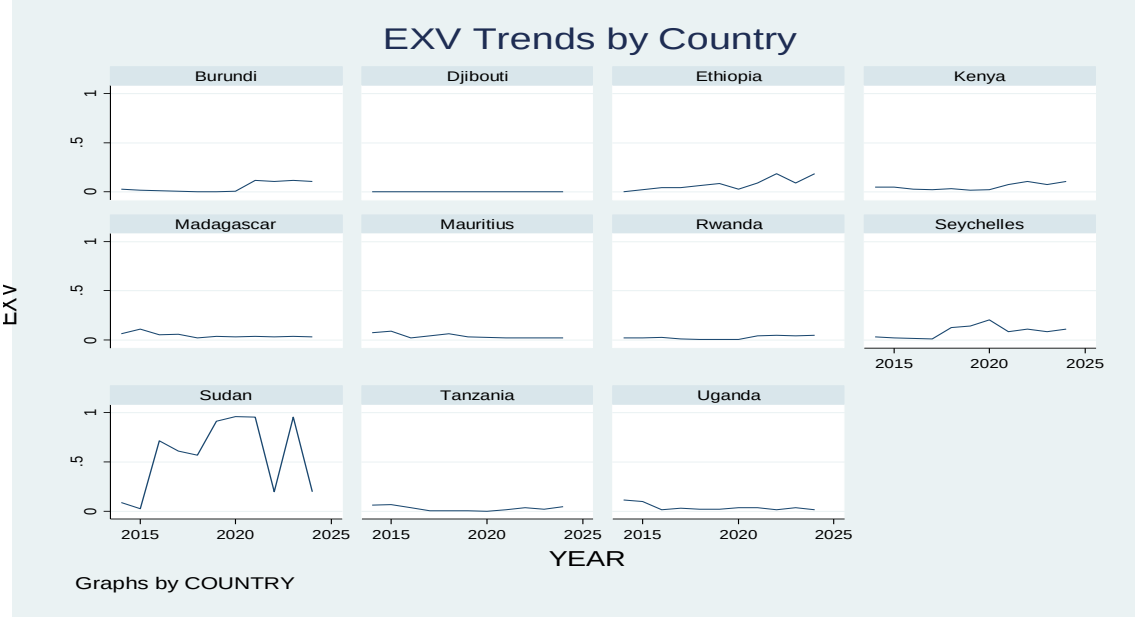
Table 4.2: correlations Matrix
Source: Author's own computation using SRATA software

The Matrix of correlations shows the relationship among economic growth, exchange rate volatility, inflation rate, government expenditure and political stability. GDP and EXV has negative correlation (-0.508), implies that low economic growth is associated with higher exchange rate fluctuations. Similarly GDP is negatively correlated with INFR which is -0.393 it presents that high inflation rate affects economic growth negatively. However, the correlation coefficient of GOVE shows a weak negative relationship with GDP (r = -0.129), suggesting that higher government expenditure may have a slight negative impact on economic growth, potentially reflecting a crowding-out effect. The correlation matrix between POLS and GDP is positive and this implies economic growth improved with stable political environment.

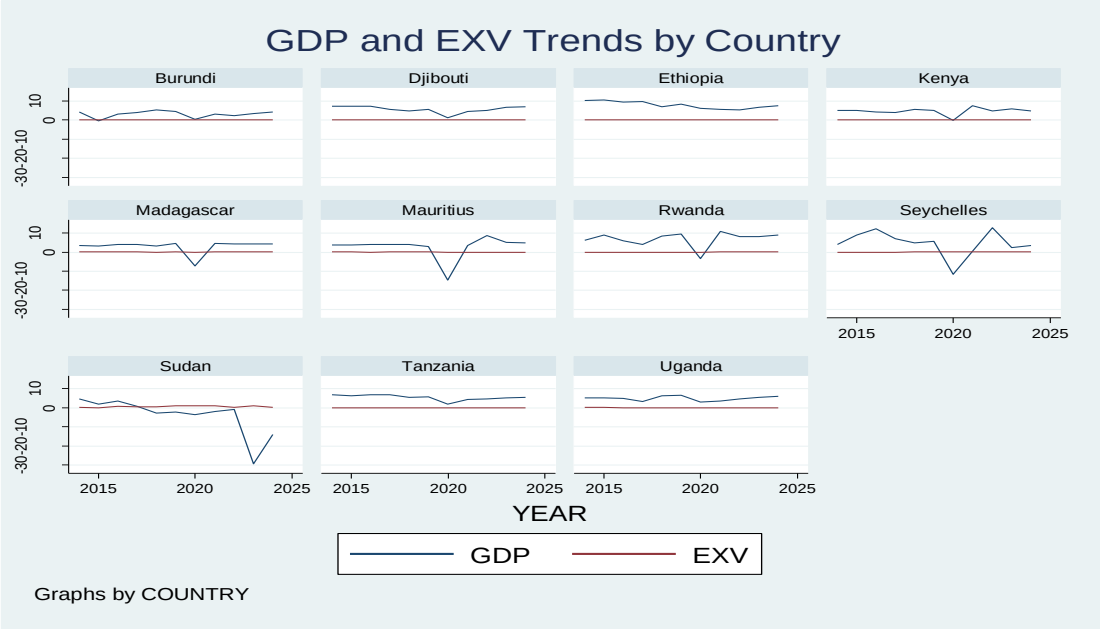
From explanatory variable i.e. EXV, INFR, GOVE and POLS, EXV and INFR have positive correlation (0.672), indicates that the effect of each variable goes on the same direction. Also the correlation between EXV and GOVE (-0.178) suggesting that even if they have negative correlation among them the effect is not strong. The relationship between INFR and GOVE is weak and negative (-0.1) implies higher government expenditure may have negative effect on inflation rate. The correlation coefficient of POLS and GOV (0.313) implies with strong political environment there is higher public spending in the economy. On the other hand POLS is negatively correlated with both EXV and INFR -0.381 and -0.348 respectively implies that with strong political stable environment exchange rate volatility and inflation rate tends to reduce.

4.3 Graphical presentation of variables in the study

4.3.1 Exchange rate and GDP trends in selected Sub Saharan African countries



The graph displays trends in exchange rate volatility (EXV) for a few chosen Sub-Saharan African nations between 2015 and 2025, showing that most of these nations have typically moderate and consistent volatility. The exchange rate situations of Djibouti, Mauritius, Uganda, Tanzania, and Rwanda have been relatively stable over the time, as seen by their extremely low fluctuations. Ethiopia and Kenya exhibit a minor rising trend in volatility over time, indicating growing exchange rate instability. Kenya, Ethiopia, and the Seychelles exhibit mild to moderate fluctuations. Sudan, on the other hand, is a prominent exception with extremely high and unpredictable volatility, marked by rapid increases and decreases that indicate extreme macroeconomic instability. Overall, the findings indicate that while the majority of nations maintain stable exchange rate circumstances, several economies Sudan in particular, and Ethiopia and Kenya to a lesser extent experience increased and increasing volatility.



Graph 4.1: trends of exchange rate and GDP across countries

Source: Author's own computation using SRATA software

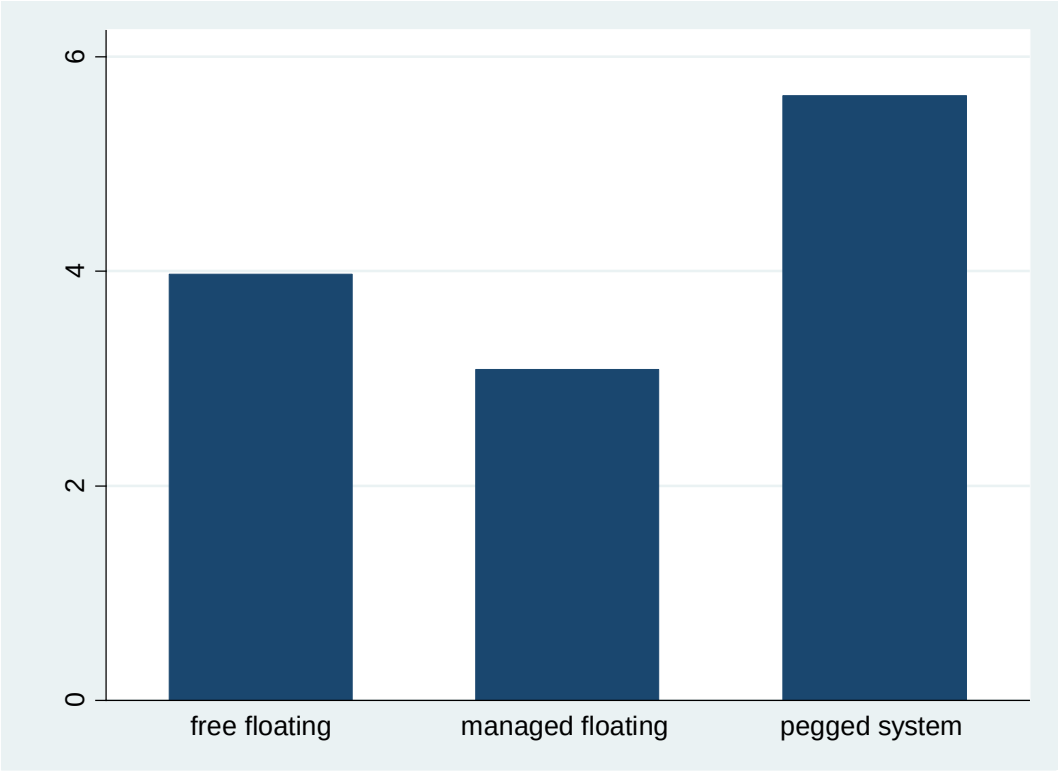
Graph 4.1 shows trends of exchange rate and GDP in selected Sub Saharan countries, and from the result we can show that there was exchange rate variability in those countries over time. From the graph countries such as Ethiopia the exchange rate fluctuation was more pronounced. Similarly, Kenya shows moderate fluctuation compared to Ethiopia with slight instability. However, countries like Uganda, Tanzania and Djibouti reflect stable exchange rate volatility.

Whereas countries like Sudan and Seychelles shows high fluctuation. There was also extreme fluctuation with spikes and drops in countries like Sudan; this may be driven by the country economic and political challenges. Countries like Burundi, Madagascar, Mauritius, and Ruanda shows relatively moderate and low fluctuation compared to others.

To sum up, the above figure indicates that exchange rate movements varied significantly across countries during the study period. The degree of fluctuation ranges from relatively stable to moderate and highly volatile patterns among the selected countries. These differences in exchange rate behavior have important implications for economic growth, as countries

experiencing higher volatility are more likely to face macroeconomic instability, while those with more stable exchange rate movements may achieve more consistent economic performance.

4.3.2 The relationship between exchange rate regimes and economic growth



Graph 4.2: exchange rate regimes and economic growth

Source: Author's own computation using STATA software

The above graph shows the relationship between mean GDP and different exchange rate regimes, i.e. free floating, managed floating and pegged systems. The results from the graph also indicated that there was clear difference among three regimes on their economic performance. Those countries which operated under a pegged system exhibit the highest GDP on average compared to free floating and managed floating; this implies that exchange rate stability may support economic growth. Also the free floating regime shows relatively stable and low economic performance compared to the pegged systems. However regimes under managed floating system exhibit lower economic performance compared to the two regimes on average. Overall the graph suggests that countries which have stable exchange rate systems reduce uncertainty and promote investment, this are associated with higher economic growth other factors remain constant.

4.4 Diagnostic tests

4.4.1 Multicollinearity test

Variance inflation factor

	VIF	1/VIF
EXV	1.928	.519
INFR	1.868	.535
POLS	1.289	.776
GOVE	1.119	.894
Mean VIF	1.551	.

To test the presence of multicollinearity among independent variables in the model, the study used variance inflation factor (VIF), and the result shown that the individual value and the mean VIF of the explanatory variables have the value below 10, and confirmed well that multicollinarity is not a problem in the model (Craney,2002).

4.4.2 Heteroskedasticity test

Modified Wald test for group wise heteroskedasticity

In fixed effect regression model

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

chi2 (11) = 276.22

Prob > chi2 = 0.0000

To test whether heteroskedasticity problem exist in the model the paper used the Modified Wald test for GroupWise test for heteroskedasticity. The null hypothesis for this test states that all countries or panels have equal variance. The result of Modified Wald test for GroupWise test concludes that the probability value is less than 0.05 due to this the problem of heteroskedasticity was exist, the Panel-Corrected Standard Errors were used (Torres-Reyna, 2010).

4.4.3 Test for serial correlation

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F (1, 10) = 3.305

Prob > F = 0.0991

To test whether exist serial correlation in panels or not the study also conducted Wooldridge test for autocorrelation, this test used to detect first order autocorrelation in the model (Torres-Reyna, 2010), and the result also shown the probability value greater than 0.05, and the null hypothesis of this test i.e. there is no first order autocorrelation is not rejected, this implies that the error terms are not correlated overtime within panels.

4.4.4 Cross sectional dependence test

Pesaran's test of cross sectional independence = 5.930, Pr = 0.0000

Average absolute value of the off-diagonal elements = 0.384

Pesaran's test for cross-sectional dependence is a statistical test that examines whether the error terms across the countries under study are correlated, with the null hypothesis stating that there is no cross-sectional dependence (Torres-Reyna, 2010). The results from the test shown, that there is significant cross sectional dependence with probability value less than 0.05, and the shocks in one country may also have effect in other country. To overcome the problem the study used robust standard errors (Panel-Corrected Standard Errors) in the model.

4.5 Model selection

4.5.1 The test for pooled OLS versus Fixed effect model

rho = 0.74616779 (fraction of variance due to ui)

F test that all ui = 0: F (10, 106) = 5.14, Prob > F = 0.0000

From the result from F test for individual effect the null hypothesis is rejected, i.e. all country specific effects are equals to zero (F test that all ui = 0: F (10, 106) = 5.14, Prob > F = 0.0000,

this suggesting that the pooled OLS model is not appropriate. Also the rho value of 0.7476 implies that around 74% of the total variation in GDP is due to unobserved country specific effects, this confirmed that the fixed effect model is more appropriate than the pooled one (Torres-Reyna, 2010).

4.5.2 The test for fixed effect model versus random effect model

Hausman (1978) specification test

	Coef.
Chi-square test value	22.86
P-value	0

To determine whether a fixed effects or random effects model is appropriate, the Hausman test were employed. Under the null hypothesis, the random effects model is consistent, meaning that the individual effects are uncorrelated with the explanatory variables (Torres-Reyna, 2010). The test yielded a chi-square value of 22.86 with a p-value of 0.001, indicating that the fixed effects model is the appropriate specification for this study.

4.6 Econometrics analysis of the study

The econometric analysis of the study is presented by using the Panel-Corrected Standard Errors (PCSE) approach. The model is estimated to examine the relationship between economic growth, exchange rate volatility, inflation, government expenditure and political stability across selected Sub Saharan countries. Because the study includes panel data with heteroskedasticity, temporal correlation, and country-specific effects across the selected Sub-Saharan African countries, the Panel Corrected Standard Errors (PCSE) estimator was chosen. When cross-sectional dependency and heteroskedasticity are present, PCSE offers more reliable and efficient standard errors than pooled OLS, which assumes homoskedastic and independent errors. PCSE is more appropriate for macro panel data where changes may be correlated over time across countries than Fixed Effects and Random Effects models. Furthermore, PCSE helps provide robust statistical inference while accounting for unobserved nation-specific variation through country dummy variables and performs better when the time dimension is relatively larger than the cross-sectional dimension.

4.6.1 Model estimation and interpretation

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable: country1 Number of obs = 121
Time variable: YEAR Number of groups = 11
Panels: correlated (balanced) Obs per group:
Autocorrelation: no autocorrelation min = 11
Avg = 11
Max = 11
Estimated covariance = 66 R-squared = 0.5368
Estimated autocorrelations = 0 Wald chi2 (14) = 540.83
Estimated coefficients = 15 Prob > chi2 = 0.0000

VARIABLES	(1) GDP
EXV	-10.000**
	(4.922)
INFR	0.0195
	(0.0208)
GOVE	-1.146***
	(0.234)
POLS	1.112
	(1.244)
2.country1	-4.559**
	(2.197)
3.country1	-12.83***
	(3.890)
4.country1	-13.09***
	(3.109)
5.country1	-11.50***
	(2.839)
6.country1	-14.05***
	(4.303)
7.country1	-8.212***
	(3.164)
8.country1	-2.196
	(3.306)
9.country1	-19.57***
	(5.113)
10.country1	-17.37***
	(4.272)
11.country1	-17.09***
	(3.972)

Constant	33.35***
	(6.386)
Observations	121
Number of country1	11
R-squared	0.537

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

To examine the consequence of exchange rate fluctuation on economic growth the study employed Panel-Corrected Standard errors (PCSE) regression model across 11 selected Sub Saharan countries with balanced panel of 121 observations. As indicated by a Wald Chi-square value of 540.83 with a probability value of 0.00 the model is overall statistically significant. Implies, jointly the explanatory variables have a significant effect on GDP. The value of R – square 0.5368 in the model implies that approximately the explanatory variables including country specific effects explained the variation in GDP approximately by 53.7%.

EXV shows a negative statistically significant effect on GDP at 5% of significant level. The coefficient of -9.9998 and p – value implies that a one unit increase in exchange rate volatility(0 to 1) other thing remain constant leads to decrease approximately by 10 units in GDP, indicating that higher volatility in the exchange rate reduces economic output. This result indicates that exchange rate volatility has a negative effect on economic growth. The variable government expenditure (GOVE) has statistically negative effect on GDP. The coefficient and the p value -1.1459 and 0.00 respectively implies that the when government increase its expenditure by one unit economic growth reduce by 1.1459 unit, other things remain constant.

Unlike the above variables, the coefficient of INFR and POLS are statistically insignificant in explaining GDP. The positive coefficient of 0.0195 with p value of 0.348 of INFR indicates that the effect on GDP in this model and selected sample countries were insignificant. This suggests that the inflation effect on GDP may not direct. Although the coefficient of political stability is positive (POLS) 1.1119 with p value 0.372. This indicates that, while political stability is associated with economic growth the relationship is not strong enough for this model and samples.

The dummy variable country1 which captures country specific effects show a significant difference in GDP levels across countries compared to the reference category. Except one

dummy variable all variables are negative and statically significant, implies that compared to the base country countries have lower GDP after controlling for macroeconomic variables. The difference among countries is because of structural differences among countries.

The coefficient of the constant term (33.3539) is statistically significant, and it implies that the baseline value of GDP, when all other explanatory variables are equal to zero that is, when both the explanatory and country-specific variables take a value of zero is 33.3539. Overall, the result indicates that exchange rate fluctuations and government expenditure are the most important determinants of economic growth in the study, both indicates statically significant effect on GDP. On the other hand, inflation rate and political stability are not statically significant effect on GDP in the sample. The result also show there was cross country differences across countries.

Chapter Five

5. Conclusions and policy implications

5.1 Conclusion of the study

The study examined the consequences of exchange rate fluctuations on economic growth in 11 selected Sub-Saharan African countries. The analysis was based on a balanced panel dataset comprising 121 observations. The dependent variable of the study was GDP growth rate, while exchange rate volatility, inflation rate, government expenditure, and political stability were used as explanatory variables. Both descriptive statistics and econometric techniques were employed to achieve the objectives of the study. The descriptive results revealed substantial variation in economic growth across the selected countries. In addition, the graphical analysis showed that exchange rate movements differ across countries; while some countries experienced relatively stable exchange rates, others exhibited high volatility. The correlation analysis further indicated that exchange rate volatility, government expenditure, and inflation are negatively associated with economic growth, whereas political stability shows a positive association with GDP growth. Before estimation, diagnostic tests confirmed the presence of heteroskedasticity and cross-sectional dependence in the panel data. Accordingly, the Panel-Corrected Standard Errors (PCSE) estimation technique was applied. The econometric results indicate that exchange rate volatility and government expenditure have a statistically significant negative effect on economic growth. This implies that higher exchange rate fluctuations and inefficient public spending are associated with lower economic growth in the selected Sub-Saharan African countries. Inflation and political stability, however, were found to have statistically insignificant effects on economic growth within the model. The findings suggest that exchange rate stability plays a crucial role in promoting sustainable economic growth in Sub-Saharan Africa. The results are consistent with the theoretical literature reviewed in Chapter Two, including the Absorption Approach, the Marshall–Lerner Condition, and the Keynesian Open Economy Model. The Keynesian Open Economy Model posits that exchange rate instability creates uncertainty in macroeconomic performance, trade, and investment, thereby adversely affecting economic growth. Similarly, the findings of this study confirm that exchange rate volatility can significantly hinder economic growth in several Sub-Saharan African countries. The results also support the Marshall–Lerner Condition, which suggests that in economies characterized by high import dependence and weak

export responsiveness features common in many Sub-Saharan African countries exchange rate fluctuations may not generate the expected growth benefits. Furthermore, the Absorption Approach, which emphasizes the role of domestic spending and macroeconomic balance, is consistent with the observed negative effect of government expenditure on economic growth, particularly where public spending is inefficient or poorly allocated.

5.2 Policy implication

As the negative effect of exchange rate volatility on economic growth indicates, policymakers should focus on maintaining exchange rate stability through appropriate monetary and fiscal policy instruments. The negative impact of government expenditure on economic growth suggests that governments should prioritize the efficiency of public spending by investing in infrastructure, education, and health sectors. Even though both inflation and political stability were found to be statistically insignificant, policymakers should continue to maintain price stability and strengthen political institutions to support sustainable economic growth. Even though this study found inflation to be statistically insignificant, price stability is still crucial for macroeconomic stability. Since ongoing inflation volatility might have an indirect impact on investment and exchange rate stability, policymakers should keep enacting prudent monetary policies targeted at reducing inflation expectations. Political stability is still an essential structural element for long-term economic growth, even though the regression findings did not show that it was statistically significant. Governments should keep strengthening governance frameworks, the rule of law, and institutional quality because these elements boost investor confidence and foster a stable economic climate. The results indicate that policy coordination particularly exchange rate stability and fiscal policy management is a key policy priority for achieving sustainable economic growth in Sub-Saharan African countries. Monetary policy tools for exchange rate and inflation control and fiscal policy measures that improve the efficiency and productivity of public expenditure.

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Appendix

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	121	4.043	5.196	-29.433	12.71
EXV	121	.09	.189	0	.959
INFR	121	15.257	41.429	-2.815	359.093
GOVE	121	14.88	5.825	5.516	26.377
POLS	121	-.634	.921	-2.363	1.283

Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) GDP	1.000				
(2) EXV	-0.508	1.000			
(3) INFR	-0.393	0.672	1.000		
(4) GOVE	-0.129	-0.178	-0.100	1.000	
(5) POLS	0.157	-0.381	-0.348	0.313	1.000

Variance inflation factor

	VIF	1/VIF
EXV	1.928	.519
INFR	1.868	.535
POLS	1.289	.776
GOVE	1.119	.894
Mean VIF	1.551	.

Pesaran's test of cross sectional independence = 5.930, Pr = 0.0000
Average absolute value of the off-diagonal elements = 0.384

Hausman (1978) specification test

	Coef.
Chi-square test value	22.86
P-value	0

xtpcse GDP EXV INFR GOVE POLS i.country1

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable: country1 Number of obs = 121

Time variable: YEAR Number of groups = 11

Panels: correlated (balanced) Obs per group:

Autocorrelation: no autocorrelation min = 11

avg = 11

max = 11

Estimated covariances = 66 R-squared = 0.5368

Estimated autocorrelations = 0 Wald chi2(14) = 540.83

Estimated coefficients = 15 Prob > chi2 = 0.000

| Panel-corrected

GDP | Coef. Std. Err. z P>|z| [95% Conf. Interval]

---+---

EXV | -9.999842 4.9217 -2.03 0.042 -19.6462 -.3534866

INFR | .019514 .0208092 0.94 0.348 -.0212713 .0602993

GOVE | -1.145883 .2337027 -4.90 0.000 -1.603932 -.6878336

POLS | 1.111886 1.244451 0.89 0.372 -1.327193 3.550966

|

```
   country1 |
          2 |  -4.559048   2.197368    -2.07   0.038    -8.865811   -.2522852
          3 |  -12.82986   3.890001    -3.30   0.001    -20.45412   -5.205598
          4 |  -13.08978   3.108885    -4.21   0.000    -19.18308   -6.996478
          5 |  -11.49764   2.838663    -4.05   0.000    -17.06131   -5.933958
          6 |  -14.05211    4.30283    -3.27   0.001     -22.4855   -5.618716
          7 |  -8.211569   3.164342    -2.60   0.009    -14.41356   -2.009574
          8 |   -2.19603   3.305891    -0.66   0.507    -8.675457    4.283396
          9 |  -19.56893   5.113193    -3.83   0.000    -29.59061   -9.547261
         10 |  -17.36925   4.272356    -4.07   0.000    -25.74291   -8.995583
         11 |  -17.09094   3.971638    -4.30   0.000     -24.8752   -9.306668
            |
      _cons |   33.35388   6.385792     5.22   0.000     20.83796    45.86981
------------------------------------------------------------------------------
```

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