

**ASSESSING THE IMPACT OF EXCHANGE RATE  
FLUCTUATIONS ON RICE IMPORT PRICES IN FIVE  
WEST AFRICAN COUNTRIES: AN ECONOMETRIC  
APPROACH USING THE GENERALISED METHOD  
OF MOMENTS (GMM)**

**A Thesis**

**Submitted to the Master's Study Program of Economics at the faculty of  
economics and business in partial fulfilment of the requirements for the  
degree of**

**Master of Arts in Economics (M.A.)**



by:

Amadou Gissay

03212320006

UNIVERSITAS ISLAM INTERNASIONAL INDONESIA  
DEPOK  
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## **ACKNOWLEDGEMENT**

I would like to express my deepest gratitude to everyone who has supported me throughout my academic journey, culminating in this thesis, "Assessing the Impact of Exchange Rate Fluctuations on Rice Import Prices in Five West African Countries." An Econometric Approach Using the Generalised Method of Moments (GMM).

First and foremost, I want to extend my heartfelt thanks to my chairman, Dr. Rininta Nurrachmi, and my supervisor, Dr. Teguh Yudo Wicaksono whose guidance, encouragement, and insightful feedback have been invaluable in shaping my research. I am also grateful to my examiners, Dr. Fajar B. Hirawan and Dr. Dionisius A. Narjoko, for their constructive critiques and support to see that I produce an amazing document that will be of help for future researchers.

I would also like to express my deepest appreciation to my parents, Salifu Gissay and Fatoumatta Gissay, for their unwavering love, motivation, and prayers since my high school days and I so honoured to have you both in my life. A special acknowledgment also goes to the late Aunt Kumba Jallow, whose belief in me will always be cherished as she has stood by me through my trying times to see that I have the best education in life. Additional thanks to my sister Ramatoulie Gissay, Jainaba Sowe (Yajai), Ramata Sowe, Auntie Adama Jallow, Janjume Jallow, and Sereh Y.C. Darboe for their support, prayers and words of wisdom throughout my stay in Indonesia. I am particularly grateful to my best friend, who has stood by me through late nights study moment to see that my thesis is completed with a great insight for policy makers. Finally, my sincere thanks to Yakuba Cham, Dr. Christopher Belford, Sheriff B. Njie, Yakuba Mamburey, Issa Hamidou, Momodou Salieu Jallow, Jacy Joof, Alfusainey Jarju (Former Chief of FBKD) and everyone else who has contributed to my academic journey. Your support has meant the world to me.

Thank you all

## ABSTRACT

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West Africa's heavy reliance on food imports, particularly rice, renders the region vulnerable to external market fluctuations, especially since these imports are primarily dollar-denominated. Currency depreciation exacerbates inflation, adversely affecting food security and purchasing power. This paper investigates how exchange rate fluctuations influence rice import prices and whether they impact monetary policy in major importers like Nigeria, Ghana, Senegal, Côte d'Ivoire, and Benin. Utilizing a monthly panel dataset from 2000 to 2024 and employing the System Generalised Method of Moments (GMM), the study reveals significant price persistence, with past rice prices heavily influencing current prices. Depreciation of exchange rates has a pronounced effect on import prices, indicating high sensitivity to currency fluctuations. Additionally, global food prices and trade tariffs contribute to rising costs, intensifying consumer vulnerability to international market shocks. The research further shows that exchange rate fluctuations significantly influence monetary policy decisions, particularly concerning interest rates. Central banks tend to tighten monetary policy in response to currency depreciation and rising food prices. However, the inertia in interest rate adjustments suggests a slow monetary policy transmission process in the Sub-Region. The study advocates for sound fiscal policies, effective foreign exchange interventions, and improved governance to mitigate food import inflation. Additionally, future research may extend to wheat, maize, or use an importable stable index to test whether past-through elasticities differ by cereal. Similarly, for the household's welfare link, coupling the price pass-through with LSMS-type consumption data could help estimate real-income effects on poor households versus non-poor households.

*Keywords: Rice Import Price, Exchange rate fluctuation, Monetary Policy, West Africa, Generalised Method of Mome*

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## ABBREVIATION DIRECTORY

|     |                                     |
|-----|-------------------------------------|
| RIP | : <i>Rice Import Price</i>          |
| EXG | : <i>Exchange Rate</i>              |
| PPP | : <i>Purchasing Power Parity</i>    |
| IRP | : <i>Interest Rate Parity</i>       |
| MFT | : <i>Mundell-Fleming Model</i>      |
| WA  | : <i>West Africa</i>                |
| FPI | : <i>Food Productivity Index</i>    |
| GDP | : <i>Gross Domestic Product</i>     |
| CPI | : <i>Consumer Price Index</i>       |
| DPM | : <i>Dynamic Panel Model</i>        |
| CD  | : <i>Cross Sectional Difference</i> |
| MP  | : <i>Monetary Policy</i>            |
| IR  | : <i>Interest Rate</i>              |

# **CHAPTER I**

## **INTRODUCTION**

West Africa's main international trading currency is the US Dollar. The region relies heavily on food imports, especially staple cereals like maize, wheat, and rice. Because of this, changes in exchange rates have significant effects on food prices. Since the US Dollar is dominant in international trade in West Africa, any drop in local currencies against the Dollar leads to higher food costs and worsens inflation. This situation reduces household purchasing power and increases food insecurity throughout the region. The problem has become clearer as ongoing currency devaluation keeps pushing up the price of essential food imports. It is important to understand how changes in exchange rates relate to food import prices. This knowledge is vital for evaluating the region's economic stability and creating plans to alleviate the growing food crisis. With millions of people facing hunger, addressing this issue needs immediate action from policymakers, economists, and trade experts to protect economic stability and food security.

This chapter serves as an introduction to the thesis. It provides the research context and explains why West Africa continues to import food. It also discusses how exchange rate changes impact food import prices. Additionally, it lays out the problem statement, research goals, research questions, significance and originality of the study, hypothesis, scope, and overall structure of the thesis.

### **1.1 Research Background**

West Africa, officially called the Economic Community of West African States (ECOWAS), was established in 1975. It is one of Africa's major sub-regions, with a population of 419 million people in 2021 (World Bank, 2021). The region includes 17 member states that aim for similar goals in trade, conflict resolution, migration, and economic growth. Collectively, these countries have a Gross Domestic Product (GDP) of about \$676 billion. Nigeria is the largest economy, contributing around \$363 billion (Economic Community of West African States, 2025). Other notable economies in the area include Ghana, Côte d'Ivoire, Senegal, and Benin.

Figure 1.1 below shows the GDP shares of countries in West Africa from 2014 to 2022. It highlights the economic changes in the region. Nigeria, while still the dominant economy, has seen its GDP share decline from 73.1% in 2014 to 63.7% in 2022. This shows a gradual decrease in its dominance. In contrast, Ghana and Côte d'Ivoire have experienced steady growth. Ghana's share increased from 7.0% in 2014 to 9.5% in 2022. Côte d'Ivoire's

share rose from 6.3% to 9.0% during the same time frame. The combined GDP share of other West African countries, including Senegal, has also grown, rising from 12.9% in 2014 to 18.8% in 2022. This indicates that smaller economies are gaining strength alongside the larger ones. Overall, it seems that the regional economy is becoming more balanced.



Figure 1. 1 Country shares in West Africa's GDP 2014 to 2022 (%)

Source: African Development Bank Statistics (2023)

Despite these positive developments, West Africa still faces significant challenges in achieving self-sufficiency, especially in essential goods like food. The region relies heavily on food imports, making it vulnerable to external shocks, such as changes in exchange rates. These fluctuations put additional financial pressure on households (Gizaw and Myrland, 2025). The collapse of the Bretton Woods exchange rate system in 1973 led to a flexible exchange rate system in West Africa and introduced significant volatility. This volatility has affected the region's ability to maintain stable food imports (Mati et al., 2024). Changing exchange rates have complicated the cost of importing staple foods, worsening West Africa's dependence on outside markets.

Over the past fifty years, the region has struggled to achieve self-sufficiency in producing staple foods, particularly maize, wheat, and rice. According to the Food and Agriculture Organisation of the United Nations (2025), maize, rice, and wheat are the most widely consumed cereals in West Africa. They form the dietary foundation for much of the region's population. These staple crops are important not just for calories but also for their cultural significance in local cuisines, driving demand in both rural and urban areas.

As shown in Figure 1.2 below, the average daily cereal caloric intake per person varies greatly across the region. Nigeria leads, with about 82% of total daily calories coming from cereals. Ghana follows at 80%, Senegal at 77%, Côte d’Ivoire at 75%, and Benin at 70%. These five countries have the highest levels of cereal dependence, reflecting both their large populations and their dietary focus on staple grains. Other countries in the region have slightly lower figures: Burkina Faso (43%), Sierra Leone (40%), Niger (37%), The Gambia (36%), and Liberia (35%) still show significant reliance, though less than the top five. Meanwhile, countries like Guinea-Bissau (34%) and Cape Verde (28%) show relatively lower cereal intake proportions, suggesting more diverse food consumption or differences in access. The distribution highlights the need to focus on Nigeria, Ghana, Senegal, Côte d’Ivoire, and Benin. Their high reliance on cereals increases their exposure to exchange rate changes, which are important concerns in discussions about regional agriculture and food policy.

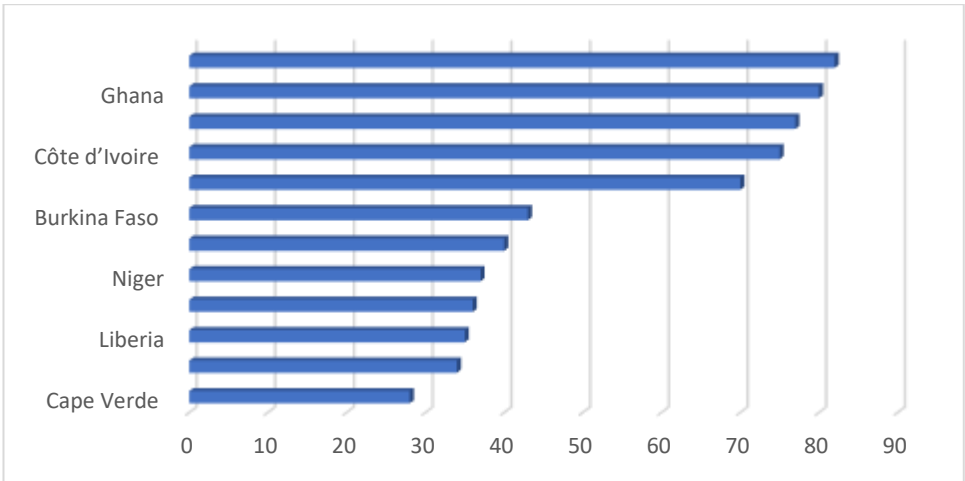


Figure 1. 2 Average per capita cereal intake across heavily imported countries in West Africa in 2023(%)

Source: Directorate General for Commission Agriculture and Rural Development (2024)

Despite efforts to increase agricultural output, local production has not kept up with rising demand. This leaves West Africa heavily dependent on imports. You can see this dependence in the region’s top imported food products for 2023, as shown in Figure 1.3 below. Cereals are at the top, with an import value of \$1,824 million. Dairy products follow at \$884 million per metric ton. Other imported food categories, such as vegetables, poultry and eggs, nuts and seeds, and oils and fats, make up smaller portions of total imports. The large volume of cereal imports highlights the region’s reliance on global markets to meet staple food needs. This raises concerns about food security and price stability.

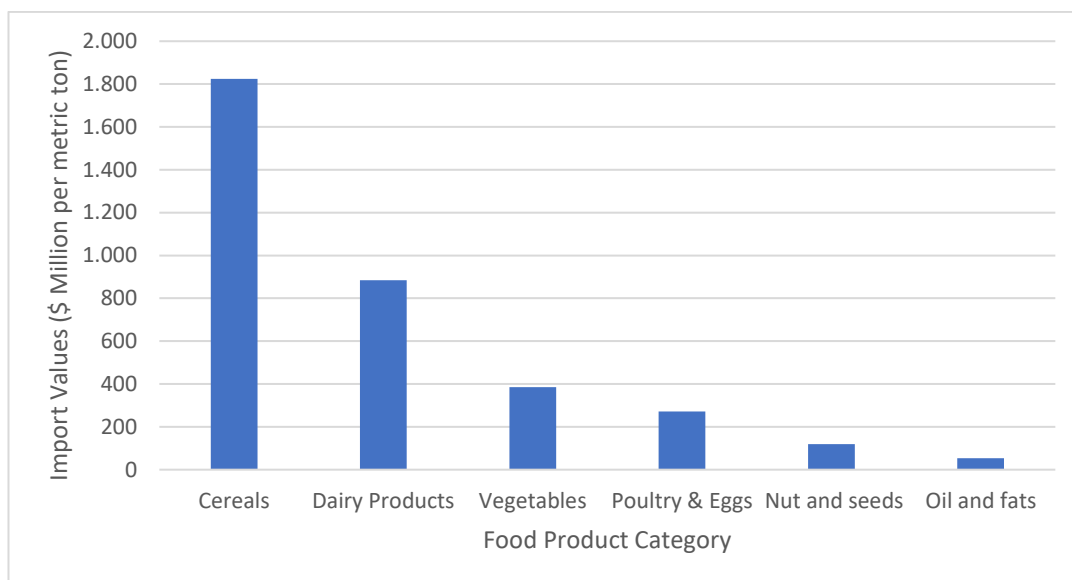


Figure 1. 3 Imported Food Products in West Africa in 2023

Source: Directorate General for Commission  
Agriculture and Rural Development (2024)

Rice makes up the largest part of cereal consumption, as shown in Figure 1.4 below. It accounts for 73% in Nigeria, 63% in Côte d'Ivoire, 56% in Senegal, 54% in Benin, and 48% in Ghana. Maize consumption differs by country, with the highest share in Ghana at 35%. Benin follows with 29%, Côte d'Ivoire with 20%, and Senegal with 16%. Wheat, though less common, contributes between 10% in Nigeria and 21% in Senegal of total cereal consumption. This strong reliance on imports results from production issues, changing dietary habits, and economic factors, especially exchange rate fluctuations. These fluctuations directly affect food prices and household purchasing power (FAO, 2022).

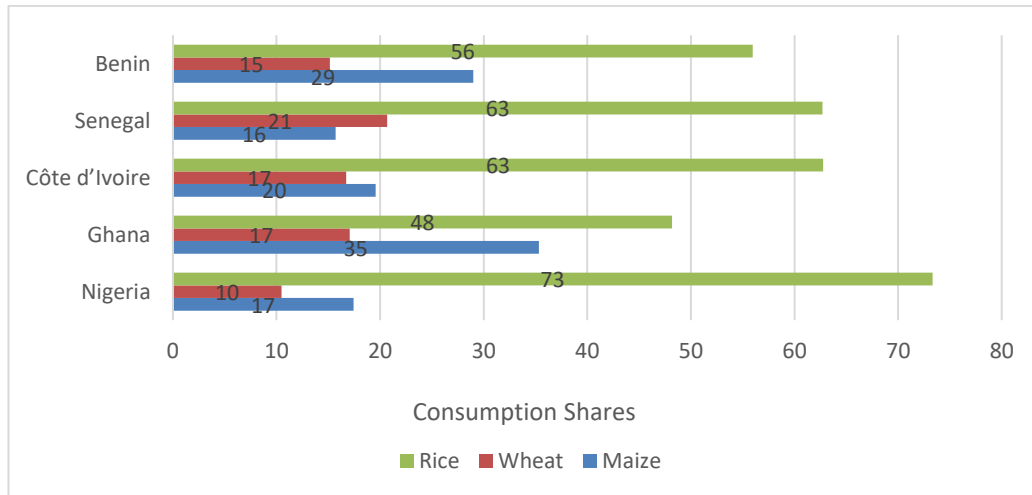


Figure 1. 4 Consumption Share of Maize, Wheat, and Rice in Heavily Imported West African Countries (%)

Source: Authors' calculations based on FAO Stat from 2022 data

*Note: Consumption shares are expressed as a percentage of daily per capita caloric intake for a specific cereal by dividing its caloric intake by the total cereal caloric intake.*

A key reason for this reliance on imported cereals is the long-standing challenges within the region's agricultural sector. While global food markets grew in the late 20th century thanks to technology that improved cereal yields, West African agriculture had difficulty keeping up (Berkum & PETERS, 2025). Countries like the United States, Canada, and France took advantage of economies of scale, government subsidies, and efficient supply chains, allowing them to lead in global cereal exports (Janvry & Sadoulet, 2022). In contrast, West African farmers face ongoing obstacles, such as low mechanisation, limited access to modern supplies, and poor storage and transportation infrastructure (Agra 2021). These issues have consistently caused production shortfalls, forcing governments and private businesses to depend on imports as a stable food source.

The development process of succeeding farming activities, such as urbanisation and shift in diet, has augmented the dependence of the region on imported cereals (Okou et al., 2022). With an increase in urban population, people are increasingly consuming wheat-based food such as bread, pasta, and rice, and consumption is on the rise as a staple food in a household (Reardon et al., 2019). Despite the fact that West Africa still largely depends on maize to sustain its food demands, local supply is finding it difficult to keep up with the demands. To fulfil the consumption demand, the region imports large volumes of rice from India and Thailand, maize from Russia and Ukraine, and wheat from the United States, Canada, and Argentina (FAO, 2022). Although such imports stabilise the food prices

and contribute to food security, the affordability of the imports is sensitive to fluctuations in the exchange rates and hence the cost of food tends to be unpredictable to a consumer. Given that the majority of the food that is imported is priced in US dollars, devaluing local currencies will have a direct effect of increasing the prices of food and inflation, and thus, citizens will not be able to afford some basic needs. This is evident in the global food price crisis during 2014-2016, when the loss of strength of the Nigerian naira, Ghana cedi, and other regional currencies made food imports so expensive (IMF, 2017). More recently, global economic disruptions have led to further currency depreciation, pushing up cereal prices and worsening food insecurity (World Bank, 2023). Dada & Femi-Olagundoye (2023) note that the strengthening of the US dollar against other currencies has worsened price hikes, affecting consumers who must pay more for essentials. These aspects explain the relationship between the fluctuation of exchange rates and the continued dependence of West Africa on imports, which is still a burden on the economy and households. Since strong home currencies might be able to momentarily reduce the importation prices and stabilise the food prices, the periods tend to be short-lived. Governments have employed methods such as subsidies, limits on importation, and strategic grain reserves in order to minimise the effects of fluctuations in food inflation and economic stability (Ekeruche, 2020). Although these policies can offer reprieve, they fail to address broader structural faults that have perpetuated the trend of dependency on imports and vulnerability of economies to changes in currency.

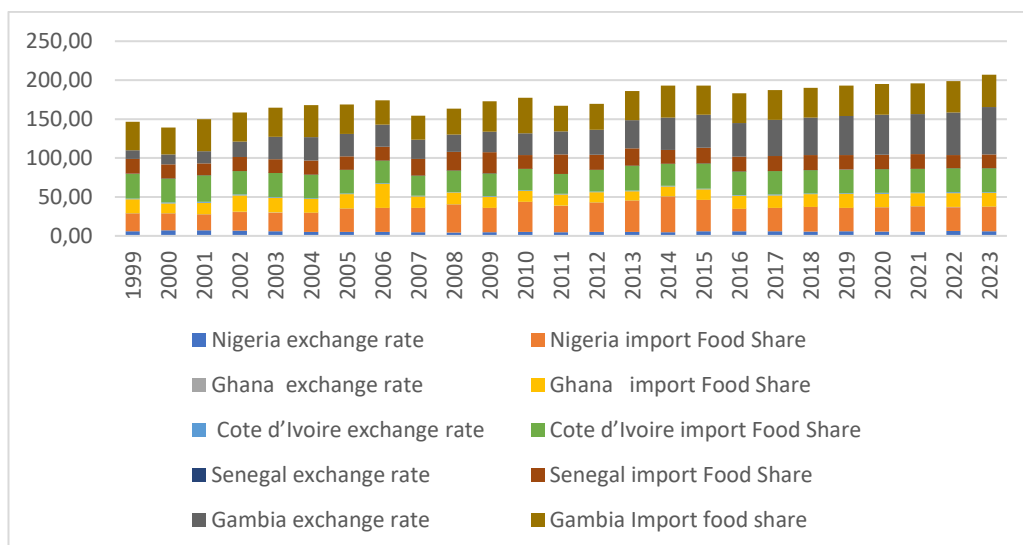


Figure 1. 5 Exchange Rate Fluctuations on Food Import Share.

Source: World Bank

The correlation between the food import dependency versus exchange rate fluctuation manifests itself in West Africa. Figure 1.5 above shows that the fluctuations in the exchange rates normally go hand in hand with the increase in the share of importation of food in West African countries, especially Nigeria, Ghana, Côte d'Ivoire and Senegal in the period between 1999 and 2023. The continuous depreciation of the exchange rate in Nigeria has also been characterised by the rising food dependencies in importation, especially between 2010 and 2023, showing that the country is increasingly becoming dependent on foreign markets. On the same note, Ghana has recorded high levels of depreciation of its currency since 2010, a factor that has been matched with increased importation of foodstuffs and inflation in household spending. The trends of Côte d'Ivoire and Senegal can be seen as rather steady, although both countries are susceptible to the changes in prices of global commodities, which tend to influence the balance of trade and the economic well-being of these countries. These trends highlight the strong relationship between exchange rate volatility and not only food import dependency, but also a wider economy, such as inflation.

Since the region is exposed to external market forces, there is our dire need for policies to boost the level of local cereal production and lower the level of importation. The production gap can be closed by enhancing agricultural productivity using modern techniques, better irrigation systems, and storage facilities. At the same time, the economic risks of currency fluctuations can be softened through proper foreign exchange management policies and better regional economic trade integration into West Africa.

Unless this happens, then the region is bound to be hit by the external shocks, and the exchange rate will remain volatile and thus affecting food security and stability of the country.

## **1.2 Problem Statement**

Food prices have risen globally, hitting record highs in 2022, according to the FAO's estimate of the world food situation (Food and Agriculture Organisation of the United Nations, 2025). This poses a challenge for food security everywhere, especially for emerging nations like West Africa that depend on imported food. In addition, unlike previous food crises, they now face two issues. They not only have to pay more for the food they import, but the depreciation of their currency also adds to the price increase (UN Trade and Development, 2022).

West Africa is facing severe challenges due to currency depreciation and rising food import prices. The significant decline in the value of West African currencies has made food imports more expensive, driving inflation and reducing consumers' purchasing power (Ekanem, 2024). Households in West Africa spend an average of 60% of their income on food, making them particularly vulnerable to these price changes (Bai et al., 2023). Since food is crucial for the region's economy, providing jobs for two-thirds of the population and contributing about 36% to GDP, these price shocks have wide-ranging economic effects (Organisation for Economic Co-operation and Development, 2025). Rising food prices are making it hard for millions to access a nutritious diet, which highlights the urgent need for monitoring prices and strategic actions (World Food Programme, 2024). The increase in food imports is concerning because it indicates a decline in the competitiveness of food exports. Overreliance on food imports has often led to imbalances in West Africa's food trade. For instance, in 2023, the region experienced food trade deficits, as shown in Figure 1.6 below. If the current trend in food imports continues, the country's food security will likely be at risk.

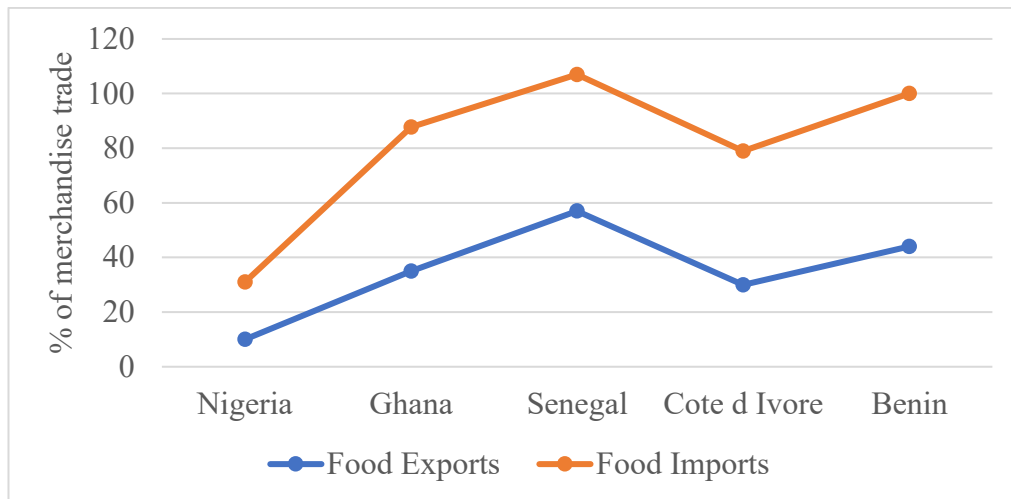


Figure 1. 6 Average food trade among West African countries (%)

Source: (World Bank, 2024)

According to OECD (2023), rising food prices are mainly caused by high food import costs. This situation stems from the decrease in the purchasing power of local currencies. The effects of currency depreciation on food prices are especially significant in countries that mostly rely on food imports. Between June 2023 and December 2024, the Nigerian naira fell from N450 to N1,600 per USD. This drop resulted in 39.84% food inflation, particularly affecting staples like maize and rice (Central Bank of Nigeria, 2025). Likewise, the Ghanaian cedi decreased from GH¢12.30 to GH¢16.05 per USD, leading to a 50% increase in food inflation (Bank of Ghana, 2025). In Senegal, Côte d'Ivoire, and Benin, the CFA franc dropped from 617 to 626 per USD, causing a 20% rise in food import prices (Central Bank of West African States, 2024).

The decline of local currencies against the US dollar has raised food import costs, putting financial pressure on both businesses and consumers (Dada & Femi-Olagundoye, 2023). Farmers, who often are net consumers in West Africa, also suffer from higher food prices, increasing their economic risk (UN Trade and Development, 2022). These trends show how changes in exchange rates affect food affordability and overall economic stability in the region. Beyond food prices, currency changes also have wider economic effects. The exchange rates in the West African Economic and Monetary Union (WAEMU) countries have gone through three distinct cycles since the devaluation of their common currency in 1994. From 1994 to 2002, the exchange rate rose, peaking at an increase of 6.6. However, it fell from 2002 to 2010 before starting to appreciate again until 2020. Despite this appreciation, it remained below the level seen in 2002, as shown in Figure 1.7. below

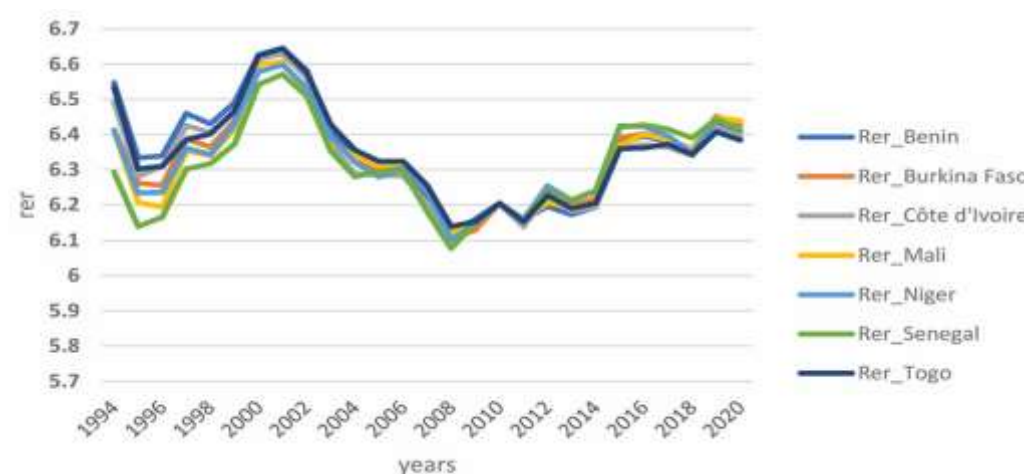


Figure 1. 7 Evolution and fluctuation of the exchange rate of the West African Economic and Monetary Union

Source: (Guidime et al., 2024)

Monetary policy actions by West African central banks have made exchange rate fluctuations worse, impacting food import prices (Nieuwsbericht, 2024; Andriantomanga et al., 2023; Although central banks have tried to stabilise currencies, many believe these efforts do not reflect market realities or improve consumer purchasing power. The Monetary Policy Committee has recognised that monetary policy has limits when it comes to fighting inflation due to ongoing issues in domestic food production. As a result, mass protests have started, with youth groups pushing for policies that support local food production instead of depending on costly imports. Some studies indicate that monetary and fiscal policies can effectively control inflation and exchange rate changes in developed countries. Nonetheless, some studies support a different opinion, saying that monetary policies can be the cause of a decline in exchange rates, and in periods of economic downturn, the risk of it is even greater (Inoue & Rossi, 2019). The continuous increase in prices of food imports and the existence of unstable exchange rates and poor monetary policies point to the necessity of specific policy adjustments. Since food importation plays a very crucial role in the economy of the West African region, it is crucial to examine the impact of exchange rate change on the price of food importation. It is this knowledge that can be used to develop more amicable fiscal and monetary policies. Stable exchange rates achieved by enhanced monetary policies are also major avenues of enhancing the stability of the economy and food security in the region.

### **1.3 Research Question**

In recent years, the effects of exchange rate changes on food import prices in West Africa have become a significant topic for discussion among scholars. Policymakers in the region argue that imported foods can help people access a wider variety of options and may lower overall food costs for consumers. This is true even though there are concerns about exchange rate fluctuations affecting these import prices. We need academic research and investor analysis to grasp how these fluctuations influence the cost of imported food. This study aims to analyse how changes in exchange rates affect food import prices in West Africa. Based on this, we developed the following research questions.

1. What is the impact of exchange rate fluctuations on imported rice prices in five West African countries over time?
2. Do exchange rate fluctuations significantly influence changes in monetary policy instruments in five West African Countries?

### **1.4 Research Objectives**

Exchange rate fluctuations are a major concern for policymakers because they directly affect food import prices in West Africa. When the currency loses value against the US dollar, the cost of imported food rises. This situation fuels inflation and lowers household purchasing power. Although some policies have been put in place to stabilise exchange rates and control food price inflation, it is unclear how effective they are.

The objective of this study is to assess the impact of exchange rate fluctuations on imported food prices in West Africa. Specifically, the study aims to:

1. Examine the impact of exchange rate fluctuations on imported rice prices in five West African countries over time.
2. Analyse whether exchange rate fluctuations significantly influence changes in monetary policy instruments in five West African countries.

### **1.5 Hypothesis of the Study**

H1: Exchange rate fluctuations have a significant positive impact on imported rice price in selected West African countries over time.

H2: Exchange rate fluctuation significantly influences changes in monetary policy instruments in five West African countries.

## 1.6 Significance of the Study

This study adds to the current literature on food price volatility by shifting the focus from overall food import prices to a country-specific look at rice import prices in five major net food-importing countries: Nigeria, Ghana, Senegal, Côte d'Ivoire, and Benin. Rice is the main staple imported food consumed in the region, unlike previous research that has examined combined food import trends. This approach provides a clearer understanding of how currency movements impact the price of staple food.

In West African countries, Rice is an important food, and therefore, it represents about 30 per cent of the total value of agricultural imports, thereby greatly impacting the currency reserves of the countries. This means that rice is the biggest agricultural import within the sub-region. Over the last three decades, this fact could not be changed significantly; at the time, the value of rice importation has almost reached one billion US dollars (Yuan et al., 2024). Thus, the policymakers and the other stakeholders dealing with the issues of food security and economic stability need to understand these price dynamics. Another important contribution is that this paper is policy-relevant. The research provides a meaningful idea by dividing the economies into flexible and rigid exchange rate regimes (Nigeria and Ghana) and fixed exchange rates (Senegal, Côte d'Ivoire, and Benin), which proves that exchange rate regimes play a significant role in the prices of rice imports. This difference is critical towards the development of policy responses that minimise exchange rate risks and stabilise food prices. Interest rates have also been considered as the mediating variable of the study, which explains the ability of the monetary policy instruments to mitigate or exacerbate the impacts of the exchange rate on the import price of rice.

Both policymakers as well as importers and households can use the results of this research. It provides facts that can contribute to better policy measures to make sure that the exchange rate fluctuations cannot impact the price level of staple foods in the West African countries to the same extent. The findings will help policymakers in deciding exchange rates and trade policies in an attempt to achieve price stability and food security. For rice importers and businesses, understanding the currency-related risks linked to rice imports will assist in financial planning and risk management. For households, particularly those from lower-income groups where rice makes up a large portion of daily consumption, stabilising rice import prices is crucial for keeping food affordable and supporting overall economic well-being.

Additionally, this study establishes a foundation for future research by emphasising the possible effects of exchange rate systems on food price stability. While this research does not directly measure the role of exchange rate policies, its findings can guide further studies on the effectiveness of various exchange rate management strategies in alleviating food price shocks. It also opens opportunities to explore how exchange rate changes interact with domestic agricultural policies to improve food security in West Africa.

### **1.7 Scope of the Study**

The focus of this research study is regional, specifically targeting West Africa, located on the African continent. The study spans a twenty-five-year period from 2000 to 2024. It examines the fluctuations in exchange rates in West Africa. Therefore, this research looks at how these fluctuations affect food import prices in the region. However, this study has encountered challenges in gathering information and data from some other West African countries, so it concentrates on the five major net food-importing countries. Additionally, timing has been a significant challenge, as most academic institutions set specific deadlines for researchers to finish their work. Despite these hurdles, the research has adhered to guidelines to minimise any negative impact on the study.

### **1.8 Organization of the Study**

The study is structured in six chapters. Chapter One highlights the research background and problem statement of the study, the objectives of the study, and the research questions. Chapter two highlights the theoretical and conceptual framework related to exchange rate fluctuation in West Africa, as well as empirical studies of the food import prices, exchange rate fluctuations, and their consequences for West African monetary policy. Chapter Three discusses the research Methods and model specification deployed for this study. Chapter Four presents the findings and discussion of the study, while Chapter Five highlights the conclusion and policy recommendations for policymakers in West Africa.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Theoretical Literature**

The first objective of this study, which investigates exchange rate fluctuation, is to identify a suitable and acceptable model that can explain the effects of exchange rate fluctuation on the prices of imported foods in West Africa. Nevertheless, the study of exchange rate volatility has emerged gigantic in West Africa since the Bretton Woods system in the 1970s. Hence, in a bid to understand the exchange rate volatility in West Africa, this research will evaluate the effect of exchange rate volatility on the prices of imported foods in West Africa using different theoretical exchange rate models. The models chosen are based on previous research in West Africa and beyond, with a focus on models that are both theoretically sound and practically implementable in the region. The models used in this study are selected based on those used by previous researchers in line with the following criteria: (i) Prominent economic literature in West Africa. (ii). Theoretical and empirical models used beyond West Africa, and (iii). Models that can be replicable and implemented in West Africa. About the said criteria, the following models were used to explain this study better: (i) Purchasing Power Parity model, (ii) Mundell-Fleming Model.

##### **2.1.1 Purchasing Power Parity (PPP) Theory**

Purchasing Power Parity (PPP) theory was developed by Cassel in 1920 to explain how purchasing power parity works in both developed and developing economies. It states that over time, exchange rates should adjust so that similar goods cost the same in different countries when their prices are expressed in a common currency. The theory also suggests that transportation costs and international trade barriers affect the prices of similar goods in various countries when measured in a common currency (Madura and Fox, 2011). The main idea of PPP is that a unit of currency in one country should allow consumers to buy a similar basket of goods as the equivalent amount of foreign currency in another country under a flexible exchange rate. This ensures that the purchasing power of the currency remains equal in both economies. Winata & Soekarno (2024) confirm that combining past exchange rates with PPP measures can clarify exchange rates. This study follows the standard version of PPP, which looks at fluctuations in exchange rates between two countries over time based on changes in their respective price levels. Likewise, Zhou (1997) notes that during the current floating exchange rate period, PPP holds well in

countries with high inflation rates and shows weaker results when broader price level changes occur that affect PPP.

Several studies suggest that international trade may be impacted if transportation costs, taxes, and tariffs change the real exchange rate, moving it toward PPP in the long run. This is particularly true for developing countries that rely heavily on foreign currency to import goods and services. Olk (2024) argues that countries with weaker currencies encounter high interest rates in the international market because their currencies are not in demand globally. This has a strong link to purchasing power parity. However, this theory does have limitations. Zubaidi et al. (2011) argue that the parity can be more flexible if the black-market rate is used to examine the purchasing power parity hypothesis. Their findings suggest that exchange rate adjustments happen more quickly on the black market than through official rates.

To check discrepancies in purchasing power parity between two countries, you can compare prices of the same items from different countries in one basket. For example, if the exchange rate between the US Dollar and CFA is \$1 to CFA 4, an item that costs CFA 8 in all francophone countries in West Africa should be priced at \$2 in the United States to achieve parity. This theory implies that in a global market economy, there should be free international trade among nations in a competitive environment. Many scholars who support PPP believe that the price of a good in one country should match its price in another country (Law of One Price). They argue that one could buy goods at a lower price in one country and resell them for a profit in another country.

Purchasing power parity features two main ideas: relative and absolute. The absolute doctrine refers to PPP being calculated based on consumer goods prices between two nations, aiming to estimate the exchange rate. It suggests that the price variation ratio of similar goods between two countries should equal the ratio of their currency exchange rates. The relative doctrine states that changes in the prices of identical goods between nations, compared to a previous equilibrium, would reflect adjustments in exchange rates. Anderl & Caporale (2022) indicate that the speed of adjustment related to purchasing power parity shows that long-term equilibrium can occur three times faster in a nonlinear context, providing stronger evidence supporting PPP.

As a result, absolute parity between countries reflects the differences in the purchasing power of their currencies. For instance, shipping costs arising from transportation, taxes, tariffs, and duties can obstruct the Law of One Price. This shows that not all goods made in one country are traded elsewhere, as the weight of similar goods in

one country's basket influences the consumer price index and differs from that of another country. Different nations often produce goods that do not match perfectly, rather than identical substitutes. Therefore, the concept of PPP aligns with international trade theory, which assumes a perfect market where countries can trade freely with each other. However, this is not always the case, as exchange rates significantly affect purchasing power parity. Thus, absolute purchasing power parity is valid if the domestic and foreign price indices function uniformly.

### **2.1.2 Interest Rate Parity (IRP)**

This theory argues that the difference in interest rates between two Nations will be the same as the expected fluctuation in exchange rates between their various currencies. This model also argued that exchange rate tenacity is geared towards investors' willingness, in which the interest rate parity situation characterises equilibrium. In addition, the Interest Rate Parity condition is a situation where the rate of return on assets that can be compared is equal between two countries. Accordingly, IRP theory explains the value and changes or correlations between spot and forward exchange rates of currencies. The anticipated returns on domestic assets will be the same as the exchange rate-adjusted projected return on foreign currency assets to fulfil the foreign exchange market equilibrium (Mati, 2014).

Additionally, this theory focuses mainly on the changes in exchange rates, inflation, and interest rates between two countries. Furthermore, the IRP suggests that transactions on a particular nation's financial account impact the value of the exchange rate on the foreign exchange market. This differs from the purchasing power parity theory, which argues that the behaviours of foreign and domestic investors cause fluctuations in the exchange rate. Furthermore, Charles Engel conducted a study on uncovered interest rate parity for the US dollar against key currencies in the short, medium, and long horizon and found out that consisting inflation rate differential during the year in and out will forecast a surplus of returns when the US dollar inflation rate is relatively high, following the return on US deposit tend to be high (Engel et al., 2022).

Similarly, Dahlquist & Pénasse (2022) conducted a study using the present value model, which indicates that the real exchange rate should forecast currency returns, and they then found out that the unavailable risk premium, not the interest rate variation, explains most of the variation in the real exchange rate. This model explains the relationship between the Interest rate differential, the real exchange rate, and currency risk premium. Capasso et al. (2019) argued that the most straightforward prediction is that a relationship

exists between the real interest rate and exchange rate asymmetrically. His bond testing method of the NARDL models indicates that the existence of co-integration between the variables and the exchange rate changes seems to have a meaningful long-run impact on the interest rate.

### **2.1.3 Mundell-Fleming Model**

The Mundell-Fleming model, also known as the IS-LM model, is an economic model created by Robert Mundell and Marcus Fleming in 1962 and 1968, respectively. The original IS-LM model focused on the economy under autarky, or a closed economy. In contrast, the Mundell-Fleming model presents a simplified version of IS-LM that includes capital flow as an important aspect. This model explains the short-term connection between the nominal exchange rate, interest rate, and output, whereas the IS-LM model only shows the link between the interest rate and output.

According to the Mundell-Fleming model, an open economy must not attempt to achieve a fixed exchange rate in the economy, a free flow of capital, and an independent monetary policy. This fact can be linked to such a concept as the impossible trinity, as observed by (Mati, 2014). Also, Wang (2020) opines that in a flexible exchange rate regime, when a country increases the money supply, there would be a rightward shift in the LM curve and which directly influences the LM curve. This will increase the exchange rate, resulting in depreciation, making the IS shift to the right. On the same note, fiscal expansion in a fixed exchange rate regime has a direct influence on the IS curve that shifts it to the right. Because the exchange rate is fixed, any decline in the current account is not offset by capital inflows, and as a result, it leads to a decline in official reserves and the money supply.

## **2.2 Conceptual Literature**

### **2.2.1 Concept of Exchange Rate**

The exchange rate refers to the value level of one currency being exchanged with another. It acts as an important price attention on the global market, which indicates the global competitiveness of national currency and affects the competitiveness of a country as well as the stability of prices within the country (Edward, 2019). The exchange rate status in West Africa largely determines the price of imports, especially basic commodities such as food (Demir & Razmi, 2022). The drop in the value of the home currency results in higher prices of imported products that may easily spill over to inflationary factors and the low purchasing power of consumers. In its simple behaviour, the exchange rate appreciates

when fewer units of local currency are needed to purchase foreign currency and depreciates when more units are needed. These variations are extremely important to the West African countries, whose cost of food imports is quite heavy, and a slight change in the exchange rates can be quite significant as far as the pricing of the staple food items is concerned. Therefore, exchange rate stability not only serves as a token of macroeconomic health but also as a source of food security and standards of living.

Stability of the exchange rate is crucial in the developing world to bring confidence to the economy and promote long-term growth. Emerging economies in the West Africa region, an exchange rate as a macroeconomic aspect plays a significant role in influencing the ease of doing business in the region, with an overall implication on the economy (Etale & Ochuba, 2019). The connection between stable exchange rates and economic growth has been debated all along. In West Africa, exchange rate fluctuations have been shown to be detrimental to the performance of the economy by previous studies since they accelerate inflation, trade volumes, and both internal and external investment. As an example, we have had recent incidents involving sharp falls in the value of currency, which has increased the costs of importation of food, which translates into inflation and the reduction of purchasing power of households and firms (Fofanah, 2020). Due to this, exchange rate stability is being heavily considered as a pillar of healthy macroeconomic policy among developing world economies in which long-run economic progress is considered.

How a particular country controls the exchange rate is what is known as the exchange rate regime, which defines how trade will take place as well as the domestic inflation pattern. The International Monetary Fund (IMF) describes the exchange rate regimes mostly in two broad categories: fixed and floating exchange rate systems. Under a fixed exchange rate regime, the currency of one country is pegged to a strong currency like the US dollar or the euro, and the central bank will directly check the foreign exchange market by intervening so that it can uphold the fixed parity of the two currencies (Casiraghi, 2022). This mostly entails the use of foreign exchange reserves and the effect of the administrative controls in regulating the supply of currency. Among the most important ones, a fixed exchange rate regime makes trade and investment possible by diminishing the level of uncertainty regarding the exchange rate and increasing predictability. Moreover, when the market participants see the fixed rate to be credible, they are less likely to provide speculative attacks on the currency, hence maintaining it stable (Binici & Das, 2021). Fixed regimes also have the capacity of exercising discipline over the domestic producers, by forcing them to keep costs down to stay competitive compared to the international

competition. Meaning that the exchange rate risk is lower under this system and there is an encouragement of the foreign investors to invest in a domestic economy, further, it also limits central banks to an overly expansionary monetary policy (Chugunov et al., 2021). Nevertheless, the negatives of this regime are great. It requires a huge stock of foreign reserves to support the currency peg and to support investor confidence.

Central banks can also be compelled to move the interest rates in ways contrary to the domestic economic demands just to sustain the peg. Also, the research authored by Ameziane & Benyacou (2022) regarding the impact of the exchange rate volatility on economic growth under the various exchange rate regimes provided the following set of conclusions: when the exchange rate is pegged at a rate that is no longer reflective of the fundamentals in the marketplace, there is a risk of a currency misalignment and this may encourage the loss of international competitiveness within the national industries. Conversely, a floating exchange rate regime is a monetary system whereby the value of the currency to be adopted is largely influenced by forces in the market in terms of supply and demand of foreign exchange with minimal direct involvement of the central bank (Levy-Yeyati & Sturzenegger, 2024). This kind of regime gives certain flexibility to countries to plan their monetary policies, thereby allowing governments to direct their attempts to domestic macroeconomic goals like controlling inflation without the burden of a fixed parity.

This is one of the main strengths of a flexible exchange rate system since automation of external shocks can be made. The exchange rate may change in the event of negative trade balances or external crises, without the explicit use of any policy intervention, thus helping to rebalance the level of payments (Ilzetzki et al., 2022). It also cushions the domestic economy against the importation of inflationary tendencies that have been going on in the world economy in a fixed regime, and helps to reduce the need to keep very high foreign currency reserves. However, the floating system does have its negative feature. In economies where the demand for imports and exports of the lines is relatively inelastic, the fluctuations in the exchange rate do not necessarily result in adequate changes in the amount of trade to relieve the imbalances. In addition, Ameziane & Benyacou (2022) revealed that the high and erratic variability in the floating exchange rate may cause uncertainty in a big way and hence disincentivise trade and investments. Cost-push inflation can be worsened by the inflation value of an economy in that currency depreciation can increase domestic prices of imports, resulting in higher prices. The risks are especially significant in West African economies, where the fluctuations of the

international commodity markets and susceptibility to international shocks can produce broad changes in the exchange rates, resulting in a strong impact on prices of food imports and the inflationary process.

### **2.2.2 Exchange Rate System in West Africa**

The end of Bretton Woods in 1971, as a result of the actions of the United States, which decided to suspend the convertibility of the dollar into gold, imposed a new change in the international monetary system. Following the crisis, now there, some developing countries, among which West African ones, started leaving their fixed exchange rate regimes and transitioning to more flexible ones (Perez, 2022). This move was necessitated by the necessity to lessen the mal effects of exchange rate volatility and overshooting that were intrinsic to inflexible fixed regimes. Although most of the West African countries have since started to use a form of flexible exchange rate system, a few countries, namely, in the CFA franc zone, including the likes of Benin, Côte d'Ivoire, and Senegal, have remained an exception and still use a flexible exchange rate arrangement up to date (Kowalewski, 2024).

The transition to flexible regimes in the region started in a serious way in the 1980s. The driving force behind these reforms was that the exchange rates were supposed to be more realistic to the forces in the market and to act as shocks to externalities. In the case of nations with frequent fiscal deficits, no control over trade imbalances, and a highly disruptive pattern of capital inflows and outflows, flexible exchange rates provided a more facilitative and less politically expensive means of macroeconomic adjustment that did not depend on the less attractive options of foreign reserves depletion or deflationary government policies. Nigeria can be seen as an example of a country where there has been a profound change in the exchange rate policy, as the country responds to the economic shocks experienced at the global scale as well as at the internal scale. Femi-Olagundoye & Adedokun (2025) write that the process of foreign exchange market liberalisation gained pace in 2016, which happened after the closure of the Retail Dutch Auction System in 2015 and the steep drop in the world oil prices that started in 2014. This had a major effect on the foreign exchange earnings of Nigeria and witnessed a precipitous decline in foreign reserves as seen dropping US\$40.67 billion in January 2014 to US\$26.59 billion as at May 2016. Due to the abundance of foreign exchange shortages and inefficiency in the market, in 2016, Nigeria adopted a more relaxed exchange rate system that is compared to the managed float (Mahmud et al., 2021). Despite this change, the issue surrounding capital inflows that are insufficient, the presence of speculative pressures, and structural rigidities have kept the effectiveness of the new regime minimal.

Moreover, the experience of Ghana also supports the ineffectiveness of the fixed exchange rate mechanism when it comes to the situation of fiscal and monetary slippages. According to the Bank of Ghana (2025), they went into a flexible exchange rate regime in 2007 after years of an unstable fixed rate regime. In the past, there had been instances to hold onto a fixed exchange rate system, which were jeopardised by repeated budget deficits and inflationary pressures to cause regular misalignments of the cedi and speculative attacks. All of this was supposed to support the switch to a flexible exchange rate system to enable the currency to respond more naturally to shocks in the external environment, thus leaving the foreign reserves less stressed (Amoah & Aziakpono, 2017). Although the policy responsiveness has been improved through the flexible regime, the nation is still struggling with the instability of the exchange rate, primarily caused by recurring fiscal shortages and balance of payments imbalances.

On the contrary, other countries such as Benin, Cote D'Ivoire and Senegal have fixed exchange rate regime as they are members of West Africa Economic Monetary Union (WAEMU), as they use CFA franc since 1945, which has advantages of nominal stability and low inflation, which is supported by monetary policy of the Central Bank of West African States (BCEAO). Reserve pooling coupled with the coordination of policies has made the BCEAO uphold a stable exchange rate in the member states (Lampe, 2024). Nevertheless, the cost of this stability is a decrease in the ability to respond to the asymmetric economic shocks by themselves, because monetary policy is both centralised and homogenous among a variety of different economies.

The variability of the exchange rate regime in West Africa reflects the differences in institutional frameworks, the priorities of the economies, and trade-offs between the countries of the region. Countries like Nigeria and Ghana have welcomed adoptable exchange rate regimes to enhance the degree of exposure to the elements of external shocks and the rectification of structural imbalances, though vulnerabilities are recurrent. In the meantime, the member states in the WAEMU bloc still insist on monetary and price stability by adopting a common currency system and fixing an exchange rate system. While West Africa progresses toward regional monetary integration, notably through the prospective Eco currency by the Economic Community of West African States (ECOWAS); touching a balance among stability, autonomy, and flexibility would be necessary for a viable and inclusive exchange-rate regime which can facilitate not only macroeconomic convergence but also sustainable development among its member countries amidst the region.

### **2.2.3 Determinants of Exchange Rate Fluctuations**

The management of exchange rates is an important economic issue, especially in developing countries like those in West Africa, where food imports are crucial for consumer markets. The foreign exchange market is among the largest financial markets in the global economy. Countries compete to maintain economic growth and development. Exchange rates reflect a country's financial health and can change when the demand for a particular currency goes up or down. They are influenced by various factors and can fluctuate. Researchers widely recognise that stable exchange rates are important for trade balances, investment flows, and overall economic performance (Chikwira and Jahed, 2024; Kemoe et al., 2024; Sanusi et al., 2023; Tshidzumba et al., 2022). One main goal of exchange rate policy is to fix exchange rate misalignment. This happens when the exchange rate strays from its normal level, which can lead to economic problems (Demir & Razmi, 2022).

In West Africa, exchange rate misalignment presents a major challenge, especially because the region depends heavily on food imports. Since many West African countries do not produce enough food domestically, they rely on imported staple products. This reliance makes them sensitive to changes in exchange rates. When the exchange rate rises, imports become cheaper, which can temporarily lower food prices. However, this situation can hurt the competitiveness of exports and may harm domestic agricultural production and economic growth over time. On the other hand, when the exchange rate falls, importing food becomes more expensive, driving up retail prices and worsening food inflation. This inflation disproportionately impacts low-income households (Liu, 2024).

This situation is especially clear in West Africa. Many economies in the region use flexible exchange rate systems. This makes their currencies more likely to fluctuate. When currencies depreciate, the cost of essential food imports goes up. This contributes to inflation and reduces buying power. An increasing exchange rate can offer short-term relief by lowering import costs. However, it may also weaken domestic agricultural production and threaten long-term economic stability (United Nations Trade and Development, 2022). Given these complexities, it is crucial for policymakers to understand the factors affecting exchange rate changes. These factors include trade balance, inflation, interest rate differences, external debt, political instability, and global economic conditions. This understanding helps develop strategies that stabilise exchange rates and reduce their negative impact on food import prices. These macroeconomic factors indirectly influence the cost of importing staple foods like rice, which makes up a large part of household consumption in the region.

### 2.2.3.1 Inflation

Exchange rate fluctuations are a major factor affecting a country's overall economic performance, especially in emerging and developing economies. While these fluctuations are often seen as external shocks that cause inflation, it's important to understand that inflation can also drive exchange rate instability. When inflation increases, the real purchasing power of the domestic currency goes down. This decline discourages investment and lowers demand for the currency in international markets, resulting in depreciation. Ongoing inflation also weakens the ability of central banks to maintain monetary stability, increasing the volatility of the exchange rate (Larson, 2024).

The two-way relationship between inflation and exchange rate volatility is particularly evident in West Africa, a region that has a history of inflation problems. Diaw & Sall (2018) noted that since the mid-1970s, inflation in African countries has averaged over 15% each year, with many nations regularly surpassing 20%. In recent years, inflationary pressures have grown stronger within the West African Economic and Monetary Union (WAEMU). After experiencing deflation in 2019, the region's overall inflation rose sharply in 2020, reaching a peak of 8.8% in August 2022 before slightly dropping to 8.0% in November 2022, as shown in Figure 2.1 below (Central Bank of West African).

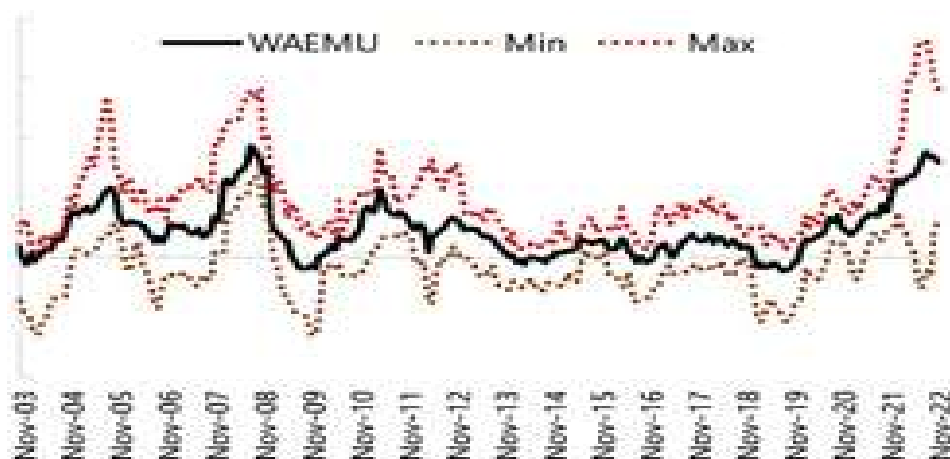


Figure 2. 1 Recent Development of Inflation in West Africa

Source: Central Bank of West African States (2023)

While West African countries have historically shown similar inflation trends, recent data show a growing difference among them. This difference is more noticeable when looking at the region's top five economies. The rising value of the US dollar against the CFA franc has increased exchange rate fluctuations, highlighting both external risks and

domestic policy challenges in Senegal, as shown in Figure 2.2 below. A sharp drop in currency value around Senegal in 2016 illustrates how sudden changes can disrupt national markets and put pressure on fiscal and monetary policies. Despite the exchange rate fluctuations, inflation in Senegal and other WAEMU countries remains stable, indicating a degree of success in monetary stabilisation efforts.

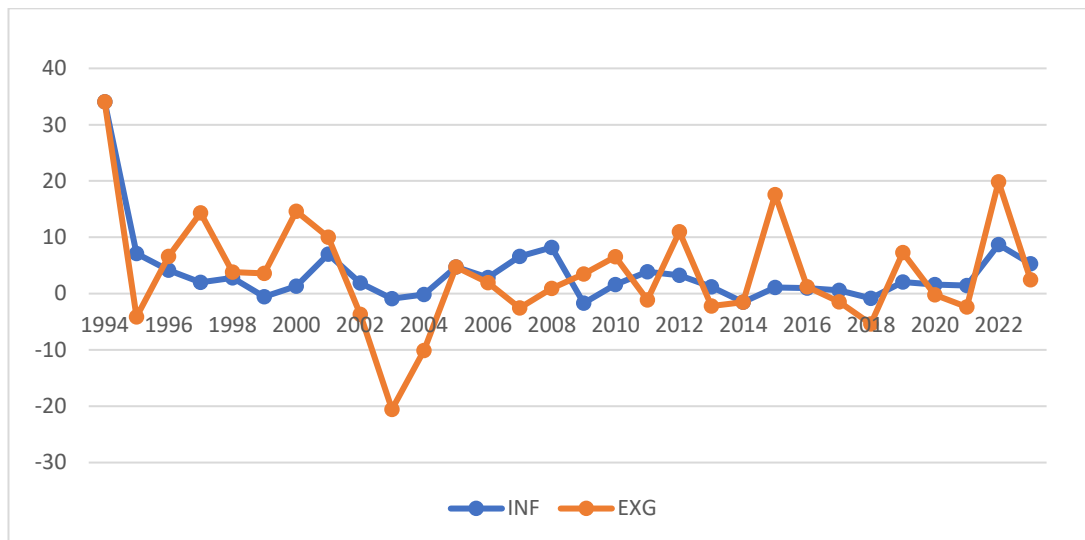


Figure 2. 2 Senegal Exchange rate and inflation Trend

Source: World Bank

This pattern is evident in Ghana. Figure 2.3 below shows a noticeable spike in the exchange rate around the year 2000. This reflects the significant rise of the US dollar against the Ghanaian cedi. This declines likely caused economic instability and led to changes in monetary policies. After that time, the exchange rate showed moderate changes but stayed relatively steady until recent years. In contrast, Ghana's inflation rate was mostly stable, except for a sharp increase in 2022.

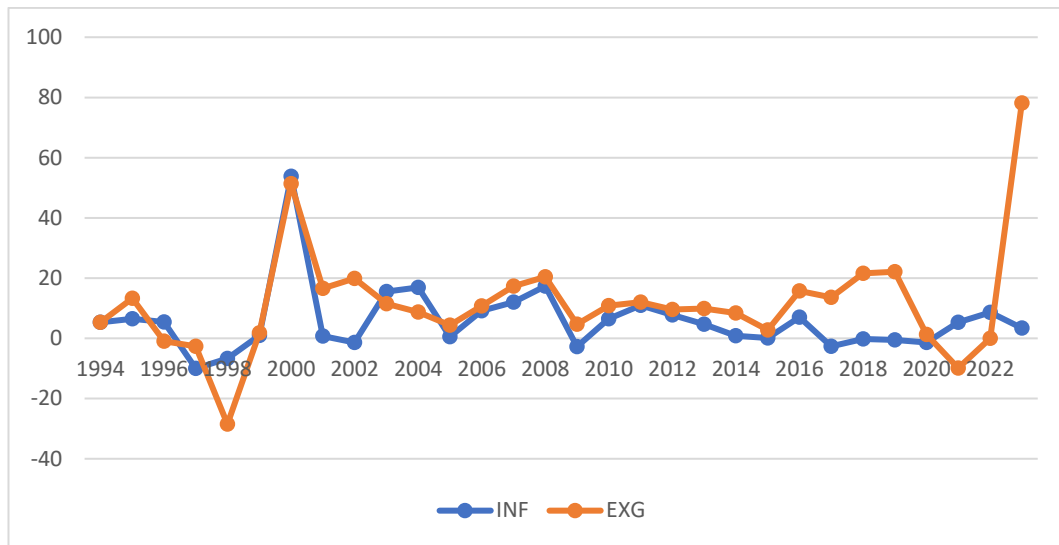


Figure 2. 3 Ghana Exchange rate and inflation Trend

Source: World Bank

Similarly, Côte d'Ivoire saw significant changes in its exchange rate, especially around 2006. This fluctuation came with a stronger US dollar, which probably put pressure on economic policy and raised import costs for consumers. Even though the exchange rate went up from 2006 to 2022, as shown in Figure 2.4 below, inflation remained relatively stable in the earlier years but became more unpredictable over time.

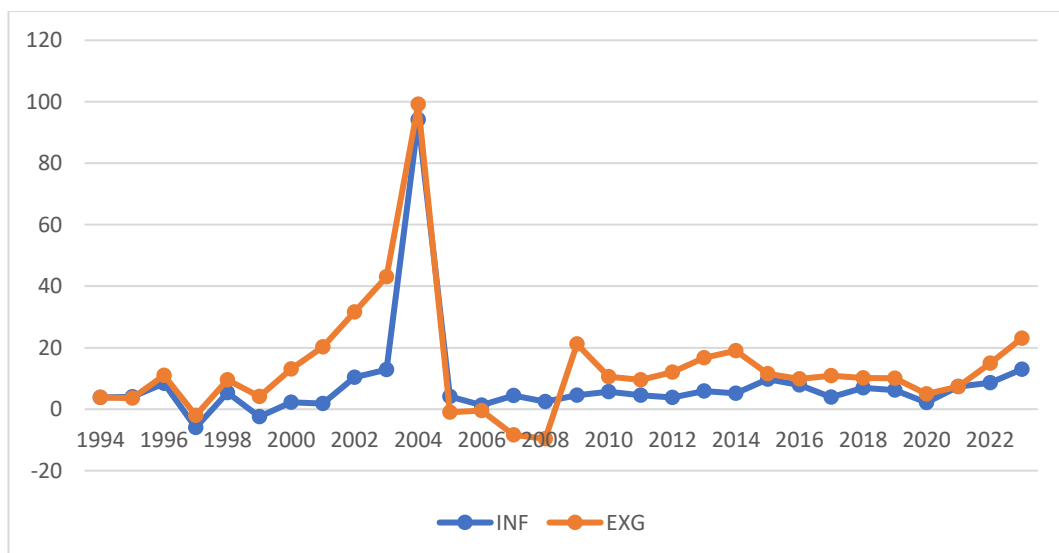


Figure 2. 4 Cote d'Ivoire Exchange Rate and Inflation Trend

Source: World Bank

In Nigeria, the exchange rate varied greatly between 2006 and 2010, as shown in Figure 2.5 below. After 2010, the exchange rate became somewhat stable but still reflected some economic pressures. In contrast, Nigeria's inflation trends were generally more

stable, with noticeable spikes in 2002 and 2006, as illustrated in Figure 2.5 below. This difference indicates that domestic supply and demand factors might influence inflation in Nigeria more than external currency shocks.

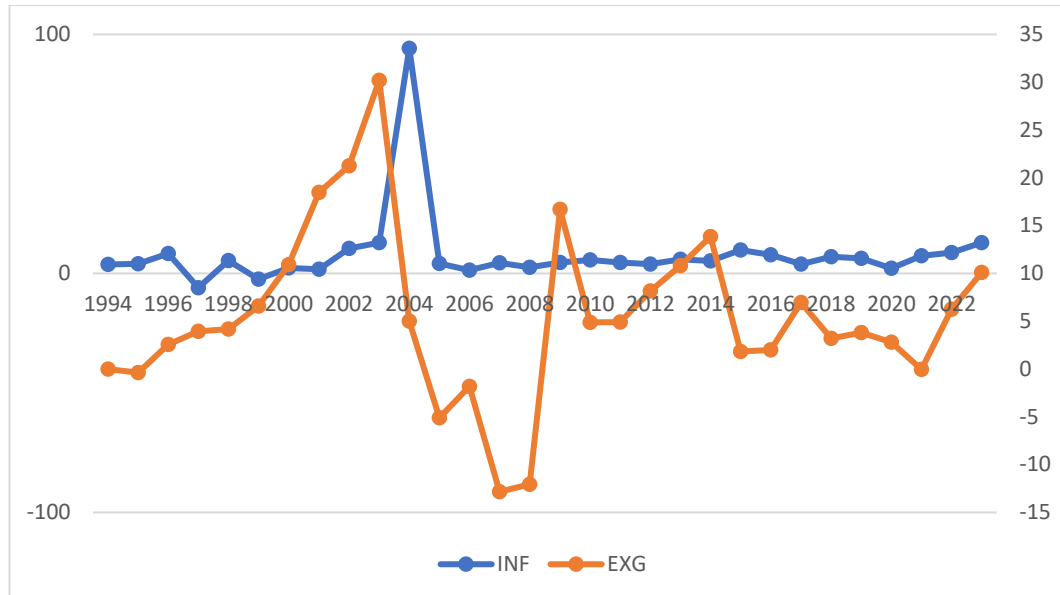


Figure 2. 5 Nigeria Exchange rate and inflation Trend

Source: World Bank

Similarly, in Benin, the CFA Franc has faced ongoing depreciation. This is mainly due to the country's heavy reliance on imports, especially food and fuel. Figure 2.6 shows that the most significant drop occurred between 2004 and 2008, alongside the strengthening of the dollar and increasing food import costs. This depreciation resulted in higher domestic food prices. Inflation rose sharply from 2002 to 2006, driven by higher global commodity prices and the devaluation of the currency. However, from 2012 to 2022, inflation started to ease as economic reforms were implemented and global conditions improved.

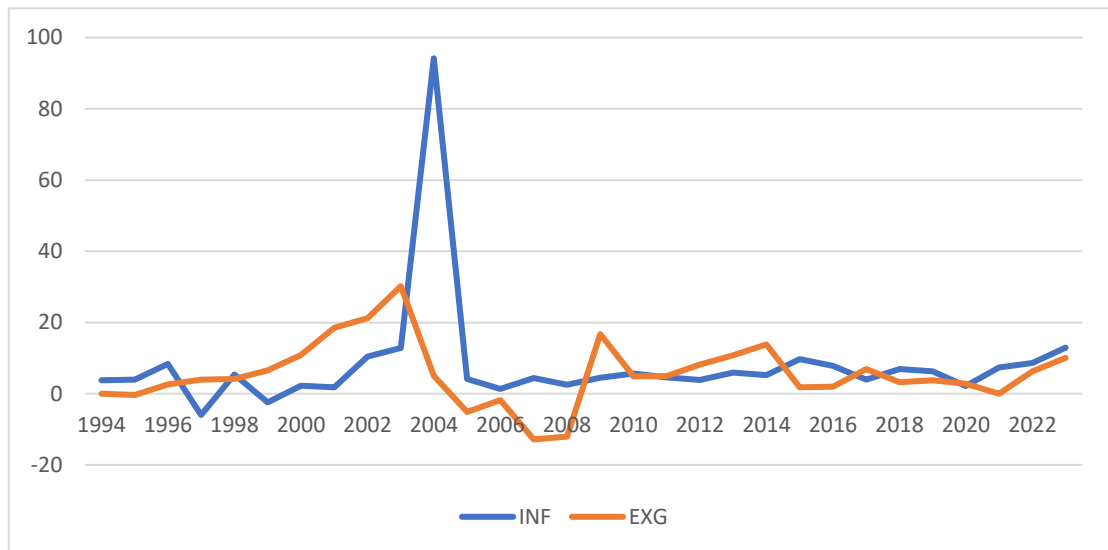


Figure 2. 6 Benin Exchange rate and inflation Trend

Source: World Bank

It is well known that higher inflation in a country can weaken the purchasing power of its currency and often lead to depreciation. Inflation shows a general rise in the cost of goods and services, which reduces the real value of money. As a currency's purchasing power falls, it becomes less appealing to international investors. This decline in interest lowers foreign demand and contributes to exchange rate depreciation (Larson, 2024). Several studies support this observation. Sumba et al. (2024) analysed exchange rate and inflation trends in Kenya from 2005 to 2023 using a nonlinear threshold autoregressive (TAR) model. Their findings indicate that increased inflation increases the probability of the depreciation of the currency after a specific level of inflation is reached.

Similarly, Akpan & Udo (2023) investigated the effect that the depreciation of exchange rates had on economic growth and inflation in Nigeria based on the Autoregressive Distributed Lag (ARDL) model. They discovered that depreciation due to inflationary forces has a positive influence on inflation as a process that strengthens a circular relationship between inflation and weakening of the currency. Consequently, Valogo et al. (2023) applied a threshold autoregressive model on monthly data between 2002 to 2018 in Ghana. They deduced that inflation will fuel depreciation of the Ghanaian cedi, thus resulting in a big bucket of consumer prices. This indicates the effect of inflationary pressures in destroying the domestic currency, particularly in the economies that are highly import-dependent. This notion is further reinforced in this paper by Uwimana et al. (2022) when they examined the issue of inflation in the case of Rwanda

and found that it significantly influenced the loss in the exchange rate under a high-import scenario.

This relationship is also confirmed in previous studies. In their discussion of Ethiopia, Gereziher & Nuru (2020) discovered that the buildup of foreign reserves is adversely affected by inflation and exchange rate volatility in the short run. This reveals how internal inflation is able to aggravate overseas weaknesses. Sen et al. (2019) visited the nexus between inflation and exchange rates in 5 emerging countries such as Brazil, India, Indonesia, South Africa, and Turkey. They have discovered that there is a long-run trend of inflation mobility with exchange rate depreciation, which is mostly brought about by increasing costs of goods imported and weakness of investor confidence. Equally, Alagidede & Ibrahim (2017) also determined with high confidence the rates of exchange determining the process of inflation in sub-Saharan Africa, where inflationary threats usually precede and drive up the volatility of the currency. A combination of these studies suggests that inflation is a cause and consequence of exchange rate fluctuation. In economies wherein inflation has been ongoing and the reliance on importation is high, the depreciation that results from inflation becomes a self-sustaining process. The trend is especially significant in West African economies since pressures of the inflationary trend can undermine the exchange rate stability and express the structural weaknesses of the monetary policy regime (Bandura, 2022).

#### **2.2.3.2 Real interest rate**

Another factor that affects exchange rates is the real interest rate. A country's interest rates, especially the real interest rate that accounts for inflation, can directly impact its currency value in the foreign exchange market. Higher real interest rates tend to draw foreign investment, which raises demand for the currency and strengthens its value. Adjusting interest rates is one of the monetary policies used by West African central banks to manage the money supply and maintain the stability of the local currency exchange rate. Understanding how changes in the key policy rate affect the exchange rate of the national currency remains crucial for central banks in West Africa. Real interest rates play a major role in a currency's value and are an essential part of a country's monetary policy. Governments often modify interest rates to control inflation and promote economic growth, which can push a nation's exchange rate higher (Larson, 2024). For instance, a government may raise interest rates in a high-inflation economy. This discourages borrowing and encourages saving. Over time, food prices may decrease, prompting consumers to start

buying again. This usually leads to currency appreciation, resulting in a higher foreign exchange rate.

The real interest rate is influenced by inflation, linked to the lending interest rate. It is calculated using a GDP deflator. This factor is vital in exchange rate fluctuations, as it weighs foreign currencies against the domestic currency in both the short- and long-term regarding value. When real interest rates are high, they attract foreign capital inflows, which increases demand for the domestic currency and may lead to appreciation. On the other hand, low or negative real interest rates may result in capital outflows and currency depreciation. Thus, changes in real interest rates can significantly drive exchange rate volatility, both short-term and long-term. Additionally, several empirical studies have explored the link between real interest rates and exchange rate fluctuations, using various econometric models across different economic contexts. Kemoe et al. (2024) studied the effect of exchange rate movements on inflation in Sub-Saharan Africa from 1982 to 2022, using local projection methods. While the study mainly focused on the exchange rate-inflation relationship, it is importantly connected to the broader way real interest rates affect exchange rates.

The researchers have identified that exchange rate depreciations have a highly significant effect as far as the expansion and increase of domestic inflation are concerned. The pass-through effect is also much more pronounced when depreciations take place as compared to appreciations, implying that these economies are very sensitive to currency fluctuations. By increasing the real interest rate, the study advisably recommends this as a counter-action, by stimulating the inflow of foreign capital, and currency appreciation that serves as a moderation of inflationary effects. This is useful in the argument in the sense that it reveals that the level of real interest rates acts indirectly to stabilise the exchange rates by the control of capital flows. Olamide et al. (2022) evaluated the effects of exchange rate volatility on the inflation growth dynamics in Sub-Saharan Africa by assessing the use of data between the periods 2000 and 2018. Among the estimation methods they used were Pooled Mean Group (PMG), Generalised Method of Moments (GMM), and Dynamic Fixed Effects (DFE). The Hausman test was used to prefer the PMG estimator of the Panel ARDL model. They discovered that exchange rate and instability, and inflation have adverse effects on economic growth. Further, instability in the exchange rate aggravates inflation, affecting the coordination between growth and inflation. Such dynamics are associated with the changes in real interest rates as the latter variations impact the flow of capital and exchange rate stability. The study confirms that higher inflation, often caused or worsened

by currency depreciation, accelerates exchange rate pass-through effects. This further emphasises that managing real interest rates is essential for stabilising exchange rates and reducing their macroeconomic effects. Li and Lee (2022) also explored the non-linear relationship between interest rates and exchange rates between China and the United States using a rolling-window estimation method. Their study showed that changes in U.S. interest rates have a stronger effect on the volatility of the China-U.S. exchange rate than changes in Chinese interest rates. Additionally, exchange rate fluctuations also feed back into U.S. interest rate adjustments more significantly than into China's. This asymmetry indicates that real interest rates, particularly in dominant economies, play a significant role in driving currency value and exchange rate fluctuations, especially in a highly interconnected global financial system.

Their results affirm that interest rate differentials adjusted for inflation are a key factor determining exchange rate behaviour. These findings align with Garg's (2021) study, which examined the link between interest rates and exchange rate dynamics among the six BRICS economies during the COVID-19 pandemic. Using the Autoregressive Distributed Lag (ARDL) model, the study focused on short-run dynamics and found that interest rate variations enhance the predictability of future exchange rate changes. This is particularly the case at a period of global uncertainty where investors are futuristic and adapt their actions according to the future alteration of the monetary policy. The results provided by Garg tend to show that short-term and long-term changes in exchange rate have a direct correlation to an interest rate variation, where an increase in real interest rates tends to motivate investors to acquire large amounts of domestic currency either to make investments or to import goods. This confirms the main claim that the currency demand is based on real interest rate movements and has an impact on the exchange rate volatility.

Moreover, Akinlo & Onatunji (2021) examined dynamic relationships between real GDP, real interest rates, real exchange rate, and exchange rate volatility in twelve countries of the ECOWAS group between 1986 and 2017. They applied the Autoregressive Distributed Lag (ARDL) model and error correction modelling to test both the long-term and short-term relationship between the variables. They found the existence of a great long-run relationship between the real rate of interest rate and the exchange rate volatility. In particular, according to their model, the shifts of the real interest rates were connected to the changes of the exchange rates, and these latter affected domestic investing. This connection was especially stiff in such nations as Nigeria and Sierra Leone. Later and in a similar (but more theoretical/empirical study), Egilsson (2020) came up with a model to

estimate how prolonged augmentations in real interest rate differentials can cause circling inflation and exchange rate dynamics. This model is backed by the cost-push effects, and it is argued that high, continued real interest rates will have windings in eventualities such as devaluation of the currency, inflation, and wage drift. Contrary to the conventional view that higher interest rates always attract capital and appreciate currency, this model suggests that under certain structural conditions, especially in economies prone to inflation, excessively high real interest rates can create cycles of chronic inflation and depreciation. The study enhances the argument by revealing the complex and sometimes counterintuitive role of real interest rates in influencing exchange rates, especially when inflation expectations are part of market behaviour.

### **2.2.3.3 High tariff rates**

West African countries have high tariff rates that contribute to fluctuations in exchange rates. Many countries in the region depend mainly on taxes for economic growth, making revenue from tariffs essential for boosting the economy. The high tariff rates have also weakened many local currencies in West Africa due to changes in exchange rates against foreign currencies. According to Rogatis (2022), transport companies with market power can raise their freight rates when import tariffs change. This suggests that food importers can increase or decrease the prices of imported food based on exchange rate changes or other costs associated with their products. Some governments impose higher tariffs on foreign goods, requiring more domestic currency to purchase these items. Consequently, higher tariffs increase the demand for foreign currency, which, in turn, leads to exchange rate volatility.

The immediate impact of out-of-the-blue U.S. tariffs on metal Mexico, Canada, and China led to dramatic volatility in the world financial markets as reported by Ahmed (2025) in an article by Reuters, titled, Trump Tariff Headlines Spur Volatility Surge Across Markets. Investors wanted safe investments in a stable asset, which led to huge fluctuations in exchange rates. These sudden changes demonstrate how major tariffs can be unpredictably fluctuating and unstable. To further substantiate the relationship between tariffs and volatility, the Bank of England policymaker Megan Greene, in her description, noted that the impact of U.S. tariffs on world inflation and the exchange rate dynamics would be complex. Unconventionally, the U.S. dollar failed to rise in value as it normally would have after the tariffs had been increased, and this demonstrates how tariffs may cause abrupt changes in the exchange rates. This idea is strengthened by a number of empirical studies. In a study by Sun (2025), the asymmetric impacts of the tariff news on the volatility

of the Renminbi exchange rate were explored through heterogeneous autoregressive (HAR) models. In the trade war between the U.S. and China, he discovered that the announcement of future tariffs had a profound effect on the fluctuations of the exchange rate, whereas the installation of tariffs had very little short-term effect. These findings underscore that the development of expectations of an increase in tariffs can disorient the exchange markets, and the effect of expectations due to tariffs is impressively and effectively present in the currency rates. Further studies are presented by Chen et al. (2024) who used structural panel VAR models in the period between 2002 and 2020 to examine the impact of tariff-induced capital flows volatility on the exchange rate stability in 20 countries. They found out that tariffs aggravated the outflow of capital and exchange rate volatility in economies with less sound economic fundamentals. On the other hand, stronger institutions and fiscal discipline by the countries meant that they were best placed to absorb the currency shocks due to fluctuations in the trade policy.

Moving to the wider macroeconomic implications of this topic, Sowrov (2024) investigated 11 countries within the G20, and the researcher revealed that a higher tariff rate is also associated with greater exchange rate volatility, which has a negative effect on economic growth. This instability has been linked to reduced rates of trade openness and reduced investor confidence, both of which strain foreign exchange reserves and increase the level of currency instability. In a similar topic, Ouattara (2023) studied Turkey between 2018 and 2020 by testing how exchange rate volatility affects trade through an ARCH framework. The erratic tariff policies increased such instability, which was harmful to export volumes, that he discovered. This emphasises further that high and volatile tariffs have the potential of increasing fluctuations in currencies, hence hindering international trade, particularly in developing economies. These reports and studies indicate that high tariff rates, especially those that are unpredictable or keep changing, are key in shifting the exchange rates. By regulating the cost of imports, expectations of investors, flow of capital, and trade performance, tariffs have a rippling impact that has a direct effect on the stability of the currency.

#### **2.2.3.4 Dependency on imported goods**

Dependence on the purchase of foreign foodstuffs in West Africa has been such a central phenomenon in the fluctuation of exchange rates in that region. The problems experienced in the agricultural sectors of many countries over a long period are the low productivity level, bad infrastructure, and problems associated with climate that make the achievement of food self-sufficiency difficult. This constant need to consume imported

food places great strain on the local currencies due to the quantities of foreign exchange that are required to finance these essential imports. In case the volume of imports grows and exports do not receive more revenues at their end; they cause a trade imbalance that results in a fall of the currency value and increases the fluctuations of the exchange rate. This relationship is endorsed by earlier research. According to the study conducted by Okogor et al. (2023) alterations in the exchange rates caused by import dependency adversely affect the export performance in Nigeria, raising instability in the macroeconomic sector. Similarly, Oyadeyi (2024) studied the issue of exchange rate volatility in Nigeria, with the factor economy being pressured as the cause of the said volatility, and identified the factor of import dependence as especially influential. The research provided the necessity of such policies that would prioritise the increase in domestic production in order to stabilise the currency. Turaki & Sanusi (2023) further elaborated in this analysis and analysed the correlation between the food price volatility and the exchange rate using MGARCH and VAR models. They found out that there were high correlations of food prices in urban areas with the foreign exchange market, and as long as food prices are likely to fluctuate (especially with dependency on imports), foreign exchange markets will easily erupt.

The same case applies to Ghana. According to Nuhu & Bukari (2021) the flows of imports and exports and the effects of the exchange rate movement were examined with attention given to the fact that the growth in the importation of the necessities undermines the Ghanaian cedi. Their results bring to light the fact that any economy that is heavily dependent on imports, particularly food, is susceptible to sustained disturbances in the exchange rate. These observations were further corroborated by Dada (2021) who examined asymmetric shocks in the volatility of the exchange rates across Sub-Saharan Africa. He discovered that negative importation shock usually wreaks more wholesome damage to trade than positive shock, and especially in an economy dependent on essential imports such as food and fuel. This reliance is also made even complex by the fact that the food importation desire is inelastic. Keho (2021) found that in most countries of West Africa, currency devaluation does not reduce the volume of food materials into the country since they are necessities and cannot easily be replaced in the short term. It, however, results in increased cost of imports, aggravating trade imbalances and inflation. Such a position is confirmed by Akanni (2020) who demonstrates that the intensive consumption of basic products in Nigeria, largely imported rice, increases the effect of sharp exchange rate declines on food prices, contributing to food insecurity and compromised food security of economic resilience.

Several researchers have doubted the effectiveness of currency depreciation in improving trade performance in import-based economies. Kamugisha and Assoua (2020) examined the dependence of Uganda on food imports and found that in their short term, the changes in exchange rates failed to produce any beneficial outcomes in terms of improving trade between Uganda and other countries. They discovered that it was the increasing level of incomes that had more control in stabilising the food supply. Similar findings were made by Akoto & Sakyi (2019) in Ghana, who concluded that no significant evidence shows that depreciation of currencies between 1984 and 2015 had a positive influence on the trade outcomes. On the one hand, Keho (2021) observed the temporary positive effects of currency devaluation on trade only in Côte d'Ivoire, which were later offset by rising food prices that affected the low-income households disproportionately. Through a broad study in 33 countries, Yazgan & Ozturk (2019) came to the conclusion that the gains of the depreciation on the balances of trade are scarce in the economies that are strongly dependent on imports. According to their study, depreciated currency may potentially improve the trade balances, but the gains are usually minimal in cases where the trade is controlled by critical imports. Through these studies, it is clear that reliance on imported products, particularly foods, plays a critical role in fluctuations in exchange rates in West Africa. Dependence on imports leads to trade deficits, resulting in rising inflationary pressure and subjecting currencies to volatility, especially when facing a global shock or an economic squeeze at the home front. In dealing with this weakness, a strategic shift towards heavy reliance on local manufacturing, carrying particular emphasis on the agricultural areas to curb reliance on imports, must be made. Policies aimed at enhancing food self-sufficiency, spreading the export base, and stabilising the fundamental aspects of the economy play an important role in stabilising the exchange rates and stimulating long-run resilience of the economy in the region.

Also, the existence of low levels of demand for food imports increases the pressure on inflation due to helping fluctuations in exchange rates rather than adjusting the imbalances in trade. Food imports, which are typically essential foods like rice, wheat, and maize, have been experiencing high demand which do not depend on the devaluation of currency, hence the rise in the prices that the consumers pay. On the whole, the chronic reliance on foreign food exacerbates the fluctuations of the exchange rate.

### **2.2.3.5 Market speculation**

In West Africa, the emergence of flexible exchange rate systems has brought into focus the role of market speculation, which goes a long way in causing currency fluctuations. Though flexibility is meant to shield domestic currencies against speculative attacks, it usually causes volatility as promoted by investor sentiment, expectations, and activities of arbitrage on official and parallel markets. The phenomenon of speculation, in particular, on the foreign exchange market, very often leads to currency depreciation, the increase in the costs of the importation of goods, and the expanding difference between the official and the black-market exchange rates. This view is supported by recent research. Gyasi et al. (2024) looked at the Ghanaian, Mauritanian, and Tunisian exchange markets. What they discovered was that a significant reason behind the short-term exchange rate misalignments was attributable to speculation motivated by the expectations of inflation and possible policy responses of the central banks. Their application of ARCH models indicated that volatility exhibited explosive variability due to speculative forces on prices in the trade and investor confidence. The behaviour of foreign exchange under the Investors and Exporters window was also considered in the study of Oyadeyi et al. (2024) in Nigeria. They discovered that all these were often contributed by anticipation of devaluation fostered in the market through speculations, which frequently caused hoarding of currencies in anticipation and movement of currencies in the parallel market. Their approach revealed that speculation was a dominant factor in explaining exchange rate fluctuations on a day-to-day basis than economic fundamentals.

Cisse and Diallo (2022) did a local study of the West African money zone. They discovered that although a CFA franc is pegged, there are speculative pressures that arise when an external shock hits or when there is political instability. In their investigation, they suggested that when monetary credibility and foreign reserves come under pressure during periods of enhanced speculative activity, whether during an election or a shock in the world commodity markets, parallel markets develop that affect price determination at international boundaries. Fasanya & Akinywale (2022) revealed that the speculative demand for the U.S. dollar in Nigeria is a good indicator of the exchange rate of the naira. Their time series modelling on the period from 2010 to 2021 uncovered that in times when the price of oil crashed, speculation always led to panic purchasing of foreign currency, and the result could be said to further weaken the naira, despite the figures holding macroeconomic indicators, suggesting they were stable. Moreover, another micro-level study has been made by Nneji (2020) of forex dealers in Lagos, Nigeria. He discovered that

the majority of the agents are closely monitoring the Central Bank signs as well as the news about the world economy to forecast how currency will move in the future. The result of his interviews and regression tests confirmed that speculative trades to reflect expected changes in oil prices or monetary tightening are vital in the depreciation of the naira, a majority of the time, despite the real flow of trade or reserves. Nkrumah (2022) extended the discussion to the rest of the West African economies and relied on panel vector autoregression (PVAR) to examine the mutuality of the exchange rate volatility and the speculative capital flows. They also discovered that sudden currency movements are frequently accompanied by speculation-induced inflows/ outflows, particularly where there are weak capital controls in an economy. This accounts for Adam & Wilson (2021) who remarked how exchange rate agents use forward-looking behaviour in the sense that foreign currencies are hedged against the chance of increasing rates in Nigeria. This habit causes shortages of dollars at the official market and builds up black-market premiums.

Additionally, Nor et al. (2020) conducted another study on speculative trading in Somalia. They discovered that the players in the market tend to indulge in herding, that is, they will purchase foreign currency as rumours and anticipation of a change in the monetary policy. Such an act has the effect of mounting pressure on the local currency and hampering inflation management. Their results confirm behavioural theories of finance, which hold that when markets are not highly regulated, a self-fulfilling prophecy can be generated through financial speculation. Combaz (2020) looked at the exchange rate risk in Côte d'Ivoire, which uses the CFA franc. He held that despite a fixed exchange rate, the pressure of speculation would accumulate in the inactive foreign exchange market, particularly under political stress or negotiating with the foreign debtors. The studies are very convincing in the fact that exchange rate volatility is influenced by speculation in the markets of the West African countries. Flexible or fixed, speculation influences the presence of both the spot and forward exchange markets, misinformation of pricing signals, and monetary policy measures. Speculative attacks, by dealers in currency, create exaggerated exchange rate changes in countries in which exchange rate volatility is already large, due to extensive reliance on imports and foreign currency reserves. The Asian experience with the flexible exchange rate system is thought to be more efficient in responding to external shocks; however, in West Africa, it is undermined by speculative activities, which attempt to disturb the currency markets and increase inflationary tensions. This demonstrates that there must be improved regulatory enforcement, greater clarity of communication by central banks, and greater institutional procedures in order to narrow down upon the arising issue of opportunities to speculate and improve investor confidence.

#### **2.2.3.6 Political instability**

The West Africa region is characterised by common political instability, and unstable internal conditions, policies, and geopolitical shocks are common in the region. The region is among the biggest trade partners with Ukraine and Russia since it imports most of their products. The war between the two countries has been on the rise, and this has caused an increase in the prices of imported goods in the West African region. This has resulted in the demand for more foreign currencies to purchase these goods. This causes an unstable and floating domestic exchange rate. Meanwhile, various nations in West Africa have been under massive warfare due to the terrorist attacks and demonstrations that protest inflation. This high instability is resulting in high demand for imported goods to be consumed, thereby increasing the demand for foreign currencies, resulting in large fluctuations in the local exchange rate market. Studies have pointed to the importance of local disturbances as well as international turmoil on the foreign exchange markets. Structural VAR and VECM employed by Aliu & Ha (2023) are an example of other applications based on the analysis of the effects of the Russia-Ukraine war on the global exchange rates. They discovered that the Euro was losing over five points against the Russian Ruble, indicating how geopolitical problems impact key currencies. Equally, Hung (2023) adopted a time-varying Granger causality test and tried another spillover index to evaluate the connection between the oil prices and the exchange rates of G7 economies throughout the COVID-19 pandemic and the Russian-Ukrainian conflict. This paper has found that the contribution of geopolitical events is pivotal in augmenting volatility in foreign exchange markets. These external shocks cause most countries in West Africa that are usually import-driven to Western Europe to experience a high demand for foreign currency, and this exerts pressure on the local currencies.

Aliu et al. (2024) also indicated clear evidence that the Russia-Ukraine conflict and COVID-19 led to high exchange rate instability in Visegrad (V4) countries. This strengthens the worldwide spill-over impacts of political turmoil. Bram et al. (2025) adopted a time-varying parameter VAR model to investigate the spillover of returns in eight states in West Africa through the currency of those states. Their findings revealed that there is a high level of interconnection among the exchange markets all over the region, and it is a sensitive industry in relation to regional and international political instability. In the meantime, a threshold regression model has been chosen to examine the relationship between political stability, macroeconomic factors, and capital inflows, as well as currency behaviour in Nigeria (Odionye et al., 2023). They found out that the time of amplified

political uncertainty is not attractive to investment and is prone to currency depreciation. Maitah et al. (2017) discovered that in Turkey, any terrorist attack and political disturbance in a country had both short- and long-term negative effects on the Turkish Lira. This also shows the susceptibility of other emerging economies to political shocks. To further elaborate on this, Aliu et al. (2024) found out that the exchange rates of the Czech crown, Polish zloty, and Hungarian forint were highly disturbed by the Russia-Ukraine war, which is coincidental with the reaction of West African currencies to instability. Taking a somewhat global perspective, Hung (2024) used the geopolitical threat as an explanatory variable to understand the impact on significant exchange rate markets, and the outcomes showed a significant time-varying causality in such crises as the COVID-19 crisis and the Ukraine invasion.

These results are especially important in the context of West Africa, which has suffered extensively as far as both domestic and international conflicts are concerned, including protests against inflation increases, military coups, and terrorism. Another example was the war in Ukraine, which led to a rise in the cost of importing essential products such as grain and fertiliser, and therefore, piling fiscal pressure on the exchanges in domestic currency. This is aggravated by local violence, such as the insurgencies of Boko Haram and trouble in the Sahel, that undermine investor confidence and the flow of foreign sources of capital. To counter this, speculation foreign exchange operators usually hedge by hoarding the foreign currencies and selling at higher rates in parallel markets, which further contributes to a decline in the value of the local currency. These empirical studies argue in favour of the notion that political instability, be it conflict, terrorism, or geopolitical tension, is an important determinant in exchange fluctuation. This has a particularly negative impact on import-dependent and politically weak economies such as those in West Africa.

#### **2.2.3.7 Global economic condition**

The global economy has experienced some shocks, which have led to great movements in the exchange rates of West Africa. This sub-region is highly dependent on the importation of goods manufactured by the developed countries, particularly refined goods and services. As a result, West Africa is experiencing successive demand-supply gaps, especially in the development of areas that are essential, including energy. This reliance makes the region susceptible to global economic shocks. A significant shock is caused by varying oil prices, particularly those that are determined by the pricing strategies of OPEC. A good number of countries in West Africa are net importers of oil. Thus, any

increase in the price of oil compels governments to get more foreign currency to ship items, and this strains local exchange rates. As an example, when oil prices increase then the countries in the region are required to exchange a larger amount of their currency in order to earn foreign currency, which is usually the U.S. dollar, to meet their energy demand. The effect of this not only debilitates the local currency but also contributes to inflation. It has been found through research that the global factors influence a lot. Huang & Li (2022) have analysed the influence of international oil prices on the exchange rate by conducting a study on the Chinese position based on the Structural VAR model. They concluded on a dynamic and time-dependent relationship. They found that oil price shocks would initially hurt the currency prices in the short run, and relatively appreciable in the medium run, and fluctuating in the long run. These results apply to the West African economies, although they are addressed to China, as they are characterised by similar dependence on imported oil.

To reinforce this position, Mohammed (2021) explored Ghana's reaction to changes in oil prices. Engaging in a two-step analysis procedure in which structural VAR systems as well as OLS estimations were paired, the paper revealed that exchange rates, inflation, as well as the monetary policy alternatives in Ghana are marked by any shifts in the oil prices. This demonstrates how vulnerable the economy of West Africa is to external price variations and the kind of options they have to cope with the fluctuations. Besides oil, the broader global economic developments are also necessary. Nkrumah-Boadu, Mansour, & Mohamed (2024) examined the relations between stock returns and exchange rate returns in West Africa in the period between 2013 and 2023. They discovered that the volatility in the oil market, global economic policy unpredictability, and VIX in the United States will also play a major role in the movement of both the stock and currency markets within the region. This means that external effects of macroeconomic shocks within the African continent will have a rapid impact on the local financial systems, which might affect investor confidence and capital flow stability. Similarly, Adedokun et al. (2022) analysed how global uncertainties affect the management of the exchange rates in Africa based on quantile regression between 1990 and 2021. They found out that uncertainties that occur on a global and local level have a significant impact on exchange rate systems, particularly in falling and transition markets. This indicates that the African countries must have close monitoring of the external factors in order to enhance the exchange rate policy resilience.

Additionally, Lawder (2024) of the International Monetary Fund reported that net capital inflows to the emerging markets (excluding China) went up to record levels of \$110 billion in the recent past as compared to the previous levels of 2018. Such inflows were made even with the increasing interest rates in the U.S, indicating some strength among the developing countries. Nevertheless, overvaluation of the U.S dollar 5.8 per cent against GDP exposes countries with large dollar debts at risk, like West African countries, to higher repayment risks and the stability of the exchange rates. The oil is not the only area of vulnerability of the region. The S-VAR model used by Olamide et al. (2022) and their colleagues investigated the implications of external shocks, including variations in the prices of non-oil products, on the West African economies. Their study established that such shocks have major effects on exchange rates that trickle down to the GDP because of a change in the policy rates. This underlines the general problem of excess reliance on external factors and demonstrates the necessity to diversify production and exports in order to decrease the macroeconomic risks. To make matters worse, McGeever (2024) examined the hypothetical dangers of a trade war between Western countries and China. This sort of disagreement would impact negatively on the growth in the world economy, and chances exist that the U.S dollar would appreciate since it happens to be a reserve currency. This would most probably make the other currencies like those of West Africa weaken further, making imports more expensive and economically unstable. Bram et al. (2025) lastly examined currency relationships in West Africa based on a Time-Varying Parameter Vector Autoregression (TVP-VAR) model between the years 2010 to 2024. The findings indicate that the Sierra Leonean Leone and the Cape Verdean Escudo act as net transmitters of the shock on returns, and others, including the Ghanaian cedi and Nigerian naira, are net receivers.

These results indicate a somewhat poor regional currency spillover that can establish the opportunity of portfolio diversification within the region, besides portraying the fact that there is a lack of a collective reaction towards global economic shocks. Thus, on the whole, international economic shocks, which include instability of oil prices the trade wars, and dynamics of capital flows, significantly affect exchange rates in West Africa and other countries.

#### **2.2.3.8 External debt**

There is a high budget deficit in West Africa, meaning that they have to depend on foreign countries in terms of loans to develop their economies. This is, however, not always repaid as anticipated, and this lands it with heavy costs more than the principal amount.

This development makes the exchange rate unstable in the market. This is because governments are forced to finance such debts using foreign currency by converting their domestic currency, which may lead to short- and long-term appreciation of the domestic currency. In addition to that, the physical deficit is relevant to academic intellectuals and investors since the majority of the West African nations do not have enough physical strength to upgrade their infrastructure. Their development processes become complicated due to this constant borrowing of foreign debt, which is dependent on the exchange and interest rates. In this regard, scholars have already investigated the complicated dependence between external debt and exchange rate fluctuations, in particular, in West Africa. The study by Imoagwu et al. (2023) analysed external debt in Nigeria during the period 1980 to 2021. They discovered that an increase in the external debt has a lot to do with exchange rate fluctuations, which is largely caused by the inflation process and the debt servicing load. On the same note, Okoh et al. (2021) extracted data between the years 1990 and 2017 and came to the conclusion that external debt does not directly cause fluctuation of flexible exchange rates, but the consequences of the debt service obligations on currency stability have a robust influence. These results indicate the need to have cautious debt management to have stable exchange rates.

To this effect, Ahemen et al. (2020) applied an Autoregressive Distributed Lag (ARDL) model in examining the asymmetrical consequences of external debt service on the real effective exchange rate of Nigeria, adapted between 1981 to the year 2020. Their studies revealed that a rise in payment of debt servicing causes meaningful depreciation of the dollar rate, and this point underlines the sensitivity of the currency to any external debt commitments. Likewise, Eze et al. (2021) discovered that both external debt payments and the total external debt payments are positively correlated with the exchange rate volatility, which dictates the necessity of proper debt strategies. Viewing the matter in the larger context, the United Nations Economic Commission of Africa (2024) examined the degree to which the advantages of exerting downward pressure on the exchange rates and controlling the external debt among African nations. They concluded on the basis of their study that devaluation tends to contribute to the build-ups in the external debt burden in countries that have flexible exchange rate systems, but that fixed systems may utilise developed as a way of reducing external debt burdens. This implies that the form of exchange rate regime plays a critical role in moderating the degree of prevalence of debt on currency stability. Summarily, both accumulation and the management of external debts exert a significant effect on the movement of exchange rates in West Africa. The current deliberations that require strong debt management and economic planning strategies in the

region, due to the reliance on foreign borrowing, a factor that is compounded by poor domestic capabilities and circumstances that slow international finance, highlight the need for exchange rate fluctuation and sustainability in the long-run economic growth of the region.

#### **2.2.3.9 Demand and Supply of Money**

The exchange rates in West Africa are experiencing serious fluctuation due to the demand and supply of foreign currency. Foreign currency demand and supply in this region are highly regulated through the Central Banks in this region. These participate in the exchange market purchasing and selling of foreign currency, such as the Dollar, in order to stabilise the foreign currency rate in the Sub-Region. Nonetheless, it is also not easy to govern this demand and supply because most investors and countries rely on importing goods and services to West Africa, which is dependent on foreign currency. This has caused most of the Central Banks in the region to enter the exchange rate market. They also strive to arrange and supply an adequate amount of money to their investors to control the levels of exchange rates. The relation between money supply and exchange rate fluctuations in West Africa has been studied at length. As an illustration, Sikiru & Salisu (2025) applied the GARCH-MIDAS model to examine the depreciation of Nigeria's exchange rate between 2008 and 2023. They concluded that the differences in interest rates, price level differences, and interventions by the Central Bank in the foreign exchange markets were the important drivers of the level of volatility in the exchange rates. They demonstrated the influences of money supply and its components change effects on currency demand and hopes. Adenigbagbe et al. (2024) have confirmed that exchange rate fluctuations are identified by the money demand and supply. A longitudinal survey was analysed between 1980 and 2023 with important aspects of money, such as interest rates, money supply as a variable of money demand, and Central Bank reserves. In their research, they found out that a high rate of money supply compared to demand will cause inflationary pressure, therefore weakening the value of the domestic currency against the foreign currencies, causing depreciation. Conversely, when there is a stricter money supply or high money demand, it is possible that the domestic currency would gain strength. This validates the fact that exchange rate instability is paramount towards explaining monetary policy, which is proclaimed by the dynamics of money supply, in Nigeria and other West African economies. Further, to examine the impact of exchange rates on the demand for money across countries that are member states of ECOWAS, Ouattara & Kone (2023) employed a panel ARDL method. They have discovered that the higher the exchange rate, the greater

the demand for money. Therefore, the monetary holding and liquidity preferences are influenced by expectations of the stability of the exchange rate. The reason behind this two-way relationship substantiates the point further that the notion of money demand being affected by the perceived strength of the currency also affects the exchange rate. This study was supplemented by Ilyasu et al. (2024), who used BARDL and GARCH models. They demonstrated that past exchange rate shocks, as well as expansion of monetary supply, were an important predictor of future volatility, reflecting the monetary supply's impact on the exchange rate volatility.

Other literature has pointed out the least direct but very influential relationship that exists between money supply, inflation, and fluctuations in the exchange rate in West Africa. Indicatively, in its study focused on Nigeria, Amassoma et al. (2018) demonstrated a significant indication that when the money supply in the country shifts, then inflationary forces are induced. Applying annual time series data between 1970 and 2016 and co-integration and error correction modelling, the authors managed to provide evidence of the long-term effects of money supply on inflation, even though there are no immediate effects in the short run. This outcome implies that the continuous growth of the money supply may become the source of currency depreciation and the emergence of such instability in the exchange rate as a result of inflation that reduces the power of the domestic currency. In favour of this, Ozekhome (2017) examined changes in monetary growth and inflation in the West African Monetary Zone between 2000 and 2015. The study based on panel data econometrics demonstrated the essentiality of uncontrolled growth of the money supply as a principal contributor to inflation in the region. What was more important was that the negative effect of monetary expansion on the exchange rate stability is accentuated by inflation, which destabilises brands and currency rates and decreases investor confidence. The two studies complement the proposed theory of the quantity theory of money, which holds that the rise of money supply in totality without a complementary growth of output results in inflation, which eventually translates as a gut punch to the exchange rates. Price stability and stabilising exchange rate in West African economies, therefore, entail the proper management of money supply. This is the evidence that is in agreement with classical or monetarist theory, which does not give a direct relationship between the money market balance and the result of foreign exchange results which makes this evidence more in support of the theoretical perspective on money market in the West African region.

### 2.3 Exchange Rate Pass-Through on Food Import Price Transmission

Exchange rate pass-through (ERPT) refers to the extent to which a change in the nominal exchange rate influences the domestic nominal prices of imported goods. This is particularly important among West African economies whose food imports account for a large proportion to meet the local requirements. Various rates may significantly affect the affordability and stability of food prices, affecting household welfare and food security. ERPT may either be complete (a one per cent fall in the currency gives rise to a one per cent rise in the import price) or incomplete (the increase in import price is less than one per cent). Research indicates that developing countries such as West Africa are characterized by partial and asymmetric pass-through. This implies that depreciation of the currency is likely to affect it more than appreciation. The study by Amoah & Korankye (2021) concluded that exchange rate fluctuation determines the prices in the domestic market of key imported food items (rice and wheat) in the country resulting in significant effects. They found that a depreciation of the Ghanaian cedi resulted in a substantial increase in the prices of food imports, giving a short-term pass-through level of approximately 0.7. This partial pass-through could imply that other effects, such as trade margins and price control, also have an effect on the domestic prices.

In similar study, Olayungbo & Alege (2020) examined the case of Nigeria and established that ERPT on food prices is high, though they are dependent on the food product and the period. The pinch was more on the staple foods, especially those that are highly imported. These authors point out the importance of having an anchored exchange rate policy and managing foreign reserves prudently to cushion against external shocks. Moreover, Ajakaiye et al. (2022) analysed the West African trade patterns in general. They highlighted the fact that the volatility of the exchange rate, particularly in the CFA franc and non-CFA franc nations, influences food price inflation in various ways. They emphasised the need to coordinate monetary systems by the regions and have sound localised food systems that can reduce the effect of price shocks caused by currency fluctuations. The situation in West Africa has recently been demonstrated by the Food and Agriculture Organisation (FAO) data in 2023, which shows an increase in food price inflation. One of its driving factors is the intercontinental movement of commodity prices and currency devaluation, especially in Nigeria, Ghana, and Sierra Leone. These trends reveal how essential currency stability is when it comes to minimising imported inflation in the food sector.

## **2.4 Empirical Evidence**

### **2.4.1 Food Price Dynamics**

The food prices dynamic in West Africa and especially that of the imported rice are closely related to the dynamics of exchange rates. According to Abaidoo & Agyapong (2023), the volatility in the prices of commodities traded internationally contributes significantly to the process of the emergence of inflation in the region. This pressure towards inflation is compounded by the absence of effective price controls and an unrestrained exchange rate regime, which is being dictated by the forces of the marketplace. These global price shocks mostly affect the countries that heavily depend on imports of certain foods, e.g., rice. Luo and Tanaka (2021) & Fofana et al. (2021) argued that this dependency has vulnerabilities because the variations in the exchange rates may result in severe price fluctuations in staple foods and thus be less affordable to both disadvantaged farmers and consumers. Also, research by Falana et al. (2021) shows no deviation between the exchange rate volatility and the food price inflation in terms of correlation in the Nigerian economic system, providing evidence of the fact that fluctuations in currency value can cause outrage in the price of essential products. This relationship implies that as the local currency appreciates against major trading currencies, the price of the imported rice produces an elevated amount hence affecting food security and economic stability for the vulnerable populations.

Furthermore, these dynamics imply not only instant price alteration but also the consequences on wider economic policies and practices in West Africa. Gizaw and Maryland (2025) are further keen to state that the exchange rate fluctuations are not just a secondary contributor to food price instability in Sub-Saharan Africa but also the major cause of concern, which necessitates sound economic policies to overcome such challenges. Ceballos et al. (2017) also add to this discussion in their studies on how the volatility of the major grain commodities has a huge effect on the domestic food prices of the countries that rely on imports. In this regard, as suggested by the hypothesis, the impact of exchange rate fluctuation on rice import price in five selected West African countries needs urgent policy intervention, as its impact will not only lead to a rise in import price but also contribute to discouraging investors from making investment decisions.

#### **2.4.2 Monetary Policy and Exchange Rate Stability**

The dynamic changes between the movements of the exchange rate and monetary policy tools are paramount to the economy of West Africa, especially in Nigeria. According to the study by Adedamola et al. (2024) exchange rate volatility is largely affected by a wide range of monetary policy instruments, such as interest rate, money supply, and Central Bank reserves. Their longitudinal analysis of more than forty years shows that the instability of the exchange rate leads to the need for a responsive change in the monetary policy to keep the economy in a state of equilibrium. Nguyen et al. (2017) supported the relationship between inflation and exchange rates in Sub-Saharan Africa. They emphasised that depreciation of the local currency causes the increase of food prices, and this confirms that the exchange rate movement has enormous effects on the price of imported food in West Africa, and also determines the modifications of the monetary policy instruments in the Sub-Region. The results support the significance of aligning the rates of interest in the achievement of monetary authorities to improve the impacts of exchange rate volatility. This is especially necessary in a region where most of the economies are very dependent on imports and prone to external shocks.

Moreover, the study done by Akpan and Udo (2023) supports the idea that the connection between exchange rates and inflation is more complicated and needs to be given attention when developing policies. The results obtained by them using the Autoregressive Distributed Lag (ARDL) model of analysing data between 1981 and 2021 indicate that short-term inflation in Nigeria is strongly impacted by fluctuations in the exchange rates. This emphasises the need to have monetary policy frameworks that recognise the relationship between exchange rates and the dynamics of inflation. These findings are not only relevant in Nigeria but could be implemented in other West African countries under similar economic conditions. Therefore, the role of exchange rate volatility on the monetary policy instruments in Nigeria is critical not only to the region but possibly to other economies, and policy responses to it should be coordinated so as to lead towards stability and economic growth. In addition, the hypothesis that the fluctuations in the exchange rates play an important role in manipulating changes in the monetary policy instruments is well established, and there must be some form of proactive action to curtail such effects.

### **2.4.3 Trade Dynamics and Exchange Rate Effects**

The association between the volatility of exchange rates and foreign direct investment (FDI) in West Africa is a very essential area of investigation, especially considering the implications that it has on economic growth and development. Akinlo and Onatunji (2021) carried out a study on the relationship among selected West African countries throughout 1986-2017, and their finding suggest that the volatility of exchange rates tends to have an adverse influence on FDI. Their results point to the fact that investors will tend to engage in investing in a situation that is stable and predictable in regard to the exchange rate. Han (2020) examined the degree of influence of exchange rates on the growth of economies in 127 countries between 1997 and 2017. He discovered that the effect of the exchange rate volatility on growth is greatly mediated by foreign direct investment. A similar study also examined the degree of influence of exchange rates on the growth of economies and noted that the effect of the exchange rate volatility on growth is greatly mediated by foreign direct investment. Therefore, in countries such as Ghana, Sierra Leone, and Nigeria, where a higher level of exchange rate stability is experienced, the inflowing foreign direct investments are always strong. This implies that a stable exchange rate regime will help to boost the confidence of investors and thus stimulate economic activities and growth. But in other countries where exchange rates have been known to fluctuate, the potential investors might be considered to be at an increased risk, thus the inflows of FDI decrease. This activity supports the theory that the foreign direct investment decisions of West African countries are highly dependent on exchange rate fluctuations.

In line with this, Umoru and Isedu (2018) studied how the volatility in exchange rates impacts total exports in African nations between 2005 and 2018 and found that exchange rate volatility negatively influences the performance of exports, except in Liberia. Their discussion demonstrates the links between the exchange rates, trade, and economic stability. In a situation where exchange rates fluctuate heavily, exporters find it difficult to determine their profit margins, which will ultimately reduce government exports. Such a decline in exports may lead to second-order effects on economic growth and foreign investment, which also adds to the already worsening problems of the economies in the region.

Moreover, Fofanah (2020) highlighted the strong effects of fluctuation in exchange rates on the balance of trade and suggested a policy to encourage economic diversification to lower dependence on imports. Exchange rate fluctuations have the potential to cause an

imbalance in trade where a large number of countries rely on imported products, causing a continuous trade deficit. The ideas of Fofanah point to the fact that West African countries should implement holistic economic models that put an emphasis on diversification and improve the manufacturing potential of their countries. Making economies less dependent on imports, nations are able to deal with the negative consequences of fluctuations in the exchange rate on their trade balance and ensure greater economic robustness. This view falls in line with a generalised hypothesis that a change in exchange rate has tremendous effects both on foreign direct investment and exports and on the economy of West African countries as a whole

#### **2.4.4 Identified Gaps in Literature**

Despite the growing amount of research on exchange rate volatility and its effects on the economy, several key gaps remain, especially in West Africa. Most studies focus on individual countries, particularly Nigeria, as seen in the works of Akpan and Udo (2023), Falana et al. (2021), and Etale and Ochuba (2019)." This narrow focus leaves a significant gap in understanding the broader West African Monetary Zone (WAMZ) as a whole. As a result, there is limited comparative research on how exchange rate changes impact key economic factors across different WAMZ countries. This study aims to fill that geographical gap by including five WAMZ member countries in its analysis.

Additionally, existing studies mainly look at how exchange rate fluctuations affect inflation, trade balances, and economic growth. These include: Ameziane and Benyacoub (2022), Fofanah (2020), Akinlo and Onatunji (2021), and Umoru and Isedu (2018)." Very few have examined the specific effects of exchange rate volatility on rice import prices. Research by Falana et al. (2021) addresses food price changes in Nigeria and the WAMZ, but comprehensive analyses focusing solely on food import prices are limited. This is a significant oversight, especially since the region is a net food importer and sensitive to external price changes. The lack of focus on food import prices, compared to overall food price indices or consumer inflation, makes it harder for policymakers to create targeted strategies to stabilise food markets.

The other influential gap is the lack of commodity-specific analysis. The majority of the available literature handles food prices as one group without being sensitive to market characteristics of staples based on the assertions of Abaidoo and Agyapong (2023) and Nguyen et al. (2017)." This may blind the clear trends of such necessities as rice. It is with the latter in focus that this study is aimed at solving such a problem by focusing on

rice import prices in five countries, which is more detailed and specific, making the policy recommendations more precise. Little has also been done on the interplay of the exchange rate volatility with the monetary policy instruments, such as interest rates, in West Africa. Although most of the research like the study by Adedamola et al. (2024) and Han (2020) explore how monetary policy and exchange rates relate to each other, not many focused on the effects of exchange rate on the decisions of determining interest rates and its sensitivity, and vice versa on an economy that heavily depends on food imports. The research would therefore address such a gap, through an evaluation of how exchange rates change affect interest rates. Finally, though food security has been an issue of concern in West Africa, not many studies associate exchange rate volatility with food import prices and their broader implication on food security. Not much has been emphasised on how these fluctuations affect the price of food imports and thus food security in the region. A study on food security, including that of Van Berkum and Piters (2025), Wudil et al. (2022), and Reardon et al. (2021), would not address the issue of exchange rates. It is important to understand this relationship based on the fact that the region relies on food imports. Thus, the proposed problem will contribute to the discussion because the study will present the empirical information that could be used to develop strategies to provide economic stability and food security.

### Conceptual Framework

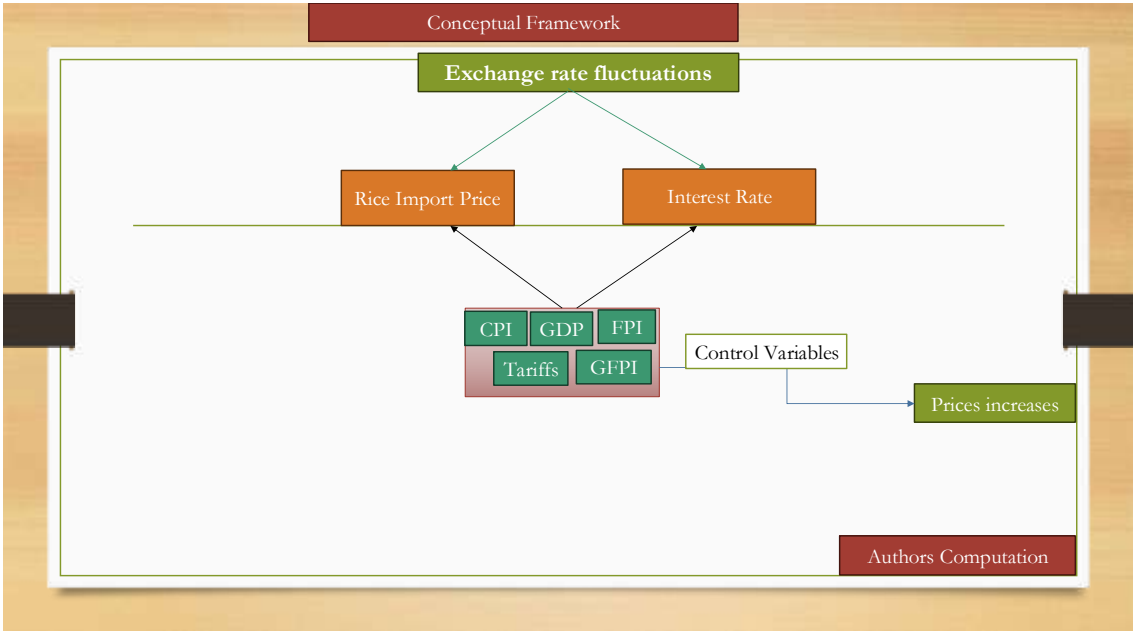


Figure 2. 7 Exchange Rate Fluctuation on Food Import Price.

Source: Authors Computation

Changes in the exchange rate directly and indirectly affect goods and services in different sectors. This has become a challenge for policymakers. Consumer behaviour has been greatly changed with these changes, and the purchasing power of the consumers has been impacted, and in turn, economic growth has been impacted. The African Development Bank can assist governments in the sub-region to ensure against the risks posed by foreign currencies on the domestic currencies and avoid inflation and declines in currency values. Direct costs can be expressed as expenses that have direct connections relating to the production of goods or services. Such costs may be incurred in the production process or during service delivery to a company. Besides, direct costs may be subject to the fluctuations of the exchange rates. Alteration in the exchange rate can increase the cost of inputs required in the production of food, consequently influencing the cost of food importation. The food industry will need a lot of money in the course of production to be at par with the consumer standards. Nevertheless, when incorporated in the price of food products, these expenses affect their prices of imports, and this makes them prohibitively expensive to investors. Countries in West Africa, which largely depend on importing foodstuffs, are mainly affected by exchange rate changes as they aggravate food security in the region. The sub-region is also struggling to produce sufficient food to feed its population, which has increased the dependency on imported food products, which are not only cost-effective for its population.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

The chapter describes the procedure applied in this study. It analyses the influence of exchange rate fluctuation on the prices of imported rice in West Africa through a dynamic panel approach; it does this by using panel data. In order to fulfil the objectives of the study, there are a number of variables in the study that assist in determining this influence. These include the price of rice imports, the exchange rate, the rate of inflation, the interest rate and the global food price index. Data collection and sample selection have also been discussed in the chapter. Lastly, it gives the model specification and estimation methods.

#### **3.1 Data Collection**

The panel data in the study is on the retail market pricing of rice, which is the most consumed staple grain in West Africa. It will target five important net food importers in the ECOWAS, namely: Nigeria, Ghana, Senegal, Côte d'Ivoire and Benin. The observations include panel data monthly between January 2000 and December 2024. The global food crisis is among the events of this period, which increased food price volatility and affected the exchange rates. These related issues are important because of the ongoing food inflation throughout this period, as well as the fact that the region used to rely on imports. The Food and Agriculture Organisation of the United Nations (2025) argue that this period is associated with a turbulent phase in the world food markets. Between 2000 and 2022, food prices increased rapidly by 74 per cent, according to the FAO food price index. This index will be one of the important indicators of food market dynamics in the world because it monitors the key traded products, such as grains and dairy. This is an era that has seen some major increases. The lack of stability in finance and the increasing appetite for using biofuels took away the critical crops, such as corn out from the food market and pumped them into the energy market. This led to a 15 per cent increment in prices between 2007 and 2008. The shortage of supply due to heavy weather, an increase in export bans by the key agricultural producers, also contributed to the 7% increase between 2011 and 2012. However, the latest event to be counted is, of course, the COVID-19 pandemic and the war in Ukraine that significantly interrupted world supply chains and increased the cost of food production by a shocking 45 percent cent between 2019 and 2022.

To obtain reliable and self-sufficient data, information was collected in different, but credible institutions, such as the Global Information and Early Warning System (GIEWS), the International Monetary Fund (IMF), World Development Indicators (WDI), and the FAO. In the study of the five West African countries, the local currencies to consider relevant to this study include the Nigerian naira, the Ghanaian cedi, and the West African CFA franc, also used by Senegal, Benin and Côte D Ivoire. By settling down to these currencies, the impact that fluctuation in the exchange rates has had on the economies of these countries is brought out closely.

### **3.2 Population of the Study**

#### **3.2.1 Unit of Analysis**

The unit of analysis includes five net food-importing countries in West Africa: Nigeria, Ghana, Senegal, Côte d'Ivoire, and Benin. These countries were chosen because they are the largest net food importers in the region, and there is sufficient data available for the study period.

#### **3.2.2 Sample Strategy**

A purposive sampling strategy selects five countries from a total of 16 net food-importing countries in West Africa. The selection criteria rely on the complete availability of retail rice price data. Countries with incomplete or unavailable data were excluded. The sample selection criteria appear in Table 3.1 below.

| <b>Sample selection criteria</b>                  | <b>Total</b> |
|---------------------------------------------------|--------------|
| Total net food-importing countries in West Africa | 16           |
| Countries lacking full rice retail price data     | (11)         |
| Total sample                                      | 5            |
| Number of months observed (2000M1-2024M12)        | 300          |
| Total samples observed (300*5)                    | 1,500        |

Table 3. 1 Sample Selection Criteria

Source: Authors' Computation

### **3.3 Description of Variables**

The data in this study looks at how changes in exchange rates impact rice import prices. The dependent variable is the rice import price, while the independent variable is the exchange rate fluctuation. It also has some control variables which include Interest rates, global food price index, food productivity index, tariffs, consumer price index (CPI) and GDP. The measurement and importance of each variable are discussed below.

#### **3.3.1 Rice Import Price**

Rice consumption is growing quickly in West Africa because of urbanisation, population growth, and increased purchasing power. It is the most consumed food in the region and has become a valuable commodity. Even though there was a big rise during the 2007-2008 food crisis, import dependency is still around 50% since local rice production has not met the demand (Wudil et al., 2022). Therefore, this study uses annual rice import prices as the dependent variable, with these prices reflecting food import costs. The data came from the Global Information and Early Warning System (GIEWS), which offers monthly agricultural retail commodity prices in local currency.

#### **3.3.2 Exchange Rate Fluctuation**

The exchange rate variable (EXG) refers to the number of local currency units per US dollar (LC/USD) based on the monthly data provided by the International Monetary Fund (IMF). The World Bank defines the exchange rate as the rate set by a National Financial Institution (Central Bank) or determined by a legally sanctioned exchange rate market (Sasaki, 2021). When a foreign currency appreciates, it means the local currency is losing value. This is reflected in the fact that it takes more local currency to buy one US dollar. Exchange rates can change due to shifts in market conditions, a country's economy, or government policies, which can impact import costs. Exchange rates are calculated using local currency units compared to a foreign currency.

Additionally, exchange rate fluctuation is the independent variable, measured as the monthly percentage change in the exchange rate of the local currency against the USD for Nigeria and Ghana, and against the Euro for Senegal, Côte d'Ivoire, and Benin. The data was obtained from the World Bank and the IMF International Financial Statistics database and illustrates how currency depreciation or appreciation affects food import prices. In this study, exchange rate fluctuation will be referred to as EXG

### **3.3.3 Interest Rate as a proxy of monetary policy**

Interest rate is used as a proxy of monetary policy in this study, and it's defined as the cost of borrowing or the return on investment, usually expressed as a percentage of the amount borrowed or invested over a period. It is a fundamental tool of monetary policy used by central banks to influence key macroeconomic variables such as inflation, exchange rates, capital flows, and aggregate demand (Sanusi et al., 2023). Furthermore, the interest rate variable illustrates how changes in exchange rates impact imported food prices, especially rice in West Africa. For example, when exchange rates fall, central banks in West Africa raise interest rates to control inflation. This action affects the prices of food imports. Umoru & Hussaini (2022) discovered that in ECOWAS countries, decisions about interest rates are very responsive to exchange rate changes and often serve as the initial policy response before making more significant adjustments to monetary policy. Similarly, Muhammad & Amponsah (2021) highlighted the role of interest rates in Ghana's monetary system. They noted that fluctuations in interest rates due to exchange rate changes often lead to modifications in other tools like reserve requirements and market operations. These findings support the idea that interest rates are connected to exchange rate changes and food import prices, showing how shifts in foreign currency affect local price changes.

### **3.3.4 Tariffs**

When governments impose tariffs on goods sold in other countries, food prices often change. This means that introducing tariffs on imports can make food items more expensive for consumers and businesses. Rose Fiamohe (2015) argued in his research using the GCE model that the introduction of Ecowas common tariffs will significantly impact regional economies, noting that exchange rates are volatile in West Africa, and tariffs on food from other nations can make it harder for people in the region to access food. Therefore, when tariffs increase, importers face higher costs, and consumer prices usually rise too. As a result, families in some parts of the world feel significant pressure on their daily budgets because a large portion of their money goes to food expenses. Coulibaly et al. (2015) highlighted that the potential impact of a proposed 35% tariff on rice imports to Côte d'Ivoire might protect local rice growers, but it could also lead to higher prices for consumers, who rely on imported rice.

Furthermore, tariffs can affect agricultural performance in the country and market behaviour. If imported food prices are high, local farmers might choose to increase production to supply more food. However, this situation can be complicated: if local farmers lack resources or new technology, the goal of protecting local agriculture may not

be achieved. On the other hand, Low tariffs on the one side may make the foods coming into the country cheaper, but at the same time, they may be disadvantageous to the local production since the prices will be different. Thus, farming and the supply of food in West Africa are mostly affected by the levels of tariffs.

### **3.3.5 Food production as a proxy of Agricultural production index**

Agricultural Productivity Index (API) in any particular place or nation demonstrates the productivity and effectiveness of agriculture in that particular country. Some of the key components include crop yield, where the number of crops collected in each area is counted, input utilisation, where the efficiency of farms as they relate to labour, land, and capital is analysed, and technological adoption, whereby the quantity of new farming technology is considered. The API, besides other aspects, also assesses the conditions available in the environment, which could include those of the climate and soil, which could be significant to the success of farming. This kind of approach provides a more detailed image of the agricultural outcomes and their impacts on food supplies. The API is also very vital in the study of food security to determine how the price of food imported into West Africa is affected by fluctuations in exchange rates. The increase in local food production would allow the country to meet changes in prices of imported food that accompany changes in currencies. When agricultural productivity is high, then means imports into the region will be reduced by other members, and this will reduce the risks the region is facing when it comes to external prices. When the country has low productivity, then it will be forced to import more, and therefore, the economy becomes more sensitive to the shock of international currency exchange and how it will affect the importing costs of food.

Additionally, the Food Production Index is used as a proxy for the Agricultural Productivity Index (API) due to its focus on food production in a particular region. The FPI mainly focuses on the measurement of food production, which helps analyse the connection between food supplies and varying exchange rates at the local level. In some regions where imports contribute a lot, information about local food production makes it easier to see how currency movements influence food supply and its price. Juliashar et al. (2024) suggest that an increase in domestic rice production may reduce resilience on imports, leading to lower import prices. As FPI increases, it shows strong local production that can reduce the effect of rising import costs because of currency weakening. Similarly, the FPI helps provide details on how much the country depends on imports. If FPI increases, it can mean that the country produces more food locally and probably uses less imported food. When we study

import prices, we need to pay attention to the relationship between exchange rates and this factor. Proper domestic production means the local economy is likely to keep food prices stable even if import costs rise. Purnama et al. (2024) stated that the import of rice has a considerable influence on the farmers. Exchange rate (NTP), but the productivity and production of rice, as well as the consumption per capita of rice and the harvest area, do not show a significant correlation with NTP in 2019-2023.

Therefore, knowing how these factors operate is essential for judging how West Africa's food systems stand up to the challenges brought by such external issues. Imports of rice are a major determinant of the Farmer exchange rate (NTP), but the productivity and production of rice also cause a significant impact, but for the per capita consumption of their rice and the rice harvest area, there is no high correlation with the NTP in 2019-2023. Interestingly, it is easier to gather and comprehend the FPI than the API, and thus, it is most often the preferred tool for the analysis. Since monitoring of food production variation is crucial during policy debate, FPI provides an easy and clear mechanism to analyse the impact of exchange rate fluctuations on food prices. Using FPI data and the expert pattern based on the trend in the exchange rate and food import MPS, the phenomenon of change in food supply gets linked to these trends and hence will advise the feasible policies that will help attain a good local agriculture and control food prices. In principle, the FPI can clarify previously unknown aspects of the economy of West Africa under the food available and accessed, as it focuses on the study of exchange rates and their impacts on food availability.

### **3.3.6 Global food price index**

The Food and Agriculture Organisation (FAO) issues the Global Food Price Index, which monitors monthly fluctuations of international prices of various food products. It serves as a significant index of the global food market and how this market is likely to influence the local economy. In the West African countries, several of which can be classified as staple food importers aiming at covering the gap between local production and consumption, the Global Food Price Index has a considerable impact on food price patterns. As such, it is reasonable to incorporate the Global Food Price Index as a control variable in a bid to deal with foreign price shocks that may have an implication in the domestic food prices, irrespective of exchange rate movements. This was the issue addressed by Okou et al. (2022) in their paper on the influence of global commodity price trends on food inflation in Sub-Saharan Africa. They observed that the global food market prices were in close connection with the rise in staple food prices, which experienced a rise from 2020 to 2022

at an average of 23.9 per cent. The value of this finding is that the Global Food Index becomes a significant factor in the determination of food inflation in West African nations.

On the same note, Agyei et al. (2021) examined how the global food prices in the context of the COVID-19 pandemic influenced the food import prices in Sub-Saharan Africa. His findings showed that high prices of international food markets had substantive spillover impacts on the domestic markets despite taking the exchange rate changes into account. This helps to argue the need to include the Global Food Price Index as a control variable to make it easier to determine the impacts of exchange rate volatility on the price of food imports. To continue to support this opinion, Abaidoo & Agyapong (2023) applied panel data analysis to food inflation within the ECOWAS countries and specifically, they included the Global Food Price Index as an exogenous variable. Their findings revealed that a shift in international food prices had major impacts on domestic price changes, and it was independent of other macroeconomic variables. This also underlines the necessity of having the Global Food Price Index as a component of studying the dynamics of food prices.

### **3.3.7 Consumer price index (CPI)**

Consumer Price Index (CPI) is a significant value in the economy that measures the average adjustment of the prices paid by consumers on the basket of products and services. This basket constitutes a sample of all the services and goods bought by the consumers. CPI is calculated every month, which is why it influences inflation and deflation in an economy. It consists of different categories, including food, housing, transport, and healthcare. CPI in West Africa has a great influence on the prices of rice imports in various ways. Rising CPI tends to imply inflation, which drives up the cost of imported goods and rice among them. Besides, an increase in the CPI will decrease the purchasing power of consumers. This would make them reduce their consumption of imported rice or utilise other cheaper substitutes. This may lead to diminishing currencies as inflation increases, thus making imports expensive.

Similarly, the World Bank (2023) reported that international commodity prices, like rice, affect consumer prices in Africa. They identified the exchange rate as a key factor influencing the consumption patterns of rice buyers. Nwofoke, Igwe, & Anaga (2024) examined consumer rice prices in Nigeria and found that inflation, exchange rates, and population growth impacted rice prices. They noted that the price of rice has risen significantly over the years, from #2,500 in 2000 to #26,000 in 2020. Their trend model is

represented as  $y = 1024.6x - 2E+06$ , suggesting that consumer rice prices will increase by  $0.0002x$  at any given time. This indicates a change in the growth of rice prices between 2000 and 2020, alongside rising inflation, the consumer price index for food, rice production, population growth rates, exchange rates, and imported rice.

### **3.3.8 Gross Domestic Product (GDP)**

Gross Domestic Product (GDP) is one of the most important economic indicators, which measures the total value in monetary terms of all the finished goods and services produced within the borders of the country in a particular span of time, most commonly one year or three months (quarterly). It is considered to be a broad indicator of the overall health and activity of the economy of a country. The GDP growth can have substantial effects on the price of rice importation. The GDP is a significant factor that shows the increasing standard of living and consumer purchasing power; thus, the demand for rice will increase, particularly in rice-consuming countries. When the demand increases in this way, it can cause an increase in the prices of imported rice, and when the supply fails to meet the quantity demanded, this can lead to a high rate of rice importation.

Moreover, an increase in GDP may bring in inflationary pressure, increasing the prices of transportation, production, which further adds to the price of rice importation. Amaral et al. (2022) argued that expansionary monetary policy does have a significant effect on economic growth in the short run, even though it does not last long. Therefore, the central banks should put in measures that will regulate this effect to avoid inflation that will affect consumer spending. Furthermore, GDP plays a vital role in affecting monetary policy tools in West Africa in a number of ways. As an example, an increase in the GDP growth rates usually causes central banks to implement less restrictive monetary policy, reducing interest rates to encourage further economic growth. Alternatively, when the growth in the GDP is slow, the central banks can also tighten the monetary policy in order to check inflation. Moreover, the GDP trends are used to coordinate fiscal policy, which triggers the central banks to think about the changes in the monetary policy according to the level of public debt and other external economic impacts that will contribute to the economic stability and growth in the area. West African countries are interconnected through regional trade, and changes in the price of non-oil commodities will have a significant impact on the exchange rate and monetary policy, which will later be transferred through policy rates to GDP (Muhammed et al., 2022).

|                                                                     | Definition                                                                                                                                                                                          | Data Source     | Code        |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|
| <b>Dependent Variables</b>                                          |                                                                                                                                                                                                     |                 |             |
| Rice Import Price                                                   | Rice import price refers to the total expenses incurred for importing rice into another country.                                                                                                    | <b>GIEWS.</b>   | <b>RIP</b>  |
| Interest Rate                                                       | Interest rate is used as a proxy of monetary policy in this study, and it's defined as the cost of borrowing or the return on investment, usually expressed as a percentage of the amount borrowed. | <b>WDI</b>      | <b>INT</b>  |
| <b>Independent Variables</b>                                        |                                                                                                                                                                                                     |                 |             |
| Exchange rate<br>(local currency units relative to the U.S. dollar) | The rate that is determined by a National financial institution (Central Bank) or the rate that is determined by a legally sanctioned exchange rate market                                          | <b>CB (W/A)</b> | <b>EXG</b>  |
| <b>Control Variables</b>                                            |                                                                                                                                                                                                     |                 |             |
| Consumer Price Index                                                | Measure of the average change over time in the prices paid by consumers for a representative basket of consumer goods and services.                                                                 | <b>IMF</b>      | <b>CPI</b>  |
| Tariffs                                                             | Tariffs or duties are taxes governments impose on the value, including freight and insurance, of imported goods and services.                                                                       | <b>WDI</b>      | <b>TF</b>   |
| Food Production Index                                               | The FPI mainly focuses on the measurement of food production, which helps analyse the connection between food supplies and varying exchange rates at the local level.                               | <b>WDI</b>      | <b>FPI</b>  |
| Global Food Price Index                                             | GFPI monitors monthly changes in international prices of a basket of food commodities                                                                                                               | <b>WDI</b>      | <b>GDPI</b> |
| Gross Domestic Product                                              | The total monetary value of all final goods and services produced within a country over a period of time                                                                                            | <b>WDI</b>      | <b>GDP</b>  |

### 3. 2 Variables Description and data source

Source: Authors Computation.

### 3.4 Model Specification

To test the proposed hypothesis, the study uses panel data regression. Panel data combines cross-sections and time series from a specific geographical region. According to Ahmad et al. (2022), the panel data method is a key statistical approach for studying long-term and complex relationships between economic variables. Thus, the study examines the impact of exchange rate fluctuations on rice import prices in five West African countries using monthly panel data from January 2000 to December 2024. A dynamic panel data model is used with the Generalised Method of Moments (GMM) as suggested by Arellano & Bond (1991). This method works well for panels with many time points, like the monthly data from 2000M1 to 2024M12, and a small number of countries (five nations).

The estimation starts with fixed and random effects models, then applies GMM to address dynamic relationships and endogeneity. The dependent variable is rice import price, and the main independent variable is exchanging rate fluctuation. The interest rate serves as a proxy of monetary policy, while global food prices, CPI, GDP, Tariffs and food productivity index are added as control variables. A lagged dependent variable helps account for rice price persistence and dynamic adjustment. Furthermore, the study explores two connected hypotheses to investigate the relationship between exchange rate dynamics and rice import prices in West Africa. Hypothesis 1 (H1) highlights that exchange rate fluctuations significantly raise imported rice prices in the region over time. Hypothesis 2 (H2) suggests that exchange rate volatility notably affects key monetary policy tools, especially interest rates, which in turn influence rice import prices. To empirically test these hypotheses, the following fixed-effects model is first specified:

#### 3.4.1 Model Equation

##### 3.4.1.1 Equation 1: Impact of Exchange Rate Fluctuations on Rice Import Prices

$$RIP_{it} = \beta_0 + \beta_1 RIP_{it-1} + \beta_2 EXC_{it} + \beta_3 GFPI_{it} + \beta_4 FPI_{it} + \beta_5 TF_{it} + \beta_6 CPI_{it} + \beta_7 GDP_{it} + \mu_i + \lambda t + \epsilon_{it} \quad (1)$$

Where:

- RIP: Rice Import Price (dependent variable)
- $RIP_{t-1}$ : Lag of Rice Import Price to capture dynamics
- EXRF: Exchange Rate Fluctuation
- GFPI: Global Food Price Index

- FPI: Food Productivity Index
- TF: Tariff
- CPI: Consumer Price Index
- GDP: Gross Domestic Product
- $\mu_i$ : Country-specific effects
- $\lambda_t$ : Time effects
- $\epsilon_{it}$ : Error term

#### 3.4.1.2 Equation 2: Influence of Exchange Rate Fluctuations on Monetary Policy Instruments

$$IR_{it} = \beta_0 + \beta_1 IR_{it-1} + \beta_2 EXC_{it} + \beta_3 CPI_{it} + \beta_4 GDP_{it} + \beta_5 TF_{it} + \beta_6 GFPI_{it} + \beta_7 FPI_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (2)$$

Where:

- IR: Interest Rate (dependent variable)
- $IR_{t-1}$ : Lag of Interest Rate
- EXRF: Exchange Rate Fluctuation
- CPI: Consumer Price Index
- GDP: Gross Domestic Product
- TF: Tariff
- GFPI: Global Food Price Index
- FPI: Food Productivity Index
- $\mu_i$ : Country-specific effects
- $\lambda_t$ : Time effects
- $\epsilon_{it}$ : Error term

If both  $\delta_2$  (exchange rate fluctuation effect) and  $\delta_3$  (interest rate effect) are statistically significant, this means that exchange rate fluctuations directly affect rice import prices (H1)

and impact them indirectly through interest rate changes (H2). A smaller exchange rate fluctuation, when excluding interest rates, would further support this indirect effect.

However, due to the possible connection between exchange rate fluctuations, interest rates, and rice import prices—especially from reverse causality—the Generalised Method of Moments (GMM) is used. As Chang et al. (2011) noted, GMM is useful for addressing endogeneity, autocorrelation, and hidden differences. The Difference GMM approach was used to analyse the data after verifying its suitability through the GMM test to remove fixed effects and then applying lagged levels as instruments for the endogenous regressors.

Thus, the differenced GMM model is specified as follows:

$$\mathbf{3.4.1.3.} \quad \Delta \text{RIP}_{i,t} = \theta_1 \Delta \text{RIP}_{i,t-1} + \theta_2 \Delta \text{EXC}_{i,t} + \theta_3 \Delta \text{GFPI}_{i,t} + \theta_4 \Delta \text{FPI}_{i,t} + \theta_5 \Delta \text{TF}_{i,t} + \theta_6 \Delta \text{CPI}_{i,t} + \theta_7 \Delta \text{GDP}_{i,t} + \theta_8 \Delta \text{IR}_{i,t} + \Delta \epsilon_{i,t} \quad (3)$$

Where:

- $\Delta \text{RP}_{i,t}$  = The change in rice import prices in country  $i$  at time  $t$ .
- $\theta_1 \Delta \text{RP}_{i,t-1}$  = Lagged change in rice import prices to capture persistence, multiplied by its coefficient  $\theta_1$ .
- $\theta_2 \Delta \text{EXRF}_{i,t}$  = Change in exchange rate fluctuation for country  $i$  at time  $t$ , with  $\theta_2$  measuring its effect.
- $\theta_3 \Delta \text{GFP}_{i,t}$  = Change in global food price index acting as a control variable.
- $\theta_4 \Delta \text{FPI}_{i,t}$  = Change in food production index acting as a control variable.
- $\theta_5 \Delta \text{TF}_{i,t}$  = taxes charge on imported goods & services coming into a country
- $\theta_6 \Delta \text{INT}_{i,t}$  = Change in interest rate Inflation for country  $i$  at time  $t$ , with  $\theta_6$  measuring its influence.
- $\theta_7 \Delta \text{GDP}_{i,t}$  = measures the total monetary value of all final goods and services produced within a country over a period of time.
- $\Delta \theta_8 \text{CPI}_{i,t}$  = Measure of the average change over time in the prices paid by consumers for a representative basket of consumer goods and services.
- $\Delta \epsilon_{it}$  = Error term

This specification allows the model to capture both the direct effects of exchange rate fluctuations on rice import prices (H1) and the effect of exchange rate volatility through interest rate responses (H2) in a unified dynamic panel framework. Monthly frequency lets the model account for high-frequency variations, which improves the accuracy of estimated macroeconomic dynamics.

This study draws inspiration from recent works that have used Differenced GMM to address similar macroeconomic issues in emerging economies. For example, Nguyen & Su (2020) employed Difference GMM to assess the effects of exchange rate volatility on trade in Asian economies. Likewise, Aliyu and Yusuf (2020) used the technique to estimate how exchange rates affect inflation in ECOWAS, and Mensah et al. (2023) applied a similar framework to explore the impacts of macroeconomic volatility on trade in West Africa.

### **3.5 Model Estimation Tests and Selection**

To ensure a strong and valid estimation of the relationships among exchange rate fluctuations, interest rates, and rice import prices in West Africa, the study uses a step-by-step model estimation strategy. This process starts with static panel models and diagnostic tests, then applies a dynamic panel model using the Generalised Method of Moments (GMM). The estimation opens with a Pooled Ordinary Least Squares (OLS) model, which ignores differences between individual countries. This model assumes that the intercepts and slopes are the same across all countries, which is not realistic in a panel setting with multiple countries that have different structures.

However, pooled OLS has issues with omitted variable bias because it overlooks unobserved country-specific effects, and it serves only as a benchmark. To tackle the differences across countries, the study moves on to estimate Fixed Effects (FE) and Random Effects (RE) models. It starts by comparing the Pooled OLS and Fixed Effects (FE) models. The F-test helps determine whether the unobserved differences (country-specific effects) are significant, supporting the use of FE over Pooled OLS. Additionally, to ensure the model's validity and reliability, the Hansen test checks if the overidentifying restrictions are satisfied. These restrictions occur when there are more instruments than endogenous regressors. Additionally, Autoregressive (AR) tests, specifically AR(1) and AR(2), are used to detect autocorrelation in the model's error terms. This is especially important in dynamic panel data models. AR(1) tests for first-order autocorrelation, while AR(2) tests for second-order autocorrelation in the residuals.

## **CHAPTER IV**

### **RESULTS AND DISCUSSION**

This chapter presents the results and discussion of the study so as to address the hypothesis underpinning the study. The study aims to assess the impact of exchange rate fluctuation on rice import price in five West African countries with tariffs, global food price index, food production index, consumer price index (CPI) and GDP as the control variables. The study uses Stata software to regress and analyse the data to generate the model, which will address the hypothesis. Additionally, the results of the descriptive statistics, correlation matrix, panel regression (Pooled OLS, Fixed and Random effects), and GMM estimation have all been presented. The results generated from the model were presented and discussed thoroughly in relation to the hypothesis guiding the conduct of the study.

#### **4.1 Results**

##### **4.1.1 Descriptive Statistics**

The table 4.1 below summarises the descriptive statistics for all variables included in the analysis based on 1,500 monthly observations. The average price of imported rice (RP), measured in USD, is 472.10, with a standard deviation of 106.75. Prices range from a minimum of 230.10 to a maximum of 647.89, indicating that rice import prices are relatively high across West African markets and show substantial variability over time.

The exchange rate fluctuation (EXG) shows a mean value of 179.68, a standard deviation of 227.68 and a large variance of 9.54 and 732.40. This high degree of variability is represented by significant exchange rate fluctuation in the five West African countries, as they witnessed a series of currency devaluations. Such a trend of exchange rate fluctuation is therefore in line with trends of weakening local currencies. The average of interest rates (IR) is 8.59% with a minimum of 2 per cent, and the highest 30.85 per cent, also pointing to quite different conditions of monetary policy in the region.

The Global Food Price Index (GFPI) carries an average of 96.64 with a standard deviation of 26.27, with some values being 53.43 and 144.51, which comprises the dynamics within the global food market that may impact the local food prices. The mean value of trade tariffs (TARIFF) imposed on the imports of rice is 7.93 per cent, and the bounds are between -2.25 to a high of 41.51 per cent, suggesting that the implementation of trade policy tariffs is not very similar across countries. Consumer Price Index (CPI) has a mean of 134.37 with a high dispersion (standard deviation = 112.24) and variations in the inflationary conditions. Finally, the Food Productivity Index (FPI) has an average of 90.74

and a rather high standard deviation (30.69), with the lowest value being 22.03 and the highest being 183.45, which is rather indicative of the heterogeneity of agricultural productivity at a national level over time.

| Variable      | Obs  | Mean     | Std. Dev. | Min   | Max    |
|---------------|------|----------|-----------|-------|--------|
| <b>RP</b>     | 1500 | 472.0984 | 106.7493  | 230.1 | 647.89 |
| <b>EXG</b>    | 1500 | 179.6844 | 227.6816  | 9.54  | 732.40 |
| <b>IR</b>     | 1500 | 8.5898   | 5.8696    | 2     | 30.85  |
| <b>GFPI</b>   | 1500 | 96.6403  | 26.2673   | 53.43 | 144.51 |
| <b>TARIFF</b> | 1500 | 7.9300   | 8.7787    | -2.25 | 41.51  |
| <b>CPI</b>    | 1500 | 134.3692 | 112.2412  | 19.21 | 749.34 |
| <b>GDP</b>    | 1500 | 4.6464   | 3.0376    | -5.37 | 15.33  |
| <b>FPI</b>    | 1500 | 90.7403  | 30.6900   | 22.03 | 183.45 |

Table 4. 1 Descriptive Statistics

Source: Authors' Computation (from Stata Software)

#### 4.1.2 Correlation Matrix

As exhibited in the correlation matrix Table 4.2. Below, there is no multicollinearity between the independent variables since most of the correlation coefficients are not close to 0.80; interest rate (IR) and consumer price index (CPI) registering 0.4933, CPI and TARIFF 0.4639, and IR and TARIFF 0.3871. The values also indicate that the correlations are moderate, hence no danger of multicollinearity. The remaining pairs of variables have a weak correlation. Therefore, based on this correlation matrix, it cannot be said that independent variables are interrelated to an extent that regression analysis could be carried out.

|               | RIP     | EXG     | IR     | GFPI   | TARIFF | CPI    | GDP    |
|---------------|---------|---------|--------|--------|--------|--------|--------|
| <b>RP</b>     | 1.0000  |         |        |        |        |        |        |
| <b>EXG</b>    | 0.2091  | 1.0000  |        |        |        |        | -      |
| <b>IR</b>     | -0.1257 | -0.3372 | 1.0000 |        |        |        |        |
| <b>GFPI</b>   | 0.1605  | 0.0903  | 0.0305 | 1.0000 |        |        |        |
| <b>TARIFF</b> | -0.1096 | -0.3860 | 0.3871 | 0.0394 | 1.0000 |        |        |
| <b>CPI</b>    | 0.1361  | -0.1585 | 0.4933 | 0.4261 | 0.4639 | 1.0000 |        |
| <b>GDP</b>    | -0.2194 | -0.0303 | 0.0837 | 0.1595 | 0.0542 | 0.0303 | 1.0000 |

Table 4. 2 Correlation Matrix

Source: Authors' Computation (from Stata Software)

#### 4.1.3 Static Panel Results

The association between the exchange rate fluctuations and the imported food prices in West Africa was analysed first through the Pooled Ordinary Least Squares (Pooled OLS) model. The assumption is that the Pooled OLS does not take into consideration the possible panel structure of the data because all the observations are treated as independent. Since our data contains monthly observations in five countries, to consider the possibility of heterogeneity among different countries, the random effects model is estimated, which assumes that unobserved effects are random and will not be correlated with explanatory variables.

Nonetheless, the random effect model can be produced only when the individual-specific effects are considered uncorrelated with the explanatory variables. But if such an assumption is not fulfilled, for example, when there are specific factors associated with countries that at the same time affect exchange rates and prices of rice imports, the RE estimates will not only be biased but also inconsistent. To respond to this issue, a fixed effects model was estimated. The fixed effects adjust to all time-invariant, unmeasured heterogeneity between nations, making sure that the effects of any possible correlation

between the country-specific aspects which are not addressed and the regressors are incorporated, and the parameter estimates would be more robust and stable.

The Hausman test was carried out to choose the best model for this study between fixed effects and random effects. According to the null hypothesis of the Hausman test, the independence or lack of systematism of the difference in coefficients between FE and RE indicates that the RE model would be efficient. However, the Hausman test produced a chi2 of 25.84 with a p-value of 0.001 in model 1 and a chi2 of 21.76 with a p-value of 0.004 in model 2, as shown in the tables below. With both models, the p-value is less than the significance level of 5 per cent, so we rejected the null hypothesis. This implies that the assumption that is made in the RE model is that there is no correlation between the unobserved heterogeneity and the explanatory variables, is not valid. Consequently, the FE model will be the specification of choice study, as it is consistent, unbiased, given that it can control the unobserved but time-invariant country-specific variables that could cause bias in the estimated outcome.

|                               | Pooled OLS             | Random Effect        | Fixed Effect          |
|-------------------------------|------------------------|----------------------|-----------------------|
| <b>EXR</b>                    | -2.9998<br>(0.002) *** | 0.0834<br>(0.000)*** | 0.0356<br>(0.014)     |
| <b>GFPI</b>                   | 0.3596<br>(0.003) ***  | 0.0077<br>(0.003)*** | 0.2729<br>(0.007)     |
| <b>TARIFF</b>                 | 0.2611<br>(0.676)      | 0.1287<br>(0.401)    | 3.2569<br>(0.007)     |
| <b>CPI</b>                    | 0.1881<br>(0.000)***   | 0.1468<br>(0.000)*** | 0.3298<br>(0.000)     |
| <b>GDP</b>                    | -7.7727<br>(0.000)***  | 0.0077<br>(0.000)*** | -5.3568<br>(0.000)    |
| <b>FPI</b>                    | 0.0797<br>(0.414)      | 0.0373<br>(0.006)*** | -0.2614<br>(0.002)*** |
| <b>Adjusted R<sup>2</sup></b> | 0.462                  | 0.472                | 0.562                 |
| <b>Hausman test</b>           | Chi2=25.84 (0.001)     |                      |                       |

Table 4. 3 Static Panel Results for Model 1  
Source: Authors' Computation (from Stata Software)

| Variable                      | Pooled OLS                           | Random Effects         | Fixed Effects          |
|-------------------------------|--------------------------------------|------------------------|------------------------|
| <b>EXR</b>                    | -1.8456<br>(0.005) ***               | 0.0672<br>(0.000) ***  | 0.0285<br>(0.018) ***  |
| <b>GFPI</b>                   | 0.4128<br>(0.001) ***                | 0.1429<br>(0.002) ***  | 0.3017<br>(0.009) ***  |
| <b>TARIFF</b>                 | 0.1985<br>(0.713)                    | 0.1054<br>(0.529)      | 2.9851<br>(0.010) **   |
| <b>CPI</b>                    | 0.1593<br>(0.000) ***                | 0.1245<br>(0.000) ***  | 0.3102<br>(0.000) ***  |
| <b>GDP</b>                    | -6.4125<br>(0.000) ***               | -1.2387<br>(0.000) *** | -4.9857<br>(0.000) *** |
| <b>FPI</b>                    | 0.0625<br>(0.501)                    | 0.0521<br>(0.008) ***  | -0.1954<br>(0.004) *** |
| <b>Adjusted R<sup>2</sup></b> | 0.418                                | 0.429                  | 0.538                  |
| <b>Hausman Test</b>           | Chi <sup>2</sup> = 22.57 (p = 0.002) |                        |                        |

Table 4. 4 Static Panel Results for Model 2

Source: Authors' Computation (from Stata Software)

**Note:** \*(\*\*) \*\*\* indicates statistically significance of p-value < 10%, 5% and 1% respectively. The p-value are in the parenthesis.

#### 4.1.4 Dynamic Panel Results

To address the possible endogeneity and dynamic relationships in the panel data, specifically due to the persistence of the dependent variables RP and IR, the analysis is further carried to the dynamic panel models techniques. Initially, we fitted a First-Difference GMM model, and we used the levels of the dependent variable, which were lagged, as instruments. Dynamic adjustment effects are controlled by the inclusion of lagged dependent variable (L.RP) in model 1 and (L.IR) in model 2, and unobserved time-invariant country-specific heterogeneity is eliminated by differencing. The Difference in GMM estimation outcomes of both models is given below

| Variable             | Diff-1 GMM             | Sys GMM                 |
|----------------------|------------------------|-------------------------|
| <b>L.RP</b>          | 0.8124***<br>(0.000)   | 0.9057***<br>(0.000)    |
| <b>EXG</b>           | 0.0275***<br>(0.015)   | 0.0198***<br>(0.038)    |
| <b>GFPI</b>          | 0.1792***<br>(0.035)   | 0.2115***<br>(0.004)    |
| <b>TARIFF</b>        | 2.4517***<br>(0.000)   | 2.1086***<br>(0.000)    |
| <b>CPI</b>           | 0.2498<br>(0.071)      | 0.2498<br>(0.078)       |
| <b>GDP</b>           | 5.9083<br>(0.121)      | 1.2574<br>(0.412)       |
| <b>FPI</b>           | 0.2195***<br>(0.004)   | 0.2017<br>(0.001)       |
| <b>Ar(1)</b>         | -2.9917<br>(0.0000)*** | -3.1027<br>(0.0019) *** |
| <b>Ar2)</b>          | -0.26195<br>(0.7934)   | 0.26195<br>(0.7934)     |
| <b>Hansen J-test</b> | (0.0019)               | (0.1564)                |

Table 4. 5 Dynamic Panel Results for Model 1

Source: Authors' Computation (from Stata Software)

**Note:** \*(\*\*) \*\*\* indicates statistical significance of p-value < 10%, 5% and 1% respectively. The p-values are in the parenthesis.

The FD-GMM estimates of Model 1 reveal a significant positive lagged dependent variable coefficient L.RIP (0.8124,  $p < 0.001$ ), which implies that the price direction of the present imported rice has a profound influence on the past price dynamics. In particular, the change at the end of the previous month in the price of the imported rice by 1 per cent is estimated to have a corresponding change of 0.81 per cent in the present period.

The exchange rate fluctuations (EXG) also affect the imported rice prices positively and significantly (0.0275,  $p = 0.015$ ), thus proving that currency depreciation is likely to have a high price increase in imported rice. Besides, global food prices (GFPI, 0.1792,  $p = 0.035$ ), trade tariffs (TARIFF, 2.4517,  $p < 0.001$ ) and food productivity index (FPI, 0.2195,  $p = 0.004$ ) are also known to have major positive influence upon prices of imported rice. The coefficients that depict the impact of CPI and GDP are positive but insignificant.

The model diagnostics reveal that the Arellano-Bond AR(1) test of first-order serial correlation is significant ( $AR(1) = -2.9917$ ,  $p = 0.0000$ ) but there is no significant result according to the Arellano-Bond AR(2) test of second-order serial correlation ( $AR(2) = -0.2619$ ,  $p = 0.7934$ ) indicating that there is no evidence of second-order serial correlation in the second-differenced residuals. Nevertheless, the Hansen J-test on over-identification restrictions yields the p-value of 0.0019, and this can cause certain issues with the instrument validity and oversampling. The values of the p-statistic are too low, which proves that the instruments are not exogenous enough. The FD-GMM model failed to get the unbiased estimator and a valid, consistent instrument; therefore, the System GMM was performed so that these issues could be resolved.

The System GMM estimation results reveal important dynamics driving imported rice prices in West Africa. The coefficient on the lagged dependent variable (L.RIP = 0.9057,  $p < 0.001$ ) being close to 1 reflects strong price persistence, meaning that current rice import prices are heavily influenced by past price levels. This suggests that price adjustments in the rice import market are gradual and tend to have lasting effects over time rather than being quickly absorbed.

Exchange rate fluctuations have a significant positive effect on imported rice prices ( $EXG = 0.0198$ ,  $p = 0.038$ ): a 1% depreciation in the local currency leads to an estimated 1.98% increase in imported rice prices. This finding underlines the vulnerability of food import costs to currency weakness; when the exchange rate deteriorates, West African countries face higher costs in domestic currency, which in turn raises imported rice prices for consumers.

There is also a significant positive impact of the global food prices ( $GFPI = 0.2115$ ,  $p = 0.004$ ) on the domestic imported rice prices. A one percentage point increase in global rice prices is estimated to cause a 2.12 per cent increase in imported rice price. This observation underscores the fact that activities in global markets, which include supply shortages and restrictions on exportation, exert a direct impact on the market prices of imported rice in West Africa. It implies that the local consumers and importers are quite vulnerable to the global food price fluctuations, and they have low measures of insulation against the international shocks.

The effect of trade tariffs on the prices of rice imported is positive and significant ( $TARIFF = 2.1086$ ,  $p < 0.001$ ). A percentage increase in tariffs of 1% increases the estimated increase in the price of imported rice by 2.11%. This explains why the issue of trade policy is of paramount importance when it comes to determining the affordability of food in West African countries, given the fact that rice is mostly major staple among low-income households. Most governments in the region manipulate tariffs to reflect fiscal requirements as well as to cushion local farmers, citing different reasons, which in turn has been found to greatly escalate the cost of imports that are immediately handed over to the common man in the form of the rising price of food itself. The implications here are severe for food security in an area where most of the individuals are exposed to great vulnerability to food price fluctuations.

On the contrary, the Consumer Price Index ( $CPI = 0.2498$ ,  $p = 0.078$ ) portrays a positive though insignificant influence on the price of imported rice. This implies that there is no direct and immediate effect of general inflationary trends on the prices of rice imports. An alternative reason could be that the importation of rice is frequently in a longer-run procurement arrangement or pre-bargaining of price, so it is less sensitive in the short term to domestic inflation. Moreover, such prices might already incorporate the inflation expectations, almost silencing the short-term effects of CPI changes.

Additionally, the increase of GDP ( $GDP = 1.2574$ ,  $p = 0.412$ ) does not indicate any significant connection regarding the variations in the price of imported rice. What this means is that in the short term, fluctuations in the general economic activity, be it an increase or a decline, do not have a direct impact on the price of imported rice. Rice prices in West Africa, however, seem to be better impacted by external market factors (the fluctuation of exchange rates, the world prices) and trade-related policies (tariffs) than by the changes in local demand connected with the macroeconomic performance.

Finally, a significant and positive impact on the imported rice price is demonstrated by the Food Productivity Index (FPI = 0.2017,  $p = 0.001$ ). A one per cent rise in the Food Productivity Index leads to a projected rise of 2.02 per cent in the prices of rice imports. This implies that agricultural advancements are not benefiting rice and other crops, meaning that production of rice in the area is not rising to diminish imports.

Consequently, the diagnostic tests confirm the robustness of the model. Arellano Bond AR(1) test ( $z = -3.1027$ ,  $p = 0.0019$ ) is significant, but the AR(2) test ( $z = 0.26195$ ,  $p = 0.7934$ ) is insignificant, which shows no second-order autocorrelation is satisfied, which is a major requirement of validity of System GMM. The Hansen J-test of overidentifying restriction ( $P = 0.1564$ ) demonstrates that the instrument set is valid and not overfitted, which proves that the System GMM estimates can be trusted.

| Variable             | Diff-1 GMM             | Sys GMM                |
|----------------------|------------------------|------------------------|
| <b>L.IR</b>          | 0.6752***<br>(0.000)   | 0.8235***<br>(0.000)   |
| <b>EXG</b>           | 0.0149**<br>(0.027)    | 0.0117**<br>(0.044)    |
| <b>GFPI</b>          | 0.1528**<br>(0.041)    | 0.1895***<br>(0.008)   |
| <b>TARIFF</b>        | 1.9826***<br>(0.000)   | 1.7551***<br>(0.000)   |
| <b>CPI</b>           | 0.1716***<br>(0.012)   | 0.1623***<br>(0.006)   |
| <b>GDP</b>           | 4.1173<br>(0.003)***   | 1.0085<br>(0.012)***   |
| <b>FPI</b>           | 0.1932<br>(0.089)      | 0.1873<br>(0.097)      |
| <b>AR(1)</b>         | -3.2845***<br>(0.0010) | -3.0975***<br>(0.0021) |
| <b>AR(2)</b>         | 0.2985<br>(0.7652)     | 0.2748<br>(0.7835)     |
| <b>Hansen J-test</b> | (0.0028)               | (0.1789)               |

Table 4. 6 Dynamic Panel Results for Model 2

Source: Authors' Computation (from Stata Software)

**Note:** \*(\*\*) \*\*\* indicates statistically significance of p-value < 10%, 5% and 1% respectively. The p-values are in the parenthesis.

Similarly, for Model 2, we began with FD-GMM estimation for interest rates (IR). The lagged dependent variable ( $L.IR = 0.6752, p < 0.001$ ) demonstrated strong persistence in interest rate behaviour. Exchange rate fluctuations ( $EXG = 0.0149, p = 0.027$ ), global food prices ( $GFPI = 0.1528, p = 0.041$ ), tariffs ( $TARIFF = 1.9826, p < 0.001$ ), and CPI ( $0.1716, p = 0.012$ ) were significant drivers of interest rates, while GDP growth ( $GDP = 4.1173, p = 0.003$ ) also showed a strong positive relationship. However, the Hansen J-test ( $p = 0.0028$ ) suggested potential concerns regarding instrument validity, warranting the use of System GMM for more robust estimates.

The interest rate persistence rose even more in the System GMM estimation ( $L.IR = 0.8235, p < 0.001$ ). This would mean that about 82 per cent of last month's interest rate would reflect in the current month, indicating the slow nature of interest rate adjustment, as is the case in monetary policy, where central banks are not expected to make big changes in interest rates. Exchange rate fluctuations have a significant positive impact on interest rate ( $EXG = 0.0117, p = 0.044$ ). This means that a 1% depreciation in the exchange rate fluctuation increases the interest rate by 1.17 per cent, as the monetary authorities of West African countries react to the inflationary pressure induced by depreciation of the local currency.

Global food prices ( $GFPI = 0.1895, p = 0.008$ ) also have a positive and significant effect on interest rate. A percentage increase in global food prices leads to an increase in the interest rate by about 0.19 per cent due to the West African central banks trying to tighten their monetary policy in response to imported food inflation. A significant positive relationship is also witnessed between tariffs ( $TARIFF = 1.7551, p < .001$ ), wherein a 1 unit increase in trade tariffs positively affects the rise in interest rates by 1.76 percentage points, which most probably is the process of tariffs passing through domestic prices, with the monetary policy reaction intended to restrain that inflation.

Furthermore, consumer price index ( $CPI = 0.1623, p = 0.006$ ) also positively and significantly influences interest rates. A 1% increase in CPI leads to approximately a 0.16 percentage point rise in the interest rate, as central banks adjust policy rates to maintain price stability. GDP growth ( $GDP = 1.0085, p = 0.012$ ) exhibits a significant positive effect, where each additional 1% increase in GDP growth is associated with roughly a 1.01 percentage point rise in interest rates, consistent with procyclical monetary policy, where stronger economic activity leads to tighter monetary conditions. Lastly, the food productivity index ( $FPI = 0.1873, p = 0.097$ ) has a positive but statistically insignificant effect on interest rates, suggesting that improvements in food productivity do not have a

clear or consistent impact on monetary policy decisions in the short term. This may be because changes in agricultural productivity take time to influence broader economic indicators such as inflation or growth, which central banks typically consider when setting interest rates.

The diagnosis results confirm the validity and suitability of the System GMM model in this study. The first-order autocorrelation in differenced residuals AR(1) of dynamic panels is expected, which contributes to a significant test result ( $z = -3.0975$ ,  $p = 0.0021$ ). The non-significant AR (2) test output ( $z = 0.2748$ ,  $p = 0.7835$ ) implies that the second-order autocorrelation does not exist, which is one of the main factors related to the model's validity. Moreover, the Hansen J-test ( $p = 0.1789$ ) proves that the instruments used are not overfitted and valid. These results indicate that the System GMM model gives reliable and consistent estimates, and it is hence a suitable and feasible specification in this study.

#### **4.1.5 Model Diagnostic Tests**

##### **4.1.5.1 Pesaran CD test**

According to Table 4.7 results of the Pesaran CD test below, the cross-sectional dependence of the residuals of Model 1 and Model 2 standardised statistics is significant. Model 1 has a CD statistic of 3.18 and -p-value of 0.0015, whereas Model 2 has a CD statistic of 2.64 and a p-value of 0.0083. These findings imply that in both models, the null hypothesis of cross-sectional independence can be strongly rejected. It means that the 5 West African countries can be concurrently affected by changes in the exchange rates. The existence of such regional interdependence challenges the inclusion of cross-sectional diagnostics in this study and demands prudence in interpreting results under presumptions of residual independence. In addition, it also emphasises the openness of West African economies and the possibility of global and regional shocks spillover.

| Model                       | CD Statistic | p-value  | Conclusion                                                                                       |
|-----------------------------|--------------|----------|--------------------------------------------------------------------------------------------------|
| Model 1: Rice Import Prices | 3.18         | (0.0015) | Reject $H_0$ : Significant evidence of cross-sectional dependence in residuals across countries. |
| Model 2: Interest Rate      | 2.64         | (0.0083) | Reject $H_0$ : Significant evidence of cross-sectional dependence in residuals across countries. |

Table 4. 7 Pesaran CD test

Source: Authors' Computation (from Stata Software)

**Note:** **\*(\*\*)** \*\*\* indicates statistical significance of p-value < 10%, 5% and 1% respectively. The p-values are in the parenthesis.

#### 4.1.5.2 Bai-Perron Structural Break Test

According to Table 4.8 below, which indicates the results of the Bai-Perron structural break test, no statistically significant breakpoint in the exchange rate was identified. It tested structural stability in key global economic shocks, including the 2015 oil price collapse and the 2022 global grain price shock, which were used as candidate break years. This is because the calculated F-statistic result of 1.87 was less than the critical value of 3.20 at a 5 per cent significance level, which implies that the currency fluctuation and the price of rice imports did not see any significant shift concerning the relationship between these events. The result means that the pass-through effect has been the same during the sample period between 2000 and 2024. Thus, it is possible to say that the average level of exchange rate pass-through is stable and reliable against external shocks, which contributes to the long-run stability of the model and strengthens confidence in its policy proposal.

| Breaks    | F-Statistic | Critical-value | Conclusion                                                                  |
|-----------|-------------|----------------|-----------------------------------------------------------------------------|
| 2015,2022 | <b>1.87</b> | 3.20           | No structural break. The average pass-through estimate is stable over time. |

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Table 4. 8 Bai-Perron Structural Break Test

Source: Authors' Computation (from Stata Software).

Note: **(\*\*)** **\*\*\*** indicates statistically significance of p-value < 10%, 5% and 1% respectively.

## 4.2 Discussion

The first hypothesis assumes that there is existence of a significant positive effect between the fluctuations in the exchange rate and prices on rice imports in five West African economies. This hypothesis is confirmed by the findings of this study, which shows that the currency depreciation is related to higher rice import prices. It further cements the important position of rice in the regional food supply and how sensitive rice markets are to any incursion of exogenous macroeconomic shocks, especially induced by exchange rate fluctuations. This finding aligned with a study done by Bahmani-Oskooee & Arize (2019) who argued that there is a positive impact of exchange rate fluctuation on food imports, suggesting that in the short run, if volatility rises, it will cause a severe reduction in import activity.

In this regard, exchange rate fluctuation increases the cost of rice imports, which is transferred to consumers in the form of increased rice prices. This price transmission channel deteriorates food price volatility and increases the risks of food insecurity, particularly in low-income households that have high shares of their income in purchasing staple food. Besides, the consequence of this reveals that the rice markets are macroeconomically fragile in West Africa and fixing the exchange rate and intensifying investments in local rice production are greatly necessary. In the absence of these interventions, the region will continue facing the effects of international pressures concerning currencies; this directly affects the cost and availability of the most consumed staple food. This is evidenced in Riyadh et al. (2024) study, which examined the influence of fluctuations in international Rice Prices, exchange rate, and world oil prices on Rice Prices in Indonesia, revealing that fluctuations in the global rice price and exchange rate significantly affect rice import price in Indonesia.

Additionally, Exchange rate fluctuation can significantly affect local currencies in West Africa, leading to an immediate rise in rice import prices. This effect is because the sub-region relies on foreign currency to import goods and services. Consequently, the Sub-Region has faced several shocks due to its currency's depreciation against the US Dollar, as it needs to exchange more local currency for US dollars to import rice. This condition is persistent, as most countries rely on imported rice for daily consumption, as it serves as their staple food. This appears to be in cognisance with Daniel & Tosin's (2020) findings, who both revealed that there exists a positive and significant relationship between fluctuation in exchange rate and domestic currency, which affects rice import price in West Africa. This suggests that when the exchange rate rises significantly, agricultural price tends to increase as well.

Moreover, in West Africa, dependent on imported rice has increase significantly due to its growing population, lack of mechanize farming tools, huge capital investment, market access infrastructure and integration of local markets with regional markets all play a key role in promoting unstable food productivity in west Africa and thereby leading to high demand of imported rice (Akande, 2012). Moreover, in the long run, the consistent exchange rate depreciation in West Africa may promote local production as governments and rice importers may seek to limit dependencies on rice importation. However, the urgent effect tends to be an increase in rice import price, leading to severe inflation and subsequently causing an unstable economic instability. This argument is in line with the study done by Umoru & Amedu (2022) who examine the variations in dollar exchange rate effects on food commodity prices in Africa, and their analysis found that variation in both exchange rate and food commodity price plays a significant role in affecting rice import price in Africa. This suggests that exchange rate depreciation is directly affected by the price of imported food commodities in Africa, highlighting a significant correlation among the economic factors.

Furthermore, many rice importers in West Africa experience high costs due to high tariff rates and fees, which are often passed on to the rice consumers. This effect leads to an increase in rice price in the local market as local customers need to pay more to afford rice for consumption, leading to food security and accessibility for many households, as many people in West Africa earn low disposable income. Thus, inconsistency in fluctuation can lead to price volatility, making it challenging for households to make a proper budget plan effectively. This finding aligned with Coulibaly et al. (2015) study who examined the effect of a 35% proposed import tariffs on rice import price in Côte d'Ivoire and found out

that tariffs may protect local rice farmers, but can't significantly improve the wellbeing of consumers in Côte d'Ivoire as tariffs may likely lead to increase of prices for consumers, which could outweigh the significant of increasing domestic production. This suggests that increasing import tariffs is not the best means for improving local rice production in an economy; instead, it will increase rice prices in the local market for consumers, as tariffs are a cost on traders, and they may recover this cost through increasing rice prices. In a similar study, Olayungbo et al. (2011) conducted a study on how exchange rate fluctuation affects 40 Sub-Saharan African countries and suggests that exchange rate fluctuation has a positive effect on aggregate trade, highlighting that a 10% increase in exchange rate fluctuation is correlated with 0,6% increase in aggregate trade.

In contrast, Ndiaye (2022) challenge this finding in his studies, where he examines the impact of CFA Franc devaluation on cereal yields and food security in West Africa and found out that CFA Franc devaluation did not impact food insecurity in West Africa, but it plays a crucial role in affecting local food patterns thereby not transmitting its impact on food import price particularly maize and rice. In this regard, the effects of exchange rate depreciation in West Africa have consistently affected food import prices by increasing the cost of consumable goods, thereby shifting the price mechanism in favour of farmers (Kargbo, 2005). This suggests that there will be an increase in nominal food prices that will negatively affect food security and consumption patterns.

In Addition, Lehrer (2023) highlighted that exchange rate pass-through is not affected by trade policy uncertainty, which maintains a minimal and incomplete state; instead, is tariffs that significantly impact trade policy uncertainty through pass-through on import price but not food import price specifically. Similarly, in a fixed exchange rate regime, tariffs do not directly impact exchange rate fluctuation, but they can affect food import price when there is a shift in consumption preference and terms of trade of a country, which are not monotonic (Lai, 2016). However, their studies suggest that there has been no significant effect of exchange rate fluctuation on rice import price, but the evidence from my research and previous studies all indicates that exchange rate fluctuation has a positive effect on food import price, and this can affect both local farmers and primary consumers of rice.

The second hypothesis was to check whether the impact of exchange rate fluctuation significantly influences changes in the monetary policy instruments in five West African countries. This hypothesis is supported by these studies' findings, which suggest that fluctuations in the exchange rates have an overwhelming influence on the making of

the monetary policy decision, especially the interest rates. These findings agree with the study of Larson (2024), who suggests that governments tend to adjust the interest rates to control inflation and economic growth and, in the process, force the exchange rate of a country higher. This mechanism often helps to control food prices over time, which attracts consumers to resume purchasing, thereby making the currency appreciate. Similarly, exchange rate variation and interest rate have played a pivotal role in affecting food commodity prices in West Africa (Umoru & Amedu, 2022). The dollar fluctuation has been the number one factor of this variation and leading to huge currency depreciation. Garg (2021) proposed that interest rate variations enhance the predictability of future exchange rate changes. This is particularly evident in times of global uncertainty when investors are forward-looking and adjust their behaviour based on anticipated monetary policy shifts.

Additionally, Akinlo & Onatunji (2021) examined the dynamic relationships between the real GDP, real interest rate, real exchange rate and exchange rate volatility amongst twelve ECOWAS countries. They established that there exists a significant long-run correlation between the real interest rates and exchange rate volatility. Through their model, they were able to show that the changes in real interest rates were matched by changes in the exchange rate, which, downstream, were matched with changes in the domestic investment. This connection was especially significant in countries like Nigeria and Sierra Leone. Also, Adedamola et al. (2013) uses survey design to determine the correlations between interest rates, money supply, and Central Bank reserves on exchange rate stability in Nigeria and their findings reveal that interest rates, money supply, and Central Bank reserves affect the exchange rate fluctuation considerably but reserve of the central bank has the largest effect on it. This analysis shows that interest rates have a moderate influence on the volatility of the exchange rate ( $t = 3.513$ ,  $p = .001$ ,  $Beta = .342$ ) and money supply also has a significant impact on the volatility of the exchange rate ( $t = 2.713$ ,  $p = .010$ ,  $Beta = .305$ ). The findings indicate the fundamental importance of the monetary policy in the stabilisation of the exchange rates, as it is used as a mechanism to control rice import prices in West Africa. A similar study appears to be in cognisance with Iliyasu et al. (2024), who indicate that the volatility of the exchange rate can be explained by the changes in money supply and the past volatility of the exchange rate. This study comes up with the conclusion that the Volatility of the exchange rate is a product of variability in money supply, interest rate and savings. It is thus important to work on containing the shocks caused by prior volatility of the exchange rate and money supply, as far as the exchange rate fluctuation in Nigeria is concerned.

In contrast, the findings of the study appear to disagree with Fofanah (2020) who argued that exchange rate fluctuation has an insignificant effect on exports and imports in West Africa. However, he recommends that central banks should tighten monetary policies to control inflation, indicating a nuanced correlation between exchange rate and monetary policy instruments. A similar disagreement was highlighted in the study done by Umaru et al. (2019) asserting that there is a negative significant relationship between exchange rate fluctuation and GDP growth in English-speaking West African countries, suggesting that while there exists exchange rate fluctuation, these effects do not translate into significant monetary policy modification. Korley & Giouvriss (2023) in their study challenge that in the short run, changes in the exchange rate are not well explained by domestic economic policy uncertainty, and this adds to the argument that changes in the exchange rate have no significant effect on monetary policy instruments. This implies that short-term effect exists together with the long-term effects and that short-term dynamics could be affected by other issues that are likely to incur greater uncertainty in local economic policies that come with the appreciation of the currency in these areas.

In this regard, as some studies disagree with these studies finding, several studies are in line with my findings noting that exchange rate fluctuations Impedes monetary policy instrument in West Africa thereby impacting rice import price. Therefore, policy-makers need to tighten effective microeconomic polices to tackle this challenge in order to control the economy.

## **CHAPTER V**

### **CONCLUSION AND RECOMMENDATION**

#### **5.1 Summary and Conclusion**

This study evaluated the impact of the fluctuation of exchange rates on the price of imported rice and monetary policy in five West African nations, including Nigeria, Ghana, Senegal, Côte d'Ivoire and Benin between 2000m1 and 2024m12. The results reveal that exchange rate fluctuation increases the prices of the imported rice to great levels. Also, the prices of food globally, trade tariffs, and food productivity index add to this. This shows the structural weaknesses of the economies of West Africa in terms of their exposure to fluctuations in currency and shocks in the global market.

The results also indicate that monetary policy instruments are influenced by fluctuations of exchange rates. Regional central banks also tend to counter inflationary pressures by raising interest rates in case of currency depreciation and changes in the global food prices; however, the pace at which central banks in the region respond by making changes in policies is rather slow and, in many cases, insufficient. The two research hypotheses are proven correct in the results of the study asserting the influence of the exchange rate fluctuation in rice import prices and monetary policies. These findings have meaningful policy implications. In the fight against inflation of food prices, stabilisation of local currencies is crucial by instituting good fiscal and monetary policies. Besides, reinforcing the local agricultural performance would be efficient in curbing the dependence on the fluctuating global markets.

#### **5.2 Policy Recommendation**

Currently, the Economic Community of West African States (ECOWAS) is on a mission to come up with a single regional currency that is called the **Eco**, and it is to be introduced with a new deadline of 2027 to boost regional trade, financial integration, and improve macroeconomic stability replacing the current local currencies as reported by (Bowa Media, 2024). Economic, political as well and institutional differences between member states however, have become a barrier in the route to its actualization as it has been delayed several times.

Meanwhile, ECOWAS is still struggling with the issue of continuous devaluation of the currency. This has impacted severely on its stability including its external effects on the price of important commodities such as rice which is part of the regional diet. With

these challenges in mind, governments and policymakers should embrace some of the strategies that are intended to make domestic and regional currencies more demanded at least to strengthen them against the international currencies like the US dollar. A stronger currency would serve to cushion the rice import prices against the inflationary pressure of depreciated national currency.

Among them is the strategy to strengthen regional means of settling trades with local currencies, so that fewer US dollar is over-relied on. Operationalization of this can be achieved by setting up regional currency swap points as well as clearinghouses that can carry out transactions in the ECOWAS bloc. Moreover, increasing the confidence of domestic currencies by means of healthy macroeconomic policy especially fiscal discipline, inflation rates and transparency can also foster investment and stability of the exchange rate. Policymakers in this regard are not supposed to seek extremely high interest rates when responding to currency fluctuation, since that will curtail domestic investment and domestic consumption. Rather, selective monetary policies and enabling fiscal structures would provide a more moderate solution to dealing with volatility.

In addition, efforts must be put on increasing its capacity to produce rice domestically where there is an imperative need to invest in domestic production capacities and not to focus on producing export oriented or cash crops. Local changes in production will slowly diminish the need of the region to rely on foreign rice, and in this process will alleviate the risk in the region to the price shocks occasioned by exchange rates. When taken together, the measures go beyond complementing the Eco currency vision of the long term and solve the vulnerabilities of the West African system of food importation today that preconditions the monetary stability as well as the food security on a lasting basis.

An example that ECOWAS can also learn is that of currency stabilization efforts of Malaysia during the occurrence of the 1997-1998 Asian Financial Crisis. Faced with a free-falling currency and speculative attacks on the ringgit, in September 1998, Malaysia ensured that it introduced a raft of aggressive capital controls to recover its monetary sovereignty and an economy. These were: Blocking offshore trading of the ringgit to weaken speculative trading against the ringgit exerting artificial pressure on it to fall, thereby reducing the ease of hedging funds betting against the ringgit by the financial institutions and hedge funds. And limiting ringgit withdrawal by travellers to prevent capital flight; since individuals could not easily withdraw large amounts of domestic currency and exchange it to foreign money the lower conversion of ringgit resulted in less demand of the US dollars saving the value of ringgit.

Importantly, Malaysia also accompanied these monetary initiatives with investments on the different national productions' capability, decreasing its dependence on imports in essential areas. The two-fold measure to a certain extent stabilizing the currency and building up internal supply acted as a buffer to shield Malaysian consumers against the effects of inflationary external shock and revived the public confidence in the country. In the case of ECOWAS, the issues that Malaysia had underlined the need of assertive but context-sensitive monetary policy particularly during crisis. It also underscores the benefits of domestic investment coordination that will achieve structural vulnerability rarity, which would prove to be very useful in dealing with the rice import price premise given the continued fluctuations in the exchange rate in West Africa.

### **5.3 Future Research and Limitation of the Study**

Furthermore, future research should make sure to expand the number of countries to make the scope of their study wider to get a better insight into different macroeconomic variables on different consumable foods in West Africa. Specifically, they may extend to wheat, maize or use an importable stable index to test whether past-through elasticities differ by cereal. Similarly, for the household's welfare link, couple the price pass-through with LSMS-type consumption data to estimate real-income effects on poor households versus non-poor households. This type of research might provide an understanding of the systematic impacts on food security and inflation, and provide answers to how nations can plan better to be less vulnerable, as well as mitigate the effects posed by external shocks. Future studies can be useful by considering a broader scope of variables and contexts to develop of more holistic policy framework, covering not only rice production but also achieving resilience of the whole food system in West Africa.

Finally, there are limitations in this research which need to be mentioned. This is a challenge as there was no adequate data to cover all the countries (in West Africa), where only five countries with the biggest economies and that are too reliant on imported rice to satisfy local demand, were used. This will be a limitation in the aspect of generalizability of the findings to the whole region, as various countries in the region might have different economic conditions and issues pertaining to rice production and importation.

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