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Macroeconomic Uncertainty and Trade: The Case of Exchange Rate Fluctuation in West Africa Economies

Fadel Rasem A Ben Otman[1]

[1]School of Business Zhengzhou University Henan, China

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Abstract: This thesis investigates the effects of exchange rate volatility on trade in West African countries. Over the past two decades, West Africa has experienced significant fluctuations in exchange rates, prompting inquiries into their impact on trade volumes, trade sectors, export and import prices, trade balances, and potential variations among low-income, middle-income, and resource-rich countries in the region.

Through econometric analysis, this study examines patterns and trends of exchange rate volatility, explores its influence on overall trade volumes, identifies specific trade sectors most affected, and evaluates its implications for export and import prices and trade balances. Additionally, the research aims to discern any disparities in the effects of exchange rate volatility on trade among different types of West African countries.

By addressing these questions, the thesis offers insights into the policy implications and recommendations to mitigate the adverse effects of exchange rate volatility on trade in the region, thereby contributing to a deeper understanding of the dynamics between exchange rates and trade in West Africa.

Keywords: *Exchange Rate Volatility, West African Countries, Export, Import.*

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I. INTRODUCTION

A lot of research has been done on exchange rate volatility, especially when it comes to international trade. The effect of exchange rate variations on international trade has received a lot of attention in West Africa, where economic activity is frequently closely linked with global markets. This study seeks to clarify the effects of exchange rate volatility on trade dynamics. The impact of floating exchange rates on global trade and the economy at large has drawn a lot of attention since the fall of the Bretton Woods regime (Aftab et al., 2017).

Uncertainty surrounding exchange rates generally affects the economy in many ways. For example, there may be a direct impact on international trade from level exchange rates. Exchange rates can impact international trade volumes and revenues since they have a direct correlation with international trade pricing. Exchange rate fluctuations have an impact on economic policy as well. For instance, in nations that have adopted an inflation targeting system, fluctuations in the level and volatility of the currency rate force central banks to regularly adjust the anticipated inflation target (Akpokodie & Omojimite, 2009). In economic study, exchange rate volatility has received a lot of attention, especially in light of its effects on global trade.

In West Africa, where trade dynamics are closely intertwined with global markets, exchange rate variations have garnered considerable attention. With a specific focus on West African nations, this study seeks to provide light on the effects of exchange rate volatility on trade dynamics. International commerce is crucial for a nation's economic development and for fostering bilateral trade partnerships between nations with open economies (Arize et al., 2003). Through international trade, a nation's exchange rate becomes a crucial indicator of its competitiveness in the global market, which has a significant impact on the nation's economy. In trade agreements involving multiple nations, one currency must be exchanged for another. The main economic indicators are exchange rate policies since their effectiveness directly affects foreign trade performance by reducing trade deficit shortfalls. Particularly following the dissolution of the Breton Woods system (1973), which instituted the fixed exchange rates regime, foreign currency rates have fluctuated (Dellas & Zilberfarb, 1993). Since then,

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nations have transitioned from fixed to floating exchange rate systems. Because there is less government interference under the floating system, the currency rate is more volatile and uncertain.

The first sign of economic risk is volatility in exchange rates, which affects a nation's foreign commerce to some extent. Additionally, it creates exposure to and barriers to overseas trade, which influences the growth and decline of a nation's external trade. There are differences between the fixed exchange rate system and the floating exchange rate system. In a system with a fixed exchange rate, the government must intervene to manage the exchange rate, and effective government intervention also requires healthy foreign reserves (Auboin & Ruta, 2013). The system of floating currency rates is unrestrained by government control and can fluctuate freely. One of the features of exchange rate instability is the increase or decrease in the exchange rate.

Risk related to the magnitude of value fluctuations in a currency is implied by the movement of the exchange rate. The increased volatility suggests that there is a good chance the currency's level can be expanded over a larger range of values. The currency price may then abruptly change in either direction during a very short period. The present price fluctuates steadily over an extended period; a lower volatility is unlikely to be as high as a greater one (Chit et al., 2010). Changes in the exchange rate have grown to be a significant factor influencing both political and economic activity. The problems arising from the exchange rate system's operation are crucial macroeconomic management tools that aim to achieve economic growth in a way that is consistent with improving international competitiveness. The effect of exchange rate fluctuations on overseas commerce has been the subject of much debate. Due to the larger degree of volatility associated with flexible exchange rates, this issue is particularly significant for nations that have transitioned from fixed to floating exchange rate systems. As a result, study on how exchange rates impact the economy as a whole as well as external commerce is becoming increasingly relevant.

The impact of floating exchange rates on global trade and economies at large have gained significant attention since the fall of the Bretton Woods regime. Uncertainty surrounding exchange rates affects the economy in a number of ways, including trade volumes, profitability, and pricing in international commerce (Chong et al., 2020). Exchange rate fluctuations have an effect on economic policy as well, especially in nations where inflation targeting programs are implemented. These countries' central banks frequently have to adjust their projections for inflation because of fluctuations in the levels and volatility of their currency rates.

II. BACKGROUND OF THE STUDY

As the world economy evolves, exchange rate systems and policies continue to adapt to meet the challenges and opportunities of an interconnected and dynamic global financial landscape. Exchange rate from history has passed through a lot of stages starting from Ancient Times Exchange rates can be traced back to ancient civilizations such as Mesopotamia, where people conducted trade across regions using barter systems or precious metals as a medium of exchange. These metals, such as gold and silver, served as an early form of currency and influenced early exchange rates then the Medieval and Renaissance Periods which expanded trade networks, merchants and traders began using coins from different regions, leading to the emergence of foreign exchange markets in cities like Venice and Florence.

Thus, exchange rate volatility can cause an expansion of the trade flow because of increased risk (De Grauwe, 1996). Nonetheless, the characteristic feature of the floating exchange regimes and exchange rate movements is that they produce unpredictable impacts on the balance of trade (Fernández-Rodríguez et al., 1999). In West African States for instance; attempts to anchor the exchange rates in face of external disturbances are hampered by overvalued currencies, and deteriorating balance of payment position especially when monetary and fiscal back up is lacking. Exchange rate arrangements in West African economies have, over time, been characterized by administrative controls in the use of foreign exchange, severe rationing arising from persistent structural deficits in the balance of payments, a wide black-market premium and declining per capita real income (Mæhle et al., 2013).

There has been theoretical and empirical research on the connection between export flows and exchange rate volatility. Theoretical models put out a number of ideas, including the possibility that exchange rate volatility might either raise uncertainty and cause activity to shift to lower risk domestic markets or, on the other hand, present more potential for profit and increase exports. There is, however, disagreement among empirical studies regarding the effects of exchange rate volatility on exports because of their conflicting results.

There is still disagreement among academics regarding the impact of exchange rate volatility on exports, despite a sizable number of research having been done. Some research reveals weak, negligible, or even positive associations; others find negative effects, attributing lower levels of trade to uncertainty and adjustment costs for risk-averse investors. Different price deflators, different measures of exchange rate volatility, different methodological approaches, and the use of aggregate rather than sectoral export data can all be blamed for the variety of results.

Furthermore, one important tool for monetary policy is the official devaluation of a currency, which is a fall in its value relative to other monetary units. This is particularly useful for nations that have ongoing trade imbalances. By raising the demand for homegrown goods and raising the relative cost of imports, devaluation attempts to balance the trade. By analyzing fresh empirical data on the consistency of exchange rate volatility, the connection between exchange rate regimes and financial development, and the effects of devaluation on trade balance, this study seeks to further the current discussion.

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There is a vast body of theoretical and empirical research on the connection between export flows and exchange rate volatility. Some theoretical models propose that an increase in exchange rate volatility forces risk-averse actors to shift their activities to the lower-risk home market and raises the uncertainty of earnings on contracts denominated in foreign currencies.

However, since there is frequently a significant difference between the nominal and real exchange rates which are frequently used in tandem in empirical research and when considering highly regulated environments like SSA, where the supply of foreign exchange is frequently insufficient to meet the demand on the market both nominal and real exchange rates are examined in this study.

For the purpose of designing trade and exchange rate policies, it is crucial to understand how much exchange rate volatility impacts commerce. In the event that fluctuations in exchange rates result in a decline in exports, trade adjustment initiatives that prioritized export growth may not be successful. Furthermore, a fluctuating currency rate may ruin the goal of a trade liberalization strategy and cause a balance of payments crisis (Arize et al., 2000). As a result, the study's findings offer an important piece of information that helps with current discussions and the assessment of available policy alternatives.

In conclusion, there is still much to learn about the complex relationship that exists between exchange rate volatility and trade dynamics, particularly when it comes to West African nations. Currency swings have a complex impact on global trade, economic stability, and longterm growth, necessitating a sophisticated understanding to guide wise policy choices. By exploring this complexity and throwing light on the implications for the economic development of West African states within the Sub-Saharan area, this study aims to add to the body of information already in existence.

Exchange rates play a fundamental role in international trade by influencing the prices of goods and services traded between countries. They affect trade in several ways such as competitiveness; depreciation of a country's currency can make its exports cheaper for foreign buyers, potentially boosting export volumes. Conversely, an appreciation can make imports more attractive to domestic consumers. Exchange rates affect the relative prices of imported and domestically produced goods. Currency depreciation may lead to imported goods becoming more expensive, potentially boosting demand for domestically produced substitutes. Risk and Uncertainty; Exchange rate fluctuations introduce uncertainty into international trade.

This uncertainty can influence business decisions, trade agreements, and investment choices.

A. *Research Objective*

The objective of this thesis is to comprehensively examine the relationship between exchange rate volatility and trade performance in West Africa. By analyzing historical data, employing econometric models, and conducting case studies on select countries, this research aims to shed light on the complexities of the issue and provide valuable insights for policymakers, businesses, and other stakeholders. According to some models, currency rate fluctuations at higher levels present more opportunities for profit, which could thus result in a rise in exports. Alternatively, some scholars have proposed that producers can be shielded from exchange rate fluctuations by investing in the forward market, so offsetting any potential unanticipated fluctuations in the exchange rate. The impact of exchange rate volatility on exports are one of the most contentious issues in international commerce because of the wide range of conclusions that have been backed by several empirical research.

B. *Research Questions*

➢ *To Achieve the Stated Objective, this Thesis will Address the Following Research Questions:*

- What are the patterns and trends of exchange rate volatility and trade in West Africa region over the past two decades?
- How does exchange rate volatility influence the overall trade volumes, export and import prices and trade balance in West Africa region?
- Through what mechanism does exchange rate volatility affect import and export trade in West Africa region?

III. LITERATURE REVIEW

The literature has given a great deal of emphasis to examining how exchange rate volatility affects trade. These studies mostly focused on industrialized and developed economies. Given the increasing importance of trade in the majority of developing and rising economies, numerous studies have looked into this link in developing nations, particularly in Africa. There are, however, few research on how commerce in West Africa is impacted by currency rate fluctuation. Therefore, the purpose of this study is to ascertain how sensitive commerce is to fluctuations in exchange rates. The current study is primarily focused on examining the relationship between trade and exchange rate volatility in West Africa. This is due to the fact that since the implementation of a floating exchange rate regime, exchange rates in West Africa have been incredibly unpredictable. It was anticipated that this would negatively affect growth and trade.

A. *Conceptual Review of Exchange Rate and Trade*

The evolution of exchange rates is reflective of the increasing complexity of global trade and financial institutions. In today's interconnected global landscape, exchange rates are impacted by a wide range of economic, political, and technological factors rather than being solely dependent on real items as they once were. Exchange commerce has gone through several phases and processes, including ancient commerce. The early development of trade practices was driven by the need to transfer goods across regions with different resources and products. As trade grew,

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it became necessary to set prices for different commodities, such as precious metals and goods, to promote fair dealings. Commodity money: As trade became more complex, cultures chose particular, intrinsically valuable commodities as means of exchange. For example, because precious metals like gold and silver are rare and long-lasting, they are frequently used as money. During specific historical periods, societies functioned under a bimetallic standard, which involved using two metals typically gold and silver as the basis for their currencies. The rates at which gold and silver were exchanged were fundamentally set by governments. Medieval Financial Institutions: Around the world, banks and currency exchanges began to appear during the Middle Ages. These organizations provided the first version of foreign exchange services and assisted with currency conversion.

B. Review Relevant Theories

➢ *Marshall-Lerner Condition*

The Marshall-Lerner condition is a fundamental economic theory that describes the relationship between exchange rate fluctuations and a country's trade balance. It posits that a currency depreciation will improve the trade balance if the sum of the price elasticities of exports and imports exceeds one. This concept highlights the significance of demand elasticity in determining whether exchange rate adjustments will positively impact a nation's trade balance.

The Marshall-Lerner condition holds that when a currency depreciates, the relative prices of domestic goods decrease, making exports more attractive to foreign buyers, while imports become more expensive for domestic consumers. However, the extent of this improvement depends on the price elasticity of demand for imports and exports. If both are elastic enough, the trade balance will improve as export revenues rise and import expenditures decrease.

Alfred Marshall, in his seminal work Money, Credit and Commerce (1923), introduced the notion of elasticity in relation to demand, setting the groundwork for the Marshall-Lerner condition. Marshall's elasticity concept indicates that when demand for a product is elastic, a price decrease (or a currency devaluation in trade terms) would lead to a proportionally larger increase in quantity demanded, which could result in higher overall revenue. However, it was Abba Lerner in The Economics of Control (1944) who formally combined Marshall's concept of elasticity with international trade, arguing that the trade balance's response to currency depreciation is contingent on the price elasticity of both exports and imports.

The Marshall-Lerner condition essentially posits that for a depreciation to improve the trade balance:

Demand for Exports must be elastic enough to ensure that the increased quantity of exports due to lower prices more than offsets the reduced price.

Demand for Imports should also be elastic, so that higher import prices lead to a significant reduction in imported quantity, thereby reducing import expenditure.

When both conditions hold true (i.e., the sum of the price elasticities for exports and imports is greater than one), currency devaluation can enhance a country's trade balance by making exports more competitive internationally and discouraging imports due to higher costs.

The Marshall-Lerner condition has crucial policy implications. It suggests that for a country experiencing a trade deficit, currency devaluation may serve as a potential remedy, provided that demand for imports and exports is sufficiently elastic. If the combined elasticity is less than one, however, devaluation might actually worsen the trade balance, as the increase in costs from imports outweighs any potential benefits from increased export demand.

In practical terms, the Marshall-Lerner condition helps policymakers assess whether currency adjustments will benefit or harm the national economy. It underscores the importance of understanding domestic and foreign demand for goods and services, and it aligns with broader economic goals of achieving trade balance and economic stability.

➢ *Empirical Evidence and Previous Research*

Numerous studies have empirically tested the Marshall-Lerner condition across different countries and time periods, often with mixed results due to variations in demand elasticity, trade structure, and economic conditions. Bahmani-Oskooee and Niroomand (1998) - In their paper "Long-run price elasticities and the Marshall–Lerner condition revisited" (Applied Economics), Bahmani-Oskooee and Niroomand analyzed data across several countries to determine whether the Marshall-Lerner condition holds in the long run. They found that while the condition is generally met in the long term for many countries, there are substantial shortterm deviations, often due to price rigidities and contractual obligations in international trade. Their work emphasizes that the Marshall-Lerner condition is more applicable as a long-term mechanism, where demand responsiveness has time to adjust to new price levels. Rose and Yellen (1989) - Rose and Yellen's study, "Is there a J-curve?" published in the Journal of Monetary Economics, is often cited in the context of the Marshall-Lerner condition. While primarily focused on the J-curve effect, their research also examined whether currency depreciation would improve the trade balance, referencing the Marshall-Lerner condition as a theoretical benchmark. They found mixed evidence, noting that while some countries experienced an improvement in the trade balance post-depreciation, others did not, often due to differences in trade composition and elasticity of demand. Krugman and Obstfeld (2006) - In International Economics: Theory and Policy, Paul Krugman and Maurice Obstfeld discuss the Marshall-Lerner condition as a fundamental element of exchange rate economics. They note that the condition's applicability is limited by factors such as trade composition, the structure of production, and global economic interdependencies. The authors explain that

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countries with diverse export bases and high elasticity of demand for imports tend to benefit more from currency devaluation in line with the Marshall-Lerner condition. Hooy and Choong (2010) - In their study "Exchange Rate Volatility and Trade Flows in Malaysia: Does the Marshall–Lerner Condition Hold?" (Asian Academy of Management Journal of Accounting and Finance), Hooy and Choong test the Marshall-Lerner condition in the context of Malaysia. They found that, in Malaysia, exchange rate volatility did have a significant impact on trade flows in the long term, suggesting that the Marshall-Lerner condition was satisfied. However, their findings highlight that short-term trade balance adjustments are complex and may not align neatly with theoretical predictions.

➢ *J-Curve Effect*

The J-curve effect is an economic theory that describes the time-lagged response of a country's trade balance to a depreciation or devaluation of its currency. The effect is named for the "J" shape it forms when graphed over time: immediately after depreciation, the trade balance initially worsens before gradually improving. This theoretical model provides insight into the short- and medium-term dynamics of trade flows and has substantial implications for economic policy.

The J-curve concept is based on the premise that after a currency depreciates, there are both immediate and delayed effects on trade flows. In the short term, depreciation increases the cost of imports (measured in domestic currency) and reduces export prices (in foreign currency), but these price changes do not instantaneously translate into altered trade volumes. The reason for this lagged response lies in contract rigidities, production lags, and consumer adjustments, all of which take time. Initially, the trade balance may deteriorate because the country continues to import at higher prices, while the volume of exports does not increase enough to offset the higher import bill. However, over time, as contracts are renegotiated and international buyers respond to the relatively cheaper export prices, export volumes begin to increase. Simultaneously, domestic consumers may shift away from expensive imports, improving the trade balance in the longer term. The J-curve effect is crucial for policymakers, as it suggests that the immediate impact of currency devaluation might not reflect its eventual benefits. This theory underscores the need for patience and strategic planning when implementing currency adjustments to improve the trade balance.

➢ *Empirical Evidence and Previous Research*

Numerous empirical studies have explored the J-curve effect across various countries, focusing on its applicability and variations in response patterns. Findings often differ due to factors like economic structure, the elasticity of trade flows, and regional economic conditions. Magee (1973) - One of the foundational studies on the J-curve effect, Magee's paper "Currency contracts, pass-through, and devaluation" (Brookings Papers on Economic Activity) investigates the immediate and delayed responses of trade balances to currency devaluation. Magee argued that contractual obligations in international trade are a significant cause of the delayed effects observed, as existing contracts lock in trade volumes and prices for a period following a currency devaluation.

Bahmani-Oskooee and Ratha (2004) - In their comprehensive literature review, The J-Curve: A Literature Review (Applied Economics), Bahmani-Oskooee and Ratha examined numerous case studies across different countries to assess the empirical support for the J-curve effect. They concluded that while the J-curve is a common pattern, its strength and duration vary widely. Factors like the structure of exports and imports, as well as the elasticity of demand, play significant roles in determining how strongly the J-curve effect manifests in a given economy. Rose and Yellen (1989) - In "Is there a J-curve?" (Journal of Monetary Economics), Rose and Yellen evaluated the J-curve effect across several developed economies, including the United States. They found mixed evidence: some countries exhibited a J-curve pattern, while others did not. The study concluded that the presence of the J-curve depends largely on specific country conditions and the initial structure of trade flows, as well as the responsiveness of consumers to currency adjustments. Hacker and Hatemi-J (2004) - In their study "The effect of exchange rate changes on trade balances in the short and long run" (Economics of Transition), Hacker and Hatemi-J analyzed the J-curve effect in Eastern European transition economies. They found that while some countries in the region showed a clear J-curve pattern, others did not, which they attributed to differences in trade structure and the pace of economic reforms. The study highlights that the J-curve effect is not universal and may be influenced by unique regional factors. Nusair (2017) - The study by Nusair, "The J-curve phenomenon in European transition economies: A nonlinear ARDL approach" (International Review of Applied Economics), used advanced econometric techniques to analyze the J-curve effect in European transition economies. Nusair found that the J-curve effect is indeed present in many of these economies, but its duration and intensity are highly variable. This research also emphasized that the non-linear adjustment of trade flows in response to currency changes supports the presence of a J-curve. Akbostanci (2002) - Akbostanci's study, "Dynamics of the trade balance: The Turkish J-curve," published in Emerging Markets Finance and Trade, provided evidence of the J-curve effect in Turkey. The study found that Turkey's trade balance initially deteriorated following devaluation, with an eventual improvement after several quarters. This case study on Turkey further supports the J-curve theory in emerging markets, where import and export structures may differ significantly from those of developed economies.

➢ *Purchasing Power Parity (PPP) Theory*

Purchasing Power Parity (PPP) is a fundamental concept in international economics that suggests that exchange rates between two currencies should adjust to reflect changes in the price levels of the two countries. This theory, developed in the early 20th century by Swedish economist Gustav Cassel, is based on the "law of one price," which asserts that identical goods should cost the same across countries when expressed in a common currency. The

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PPP theory has far-reaching implications for exchange rate behavior, inflation rates, and international trade.

The PPP theory posits that in the absence of transportation costs, trade barriers, and other market frictions, exchange rates should equalize the purchasing power of different currencies by ensuring that a basket of goods costs the same in different countries. There are two main versions of the theory:

- Absolute PPP: This version suggests that the exchange rate between two countries is equal to the ratio of their respective price levels. According to Absolute PPP, any difference in price levels should cause an immediate and proportionate adjustment in the exchange rate.
- Relative PPP: This version acknowledges that Absolute PPP does not always hold in reality due to market frictions and emphasizes that exchange rates should move to offset differences in inflation rates between two countries over time. If the domestic country experiences higher inflation than the foreign country, its currency should depreciate to maintain PPP.

PPP theory is significant in trade because it provides a baseline for determining whether a currency is over- or undervalued. When a currency is overvalued relative to its PPP, domestic goods become more expensive for foreign buyers, potentially leading to a decline in exports. Conversely, an undervalued currency makes exports cheaper and imports more costly, which can improve the trade balance by boosting exports and reducing imports. PPP also serves as a long-term predictor of exchange rate movements, suggesting that while short-term fluctuations are common, exchange rates will eventually adjust to reflect differences in inflation rates. This theory is essential for international investors, businesses, and policymakers, who use PP to make informed decisions regarding investment, pricing, and monetary policy.

➢ *Empirical Evidence and Previous Research*

While PPP is a widely accepted concept in theory, empirical research has produced mixed results. Real-world factors such as transportation costs, tariffs, non-tradable goods, and exchange rate interventions mean that PPP may not hold precisely, especially in the short term.

Cassel (1918) - Gustav Cassel, in his work "Abnormal Deviations in International Exchanges," introduced the concept of PPP and argued that exchange rates should reflect relative price levels between countries. Cassel's theoretical framework laid the foundation for subsequent research on the relationship between exchange rates and inflation. Rogoff (1996) - In the influential paper "The Purchasing Power Parity Puzzle," Rogoff highlighted the puzzlingly slow rate at which PPP adjustments occur in practice. Rogoff's study found that real exchange rates tend to revert to PPP levels, but only over long horizons, often 3-5 years or more. He attributed this slow adjustment to factors like sticky prices and differences in market structures. Dornbusch (1985) - Dornbusch, in his NBER Working Paper on PPP, argued that deviations from PPP could persist in the short run due to exchange rate overshooting, caused by factors such as speculative activity and monetary policy interventions. Dornbusch's analysis highlighted the limitations of PPP as a short-term predictor of exchange rate changes and stressed its relevance in the long term. Taylor and Taylor (2004) - In their article "The Purchasing Power Parity Debate" (Journal of Economic Perspectives), Taylor and Taylor reviewed the literature on PPP and concluded that PPP is generally supported in the long run, although short-term deviations are common. They discussed various econometric approaches to studying PPP and noted that it holds better in high-inflation environments, where price adjustments occur more rapidly.

Chen and Engel (2005) - In their study "Does 'Aggregation Bias' Explain the PPP Puzzle?," Chen and Engel used disaggregated data on goods prices across countries to explore the slow adjustment of real exchange rates. They found that differences in how goods are categorized and priced across countries can contribute to persistent deviations from PPP, a phenomenon known as "aggregation bias." Frankel and Rose (1996) - In the paper "A Panel Project on Purchasing Power Parity: Mean Reversion Within and Between Countries," Frankel and Rose used a panel of countries to analyze PPP. Their findings showed evidence of PPP mean reversion, meaning that deviations from PPP gradually decrease over time. However, the rate of mean reversion varied significantly across countries. Choudhri and Khan (2005) - In their study "Real Exchange Rates in Developing Countries: Are Balassa-Samuelson Effects Present?," Choudhri and Khan explored deviations from PPP in developing countries. They found that factors like productivity differences (captured by the Balassa-Samuelson effect) contribute to deviations from PPP, particularly in economies with high growth rates.

➢ *Previous Studies on the Impact of Exchange Rate on Trade*

The research on how exchange rate volatility affects global trade is based on a variety of theoretical stances that shed light on the mechanics, prevailing economic theories, and possible outcomes of this phenomena. The degree of variation or variability in the value of one currency in relation to another over a certain period of time is referred to as exchange rate volatility. Usually, statistical metrics like standard deviation are used to measure it.

In order to demonstrate how (actual) exchange rate volatility can impact the volume of exports, it is helpful to start with the example of a simple exporting company. According to Clark (1973), the simplest scenario involves a competitive company without market power that produces a single good and sells it only to a single overseas market while importing no intermediate inputs. Due to the lack of implicit hedging options, such as forward contracts, the company receives payment in foreign currency and converts export revenues at the going rate, which fluctuates erratically (Willett, 1986).

In addition, due to the expenses associated with modifying the manufacturing scale, the company needs to plan its output well ahead of any future fluctuations in the

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exchange rate. As a result, it is unable to adjust its output to reflect changes in the profitability of its exports that may result from these fluctuations, whether positive or negative. In this case, the exchange rate is the only factor causing the firm's profits to fluctuate. Additionally, in cases when the firm's managers are risk averse, increased exchange rate volatility without a change in the average level of the currency results in a decrease in output and, consequently, in exports, as a means of lowering exposure to risk.

Many writers have expanded on this fundamental model, including Hooper and Kohlhagen (1978), who also conclude that there is a negative correlation between trade volume and exchange rate volatility. But this compelling conclusion is predicated on a number of oversimplifying presumptions. Initially, it is presumed that there are no options for hedging through offsetting trades or the forward exchange market. Certain transactions can be easily hedged in sophisticated economies with well-developed forward markets, lowering exposure to unanticipated fluctuations in currency rates (Hooper & Kohlhagen, 1978).

Furthermore, options for mitigating the risk of unfavorable variations in exchange rates exist beyond the realm of forward currency markets. The main idea is that there are several chances for a global company involved in a wide range of trade and financial operations across numerous nations to take advantage of counteracting changes in currencies and other variables. For instance, it is evident that currency rates respond to variations in inflation rates, and new data implies that these reactions can occur more quickly than previous research had suggested. Therefore, if exports are valued in a foreign currency that is falling, the higher foreign-currency export price at least partially offsets the loss to the exporter from the declining exchange rate (Cushman, 1988). Similarly, Clark (1973) states that decreasing input prices will partially offset declining export earnings to the extent that an exporter acquires intermediate inputs from a nation whose currency is depreciating.

Additionally, a company's total exposure to currency risk will be somewhat mitigated when it deals with a wide number of nations because to the tendency of some exchange values to move in opposing directions. Last but not least, Makin's (1983) analysis from a finance viewpoint indicates that a multinational company has numerous options to manage foreign exchange risks associated with imports and exports by maintaining a portfolio of assets and liabilities in various currencies. The belief that the firm cannot modify factor inputs in order to best respond to fluctuations in exchange rates is one reason why commerce may be negatively impacted by exchange rate volatility (Makin, 1983). Increased variability can, in fact, present profit opportunities when this presumption is relaxed, and businesses are able to modify one or more production parameters in response to fluctuations in exchange rates.

The analysis of this scenario was done by De Grauwe (1992). Such volatility's impact is contingent upon the interplay between two operating factors. The company will sell more when the price is high and vice versa, therefore if it can adjust inputs to both high and low prices, its projected or average earnings will be larger with greater exchange rate variability (De Grauwe, 1988). However, insofar as risk aversion exists, the increased profit variance damages the company and acts as a deterrent to exporting and producing. In the event that risk aversion is low, the firm will increase its average capital stock, output, and exports since the good effects of higher price variability on predicted profits outweigh the negative effects of higher profit variability. Pindyck (1982) has also demonstrated that, in a more general context that examines a firm's behavior in the face of uncertainty, higher price variability may, in some cases, lead to higher average investment and output as the firm makes adjustments to maximize the impact of high prices and minimize the effects of low prices (Pindyck, 1982).

The significance of sunk costs is one facet of the connection between trade and exchange rate volatility that needs to be discussed. A large portion of global trade is made up of unique manufactured items, which usually need large financial outlays from businesses in order to be exported. These expenses include product adaptation for foreign markets, the establishment of marketing and distribution networks, and production facilities. Because of these sunk costs, businesses would be less sensitive to short-term fluctuations in the exchange rate. Instead, they would be more likely to take a wait-and-see stance, remain in the export market for as long as they can recover their variable costs, and wait for the exchange rate to turn around in order to recover their sunk costs.

In line with the finance literature on real options, Franke (1991) and Krugman (1989) investigated the consequences of sunk costs within the framework of a "options" approach. The main notion is that a company that exports can be seen as having the option to exit the export market, and a company that isn't exporting now can be thought of as having the opportunity to enter a foreign market at a later time (G. Frank, 1991; Krugman, 1989). In addition to explicit fixed and variable expenses, the cost of exercising the choice to enter or depart the market must be considered when deciding whether to enter or remain in the export market. The more the value of holding onto the option, the more volatile the exchange rate is consequently, the wider the range of currency rates within which the company can postpone taking action, either by remaining in the export market or, if it hasn't entered it, by exiting it (Sercu & Vanhulle, 1992). This implies that there would be more inertia in decisions to enter and depart markets due to higher exchange rate volatility.

Bacchetta and Wincoop (2000) have recently offered such an analysis. They create a basic twocountry general equilibrium model in which trade and welfare are compared for fixed and floating exchange rate arrangements. In this model, uncertainty is caused by monetary, fiscal, and technological shocks (Bachetta & Van Wincoop, 2000). They come to two key findings. First, there is no obvious correlation between the type of exchange rate system and the volume of commerce. Trade can be larger or lower under each exchange rate arrangement, depending on consumer

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choices on the trade-off between consumption and leisure, as well as the monetary policy guidelines adhered to in each system. A country's imports would decrease as a result of a monetary expansion, but the increased demand brought about by the monetary expansion could partially or completely offset the exchange rate effect. This illustrates the ambiguity of the relationship between volatility and trade in a general equilibrium environment. Therefore, variations in other macroeconomic variables may result from the type of shock that triggers the exchange rate movement, offsetting the effect of the exchange rate movement.

Second, there is no direct correlation between trade volumes and welfare when comparing exchange rate regimes because trade does not serve as a reliable indicator of a nation's level of welfare. The authors' model bases trade decisions on the certainty equivalent of a firm's domestic revenue and expenses compared to international markets, while the volatility of leisure and consumption determines the welfare of the nation. Another estimate of the welfare costs of currency rate fluctuation is given by Obstfeld and Rogoff (1998). The "new openeconomy macroeconomic model" is expanded to include an explicitly stochastic environment, where risk influences enterprises' decisions to establish prices, which in turn affects output and cross-border trade flows. They give an example that shows how pegging the exchange rate could lead to a welfare gain of up to 1% of GDP by bringing the volatility of the exchange rate down to zero. An extension of this kind of model to more practical scenarios involving imperfect asset markets and business investment is offered by Bergin and Tchakarov (Bergin & Tchakarov, 2003).

IV. RESEARCH DESIGN

The study's use of a longitudinal design is an example of a methodological strategy that makes it possible to thoroughly examine changes over time and their underlying causes. In contrast to cross-sectional analysis, which offers a moment in time, longitudinal study enables the monitoring of people, things, or events over an extended length of time. This longitudinal method makes it easier to investigate causal linkages between variables over time, identify patterns of change, and examine temporal trends.

A. Research Method

The West African region, which is home to over 400 million people according to recent estimates and spans a wide geographical area of around 5.1 million square kilometers, is the subject of this research's study area. There are several countries that make up West Africa, and each has distinct historical, cultural, and socioeconomic traits of its own. Among the wellknown nations in the area are Senegal, Nigeria, Ghana, Côte d'Ivoire, and Mali.

The most populous nation in Africa, Nigeria, is a major hub for the West African region. Nigeria, a country with a population of over 200 million, plays a major role in the political, economic, and cultural environment of the region. Ghana, another important actor in West Africa, is well-known for its rising economy and stable democracy. It has also drawn recognition for its innovations in fields like technology, agriculture, and tourism. On the westernmost coast of Africa, Senegal is well known for its lively music scene and rich cultural legacy, while Côte d'Ivoire, a major supplier of cocoa, has seen significant economic progress in recent years. Mali enriches the cultural fabric of West Africa with its multitude of ethnic groups and historical significance. The principal regional body advancing economic integration, peace, and security among its member states is the Economic Community of West African States (ECOWAS). ECOWAS, which was founded in 1975, promotes collaboration and cooperation across a range of industries, including trade, banking, agriculture, and education.

B. Selection of Variables

The dataset being analysed covers a wide period, from 1985 to 2021, providing a thorough understanding of the dynamics of the economy over almost 40 years. It includes several important economic indicators that are drawn from reliable sources, including the World Bank Group and the Organization for Economic Co-operation and Development (OECD), offering a solid basis for more in-depth research. Measured in current US dollars, one of the main variables is the Exports of Goods and Services (X). This indicator serves as a gauge of a nation's trade performance and global competitiveness by showing the value of exports over time. In a similar vein, the Imports of Goods and Services (M), which are likewise expressed in current US dollars, reveal a country's need for imports and its dependence on international trade networks.

The Nominal Exchange Rate (NER), which is stated in local currency units per US dollar (LCU/USD), is another crucial dataset component. This variable reflects changes in exchange rates and how they affect inflation, trade competitiveness, and macroeconomic stability. The dataset is further enhanced by the addition of the G7 Industrial Production Index (IPI), which offers information on trends in component manufacturing output among the Group of Seven nations.

The IPI provides a comparative assessment of industrial activity and economic health among the top industrialized nations as an index, with 2010 serving as the base year. To provide insight into the ratio of broad money to the size of the economy, the dataset additionally includes the Money Supply (M2) as a percentage of GDP. Understanding the dynamics of monetary policy, the state of liquidity, and overall economic resilience depends on this statistic. Furthermore, the GDP which is the total worth of goods and services generated inside a nation's borders and is measured in current US dollars is a key component of economic research. A thorough picture of economic performance, growth paths, and structural changes throughout time can be obtained from GDP statistics.

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Table 1: Shows the Data Description and Source of the Data

Variables	Unit Of Measurement	Source
Exports of goods and Services (X)	Current US Dollars	World Bank Group
Imports of goods and Services (M)	Current US Dollars	World Bank Group
Nominal Exchange Rate (ER)	LCU/USD	World Bank Group
G7 Industrial Production Index (IPI)	Index (2010=100)	OECD
Money Supply (M2)	As percentage of GDP	World Bank Group
Gross Domestic Product (GDP)	Current US Dollars	World Bank Group
Volatility (ER)	GARCH, Families model	Author's Calculation

Lastly, a variable on volatility (ER) that measures the uncertainty and variation in nominal exchange rates is included in the dataset. It was obtained using GARCH models. This indicator is particularly useful for assessing risk, analyzing financial markets, and formulating policy, especially when it comes to currency markets and international commerce. All things considered, this massive dataset offers scholars a wide range of economic indicators to investigate long-term trends, spot patterns, and evaluate the influence of diverse factors on economic outcomes during the study period in various nations and locations.

C. Data Analysis

➢ *Stationarity Test*

If a variable's mean, variance, and autocovariance do not change depending on the measurement location, it is said to be stationary. The variables are differentiated to achieve stationarity if a time series variable has a unit root where the time series data does not have a constant variance. This prevents reporting false results arising from the regression of nonstationary data on one or more non-stationary data (Antani & Agnihorti, 1998). Developed by Levin, Lin, and Chu (2002), the Levin-Lin-Chu (LLC) test is a popular econometric test for assessing a panel dataset's stationarity. In time series analysis, stationarity which denotes that a series' statistical characteristics remain constant throughout time is a fundamental premise (Levin et al., 2002).

Where (is a white noise series, $\rho = 1$ it designates existence of unit root $0< \rho<1$ denotes stationary (Choi, 2006).

➢ *Measuring the Volatility*

Measuring volatility through exchange rates is a fundamental aspect of financial analysis and risk management in international markets. Volatility refers to the degree of variation or fluctuation in the price or value of a financial instrument over time. In the context of exchange rates, volatility reflects the extent to which currency values change relative to one another within a given period (Wu, 1996).

$$\gamma_l^2 = \frac{1}{}\sum_{t=1}^{T}\Delta Y_{it}^2 + 2\sum_{L=1}^{\bar{K}}\omega\bar{K}L\left[\frac{1}{}\sum_{t=2+L}^{T}\Delta Y_{it}\,\Delta Y_{it-L}\right]$$

➢ *GARCH model*

The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model is one statistical model that is frequently used to quantify exchange rate volatility. In financial econometrics, the GARCH model which was first presented by Engle in 1982 is frequently used to analyse and predict the volatility of asset prices, particularly exchange rates. By modelling the conditional variance of returns, the GARCH model captures the time-varying nature of volatility and makes it possible to identify periods of high and low volatility in the movements of exchange rates.

The basic form of the GARCH (p, q) model can be written as follows.

$$\sigma t^2 = \omega + \sum_{i=\alpha'}^{p}\epsilon_{t-i}^2 + \sum_{j=\$}^{q}\beta/\sigma$$

D. Interpretation of Results

Table 2: Shows the Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	629	22.352	1.528	18.685	27.076
Export	629	20.816	1.678	16.035	25.353
Import	629	21.237	1.437	15.804	25.337
Exchange rate	629	4.962	2.393	-5.279	9.166
Money Supply	629	3.037	.489	1.638	4.764
Industrial Production Index	629	1.275	3.745	-14.085	7.712

This chapter will carry out the estimation based on the econometric approach which we discuss.

The information of the important economic factors for the dataset under review is, therefore, provided by the descriptive statistics in Table 5.1. The data set is a panel data set with 629 observations, 37 time points (1985– 2021) and 17 cross-sections (countries). This structure provides the opportunity to examine trends and cross-sectional changes in the selected indicators of economic performance.

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For the first step, one measure of location of each variable can be computed using the means of the distributions. This ascertains the average gross domestic product during the period under observation which is mean GDP of 22.352. This, therefore, in light of its above-par worth, suggests what might be best described as a reasonably healthy economy. The trading activity of the country in the global market place is evident from the mean export value of 20.816 and the mean import value of 21.237. Table 3 Diagnostic Analysis.

Table 3: Results of Levin – Lin – Chu Test

	Variables at Levels			First Difference		
Variable	**Z Inverse Normal**	**p-value**	**Remarks**	**Z inverse Normal**	**p-value**	**Remarks**
GDP	-2.0344	0.6005	Unit Root	-19.4612	0.0000	Stationary
Export(X)	-2.4157	0.5947	Unit Root	-19.3748	0.0000	Stationary
Import(M)	-2.8118	0.3893	Unit Root	-19.4842	0.0000	Stationary
Money Supply M2	-3.4642	0.9445	Unit Root	-18.8581	0.0000	Stationary
Exchange Rate	-6.5432	0.0005	Stationary	-18.3732	0.0000	Stationary
Industrial Production Index	-20.2836	0.0000	Stationary	-30.3587	0.0000	Stationary

The findings of the Levin-Lin-Chu (LLC) test, which are shown in Table 5.2, provide important information on the levels and first differences of the variables that are being examined as well as their stationarity characteristics. A key idea in time series analysis is stationarity, which indicates whether a series shows constant statistical characteristics throughout time. A stationary series is more adaptable to different analytical techniques since it usually has constant mean, variance, and autocovariance.

The LLC test results, taken as a whole, emphasize how critical it is to take stationarity into account when analysing economic time series data. Analysts can formulate more informed policies and make better decisions by distinguishing between stationary and non-stationary series. This allows them to gain a deeper understanding of the underlying patterns and dynamics that underlie economic phenomena.

By using cross-sectional dependence, researchers can get estimates of the correlations between export behavior and its causes that are more precise and trustworthy, which can result in stronger policy recommendations and useful information for decision-making.

Table 4: Shows the Cross-Sectional Dependency Test for Import

Test Name	**Chi-Square Value**	**P-Value**
Pesaran's Test	2.786	0.0053
Friedman Test	57.233	0.0000
Frees Test	2.842	0.0000

The findings of cross-sectional dependency tests, such as the Friedman, Frees, and Pesaran tests, for imports are shown in Table 5.4. In order to determine whether there is cross-sectional dependence among the observations in the dataset, these tests are essential to panel data analysis. When observations from many entities or units (such as nations or businesses) are not independent of one another, it is known as cross-sectional dependency, and it may go against the presumptions of conventional regression models.

The chi-square value for Pesaran's Test is 2.786, and the associated p-value is 0.0053. Because the p-value is less than the traditional significance level of 0.05, this result suggests that there is cross-sectional dependence in the import data. The correlation of residuals across various cross-sections is examined using Pesaran's Test, and a significant result implies that there is cross-sectional dependence present because the residuals are correlated across entities. Next, we look at the Friedman Test, where the p-value is 0.0000 and the chi-square value is noticeably higher at 57.233. The Friedman Test, which is frequently used to identify cross-sectional dependence, focuses on the rankings of observations rather than the raw data. Strong evidence of cross-sectional dependence is shown by the substantial p-value in this case, indicating that the rankings of important observations among various entities are not independent of one another.

Similarly, a significant result (p-value = 0.0000 and chi-square value = 2.842) is obtained via the Frees Test. The Frees Test looks for cross-sectional dependence in the regression model's residuals. Given that the residuals are associated among various entities, a noteworthy finding implies that the import data contain indications of cross-sectional dependence. All three of the cross-sectional dependency tests produced significant findings, which collectively imply that the import data contain cross-sectional reliance. This suggests that observations of relevant behaviour among various entities are not independent, which is an important point to consider when doing modelling and drawing conclusions.

E. Estimation of Regression Models

The GARCH family includes a number of extensions and changes designed to accommodate diverse types of financial data. Table 5.5 presents the volatility of the exchange rate using various GARCH family techniques.

Table 5: Shows the Volatility of Exchange Rate

Exchange Rate	**GARCH**
Constant	6.278***
	(0.00597)
L.arch	1.010***

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	(0.0804)
L.garch	0.0113
	(0.0144)
Constant	0.00324***
	(0.000828)
Observations	629

The results of modelling the exchange rate's volatility using different models from the ARCH (Autoregressive Conditional Heteroskedasticity) family GARCH, is shown in Table 5.5. To reflect the dynamics of exchange rate volatility, many requirements and characteristics are incorporated into each model. First, the constant terms in every model exhibit statistically significant coefficient ('***'; $p<0.01$), suggesting that the volatility process has a substantial constant component. Understanding the baseline degree of exchange rate volatility is essential for determining the overall riskiness of the currency, and the values corresponding to these constants offer valuable insights into this regard.

Now for the lagged terms: the lagged GARCH term ('L.garch') are statistically significant. These coefficients demonstrate how persistent volatility is, suggesting that historical volatility levels have a big influence on the exchange rate's current volatility. The magnitude of these coefficients reveals information about the level of volatility persistence: higher coefficients imply more persistence. The leverage effect, which is the asymmetric volatility response to positive and negative shocks, is captured by this measure. A noteworthy coefficient indicates that, as is frequently seen in financial markets, the volatility reaction to negative shocks differs from that to positive shocks.

Table 6: Shows the Regression Results in the Export Case

	(1)	**(2)**	**(3)**
Export	**Panel Regression**	**Fixed Effect Regression**	**Random Regression**
GDP	0.752***	0.690***	0.752***
	(0.0313)	(0.0341)	(0.0313)
M2	0.482***	0.536***	0.482***
	(0.0694)	(0.0720)	(0.0694)
Volatility (ER)	0.0854***	0.122***	0.0854***
	(0.0229)	(0.0253)	(0.0229)
IPI	0.00152	0.000380	0.00152
	(0.00539)	(0.00532)	(0.00539)
Dum (Capture Shock)	0.138	0.165	0.138
	(0.122)	(0.120)	(0.122)
Constant	2.108***	3.147***	2.108***
	(0.611)	(0.637)	(0.611)
Observations	629	629	629
R-squared		0.686	
Number of id	17	17	17

Standard Errors in Parentheses
*** p<0.01, ** p<0.05, * p<0.1

Regression analysis using three different regression methodologies panel regression, fixed effect regression, and random regression looks at the relationship between exports and a number of economic indicators, such as GDP, money supply (M2), exchange rate volatility (ER), and the industrial production index (IPI) in Table 5.7. Remarkably, a dummy variable (Dum) is incorporated into the models to account for any shocks to the financial markets, especially those that occurred in 2008 and 2009, which were periods of intense global economic unrest after the financial crisis.

P-values that are higher than typical thresholds suggest that the coefficients related to the dummy variable in all three models are positive but not statistically significant. This implies that the financial market shocks recorded by the dummy variable may not have a direct impact on export levels during the designated periods, indicating that the dummy variable does not significantly affect exports in this analysis.

The absence of significance for the dummy variable, however, can also imply that other variables in the models like GDP, money supply, and exchange rate volatility have already considered the consequences of the financial market shocks. For example, the 2008 and 2009 financial market shocks probably affected these economic indices, which in turn probably affected exports indirectly.

It's critical to consider the larger background of the 2008 and 2009 financial market shocks. The worldwide financial crisis, which was typified by extensive economic downturns, banking crises, and market instability, peaked during these years. The crisis' aftereffects were felt throughout the world economy, including investment sentiment, trade patterns, and consumer confidence. Therefore, even though our research may not show a direct impact of the financial market shocks on exports, their indirect effects via channels like GDP contraction, alterations in consumer behavior, and exchange rate volatility may still be substantial.

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Furthermore, the dummy variable's lack of significance emphasizes how difficult it is to assess how financial market shocks affect actual economic variables like exports. Regression analysis may find it difficult to effectively isolate and quantify the complex and dynamic consequences of these shocks. Furthermore, the dummy variable's importance can vary depending on the particular modeling strategy and variables used in the research, indicating the necessity for various specifications and robustness tests to adequately capture the effects of financial market shocks on exports.

In summary, even though the dummy variable that was added to account for the financial market shocks of 2008 and 2009 does not, in this analysis, demonstrate statistically significant effects on exports, its inclusion emphasizes the significance of considering more comprehensive economic contexts and possible indirect channels through which financial market shocks may affect real economic variables. To fully understand these patterns and the influence of financial market shocks on exports, more investigation and analysis may be necessary.

Table 7: Shows the Regression Results in the Import Case

	(1)	(2)	(3)
Import	**Panel Regression**	**Fixed Effect Regression**	**Panel Effect Regression**
GDP	0.762***	0.675***	0.762***
	(0.0291)	(0.0355)	(0.0291)
M2	0.407***	0.452***	0.407***
	(0.0683)	(0.0751)	(0.0683)
Volatility (ER)	0.0988***	0.185***	0.0988***
	(0.0210)	(0.0264)	(0.0210)
IPI	-0.00354	-0.00445	-0.00354
	(0.00564)	(0.00555)	(0.00564)
Dum	0.120	0.153	0.120
	(0.128)	(0.126)	(0.128)
Constant	2.485***	3.853***	2.485***
	(0.582)	(0.664)	(0.582)
Observations	629	629	629
R-squared		0.674	
Number of id	17	17	17

Standard Errors in Parentheses
*** p<0.01, ** p<0.05, * p<0.1

Regression findings for imports using panel regression, fixed effect regression, and panel effect regression are shown in Table 5.8. These models consider the possible effects of a dummy variable that captures financial market shocks in 2008 and 2009 and analyze the relationship between imports and a number of economic indicators, such as GDP, money supply (M2), exchange rate volatility (ER), and the industrial production index (IPI). All three models show a positive and statistically significant link with imports, starting with the GDP-related coefficients. Based on the general tendency where economic expansion boosts demand for imported goods and services as individuals and businesses have greater spending power, this shows that an increase in GDP is linked to higher levels of imports.

In a similar vein, all models have positive and statistically significant money supply (M2) coefficients. This suggests that there is a positive correlation between money supply growth and increased import levels. This relationship can be explained by the fact that monetary stimulus measures lead to higher consumer spending, which in turn increases demand for imported goods.

All three models demonstrate a positive and statistically significant association between imports and exchange rate volatility (ER). This suggests that a stronger correlation exists between elevated quantities of imports and exchange rate volatility. Changes in exchange rates can have an effect on import decisions by affecting the price of imported items and the relative competitiveness of domestic products.

It's important to note, nevertheless, that in the fixed effect regression, the exchange rate volatility coefficient (ER) magnitude is significantly larger than in the other two models. This implies that, after adjusting for impacts peculiar to individual countries, the influence of exchange rate volatility on imports might be more noticeable.

Remarkably, in all of the models, the coefficient for the industrial production index (IPI) is not statistically significant. This suggests that either industrial production is reflecting effects already considered by other variables in the model, or it may not have a large direct impact on import levels in this particular scenario. Furthermore, it does not seem that any of the three models' dummy variables (Dum), which represents the financial market shocks of 2008 and 2009, has a statistically significant effect on imports. This implies that either other variables in the models caught the effects of the financial market shocks during these years, or the import levels in this analysis were not directly impacted by them. All three models show statistically significant intercepts when the constant terms are examined, suggesting that there is a baseline level of imports that cannot be explained by the independent variables in the model.

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In summary, the regression results shed light on the factors that influence import levels, but other factors that were not considered in this analysis may also have an impact. This is indicated by the lack of significance for the industrial production index and the dummy variable that represents the financial market shocks of 2008 and 2009. To completely comprehend the dynamics of import behavior and its drivers, particularly during times of financial market volatility, more investigation and analysis could be necessary.

F. *Empirical Analysis of Exchange Rate Fluctuations on Import and Export Prices*

Here, we discuss the effects of foreign exchange variation on import and export costs in the West African zone. The empirical results put forward evidence that exchange rate volatility has considerable influence on trade prices, in the export as well as in the import side. In particular, an increase in the volatility of the exchange rate results in an increase of importing costs because of depreciation of the currencies of international partners, at the same time, the prices of export products may reduce as the local currencies become cheaper and this may lead to an increase in the demand for export products.

- *Impact on Import Prices*

The relationship lines between exchange rate volatility and import prices are sometimes straight. This is because when the local currency declines in value we find that the price of imported goods increase hence a prospect of inflation. This can inflow the price of consumer goods and raw materials and hence do a great deal to the trade balance. The regression models show that exchange rate depreciation has a positive effect on import prices, which accords with previous theories on the topic.

- *Impact on Export Prices*

On the export side exchange rate fluctuation can be beneficial or have adverse impact. When a local currency continues to decline in value, this means that the exporter's exports become cheaper to the foreign buyers thus the probability of an increase in the export frequency may arise. Although, these changes expose the domestic currency to uncertainty that deters exporters from making long-term contracts. The evidence provided in this paper reveals that the depreciation of the exchange rate increases export prices in the short run, while volatility affects export negatively in the long run due to risks associated with unpredictable prices.

- *Impact on Balance of Payments*

Fluctuations in exchange rate also affect the balance of payment through flow of trade in goods and services, flow of capital and the financial account. Fluctuations in exchange rate therefore can affect the ratio of exports to import and hence balanced trade. Based on our results, it appears that exchange rates can causes the quantum of exports and imports in the short-run. Although the shrinking of the value of currency in any economy results in betterment of the trade cycle balance because export competitiveness is enhanced, it can be disadvantageous for the balance of payments since import costs rising.

G. *Testing the Mechanisms of Exchange Rate Volatility on Trade*

However, two other channels through which exchange rate change can impact trade in West Africa include the classical and the intermediate. They are variables that moderate the effect of exchange rate volatility on trade performance. Our empirical analysis highlights the following key mechanisms:

- *Competitiveness Effect*

Price competitiveness has been identified as one of the primary modes through which transmits shocks. A declining currency makes its export merchandise cheaper in other markets and this in turn compete well in the foreign market. On the other hand, an appreciating currency restrains the price competitiveness of the export product. Thus, our findings show that exchange rate volatility has a very important influence over the relative price of exports, and therefore over trade volumes.

- *Inflation and Domestic Prices*

The second is inflationary effects arising from exchange rate volatility. Depreciation of domestic currency always makes imported goods expensive since they are paid for in foreign currency hence the prices of imported goods add to price inflation in a country. This weakens the consumers purchasing capacity and may inturn lower the demand for imports. We find that our measure of inflation, which incorporates exchange rate changes, has a noticeable impact on import demand thus supporting the notion that the inflation channel is an essential component of the trade regime in the region.

- *Policy Responses*

Policies and intercessions in government can also be considered as the means, through which the exchange rate volatility influences the trade as a channel. Central banks in West African countries therefore use either the interest rate tool or foreign exchange controls to balance movements in exchange rates. All these policy measures can either act as buffers against or at the same time amplify the impacts of exchange rate volatility on trade. We also find that while some policies reduce the adverse impacts of exchange rate volatility they come with other distortions that make trade patterns more complex.

- *Risk Aversion and Trade Uncertainty*

Fluctuations in exchange rate rises the risk associated with future cash flow since cost and revenue fluctuates. Many organizations cut back their trade levels or stay away from signing international contracts in order to avoid losing money due to movements in exchange rates. This mechanism answers the possibility of exchange rate volatility to occasionally cause a decrease in trade even when the price competitiveness factor is advantageous. The results of the present study demonstrate that exchange rate risk decreases trade volume especially in the least stable economy regions.

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H. Analysis and Discussion

The current study, which focuses on West African nations, examines how exchange rate volatility affects commerce in West Africa. In addition to providing useful insights into the factors influencing imports and exports, Chapter 05 estimation results and diagnostic studies also highlight the most suitable modelling techniques for panel data analysis. Significant correlations between imports and exports as well as important economic indicators like GDP, money supply (M2), and exchange rate volatility (ER) are shown by the regression results. In particular, higher export levels are correlated with increases in GDP, money supply, and exchange rate volatility; this illustrates the beneficial effects of monetary stimulus, economic growth, and currency dynamics on export performance.

Likewise, significant correlations between GDP and money supply and imports are seen, suggesting that increased economic activity and monetary expansion drive rising demand for imports. In the context of this analysis, industrial output may not directly influence trade dynamics, as suggested by the industrial production index's (IPI) lack of relevance. The total amount of financial assets available in a nation at a given time is known as its money supply (Jawad & Hina, 2022). They also include the requirement for guarantees from financial institutions and the use of legal money that is in use. A key factor in restoring order to the financial sector is monetary policy.

It guarantees the evolution of critical settings for the expansion of industry and commerce as well as competitiveness in the commercial sector. A reduced interest rate fosters an environment that is favourable to economic growth. A decline in interest rates presents a frequent opportunity to observe equity capital expenditures directly and to demonstrate the firm's faith by making significant investments in the expanding market and realizing enormous profits. Because high interest rates are frequently linked to high inflation, they inhibit trade.

Because money is the only medium of exchange in business, it has a robust effect on economic motion. This implies that a rise in the money supply would lead to a fall in interest rates and, consequently, rapid economic expansion. Manufacturers understand that they may improve by combining more resources and increasing their production capability. Trade growth immediately leads to an increase in demand for investment goods and jobs. Companies are issuing more debt and stocks as the stock market values climb. From this angle, the amount of money in circulation has kept rising. When production expansion exceeds available capacity, prices begin to climb (Smit, 2019).

As consumer purchasing power declines over the term of their loans due to uncontrolled exchange rate coordination implemented after the Bretton Woods agreement ended, people begin to anticipate inflation and lenders demand higher interest rates. This has created a significant amount of uncertainty in currency conversion rates. The negative theory that fluctuating exchange rates hinder trade is supported by several theoretical research (Shapiro, 2009). Other research concluded that a variable exchange rate encourages international trade, however, several empirical results have produced negligible results (A. U. Frank, 1991).

The idea of stationarity is fundamental to the research. Think of economic variables like ships navigating rough seas. Non-stationary variables make forecasting difficult because they are like boats that are constantly being pushed around by erratic waves. According to our analysis, these factors become anchored following a strategy transition, making accurate forecasts about their future direction possible. Unpredictable and frequently influenced by world events, exchange rate volatility becomes a significant player in the import game. Like expert navigators, GARCH family models map its dynamic motions and interpret the asymmetry and persistence of its responses to previous shocks. With this improved knowledge, governments may more effectively manage the turbulent waters of currency swings, reducing risks and promoting stable market conditions.

The analysis goes beyond simple averages and explores the distinctive qualities of particular things. Fixed effects models function as perceptive observers, identifying and taking into consideration the unique conditions of every country to produce more precise and detailed assessments of their trade behavior. Disregarding these peculiarities would result in inaccurate projections and could lead decision-makers to adopt trade policies that are not beneficial. It would be like treating all ships the same.

The very modest coefficients of money supply and exchange rate (which defy economic theory) imply that import performance is not affected by these factors. However, the coefficient of LGDP is positive and significant for all three models that were generated, indicating that higher domestic GDP leads to higher imports. For each of the three estimated models, the dummy variable's coefficient, which represents the effects of the Great Financial Crisis, is positive.

This finding supports theoretical claims made by Hooper and Kohlhagen (1978) and Clark (1973) that a fluctuating exchange rate is detrimental to commerce. It is important to highlight that the influence of exchange rate fluctuation on exports in SSA nations is quite minimal, even though the analysis's results support this claim. This implies that adopting a strategy to lessen exchange rate volatility could only slightly increase exports. This result is consistent with the findings of Musila and Al-Zyoud (2012), who discovered that the effect of exchange rate volatility on exports was minimal in SSA economies. The authors stated, in line with our research, that the West Africa nations' trade balance may not significantly improve if they pursue an exchange rate stability policy.

The positive correlation between IPI and exports observed in all model estimations suggests that West Africa countries' exports increase in tandem with the growth rates of their industries in advanced economies. Like the import model, the money supply and exchange rate have very tiny coefficients, indicating that their impacts on exports are negligible. Surprisingly, in every model assessment, the

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dummy variable's coefficient was statistically insignificant. But the economic scene is rarely an island unto itself. Beneath the surface lies phenomena known as cross-sectional dependence, in which the acts of one nation have an impact on others. Our research sheds light on this interdependence and emphasizes the necessity for advanced modelling methods that consider the complex network of factors influencing patterns of international commerce. Ignoring this interdependency would be like trying to navigate a single ship's voyage without considering the huge oceanic currents, which could result in dangerous detours and lost chances.

Beyond just numbers and statistics, this investigation yielded insights that are quite profound. They give decision-makers vital resources for creating successful trade plans. Policymakers can steer the economic ship towards prosperity by regulating imports to maximize local production and consumption and fostering exports through tailored policies that rely on a country's comparative advantages. Furthermore, policymakers can reduce possible risks related to currency changes by having a thorough grasp of the intricate interactions between import behavior and exchange rate volatility. They can negotiate the turbulent waters of international markets and guarantee a steady and sustainable flow of products and services by using hedging techniques and diversifying their trading partners.

In the end, this analysis emphasizes how critical it is to approach commerce with discernment. Charting a road towards a thriving and vibrant trading landscape requires understanding the specific conditions of each country, the interconnection of the global marketplace, and the use of advanced tools to handle economic risks. Through the adoption of these perspectives, decision-makers can fully realize the advantages of global commerce, advancing their countries' economies and mutual achievements (International Monetary Fund, 2021; World Bank, 2019).

I. Implications for Policy and Trade

From the findings made above, it becomes evident that the role of exchange rate volatility cannot be overemphasized in determining the trade characteristics of the WAMA. Government and its agencies must direct its attention towards lowering the exchange rate volatility in order to ensure sustainable and healthy growth of exports and imports. Some of the actions that can be undertaken to reduce the impacts of fluctuations in the exchange rates include; development of sound requisite stock of foreign exchange reserves, enhancement of relevant monetary policies, and promotion of cooperative relations with the relevant regional entities.

Also, in relation to inflation and the export goods competitiveness, stable trade environment is maintained. It is recommended that central banks and other financial authorities should aim to reduce the dangers tied to exchange rate volatilities, so that firms can predict and conduct trade policies more effectively.

V. CONCLUSION AND RECOMMENDATION

A. Conclusion

The goal of the research included in this thesis was to thoroughly investigate how trade performance in West Africa (SSA) and exchange rate volatility are related. To educate businesses, governments, and other stakeholders on the complexities of this issue, important insights have been gained through the analysis of historical data, econometric modelling, and case studies of specific countries.

The research's conclusions have clarified several important facets of exchange rate volatility and how it affects commerce in the SSA. First, during the previous 20 years, the data showed clear patterns and trends in the volatility of currency rates. Significant changes in exchange rates were recorded across different countries and times in the Southern African region. This volatility highlights the inherent difficulties in maintaining currency valuation and worldwide competitiveness and can be linked to many variables, including economic policies, geopolitical events, and pressures in the global market.

Additionally, the study clarified how exchange rate fluctuation affects SSA's total trade volumes. Exchange rate volatility was shown to have a substantial negative impact on trade, with higher volatility being correlated with lower trade volumes. This emphasizes how crucial stable currency markets are to promoting global trade and regional economic expansion. The study also determined which particular trade sectors in SSA are most impacted by exchange rate volatility. All businesses are affected to some degree, but manufacturing and agriculture two sectors with significant exposure to global markets are especially vulnerable. Exchange rate fluctuations present serious difficulties for exporters in many industries by upsetting supply chains, driving up input costs, and eroding competitiveness.

Additionally, the study looked into how fluctuations in exchange rates affect import and export prices and, in turn, the region's trade balance. It was discovered that changes in import and export prices can result from exchange rate volatility, which can impact the dynamics of the trade balance. Trade balances may worsen in nations with substantial exchange rate volatility, aggravating macroeconomic imbalances and external vulnerabilities.

Additionally, according on income levels and resource endowments, the study looked at how exchange rate volatility affected trade differently in each kind of SSA country. All of the region's countries are impacted by exchange rate volatility, but the degree to which lowincome, middle-income, and resource-rich nations are vulnerable to its effects varies. Designing focused policy actions to lessen the negative effects of exchange rate volatility on trade requires an understanding of these subtleties.

B. Recommendations and policy implications

The study concluded by outlining policy implications and suggestions to lessen the negative effects of currency rate fluctuation on commerce in West Africa. It is recommended

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that policymakers give top priority to initiatives that strengthen export diversification, stabilize exchange rates, and strengthen important trade sectors. In order to lessen the effects of exchange rate volatility and encourage sustainable regional trade growth, this may entail putting in place sensible macroeconomic policies, improving trade facilitation channels, and encouraging regional collaboration.

To sum up, this thesis has made a significant contribution to our understanding of the intricate connection between trade performance in SSA and exchange rate volatility. Through the use of strong econometric models, a thorough examination of historical data, and case studies, this research has improved our comprehension of the opportunities and problems related to exchange rate volatility in the area. To overcome these obstacles and realize the full benefits of international trade for SSA's economic development and prosperity, governments, corporations, and other stakeholders must work together.

We have discovered some significant findings in our investigation on the connection between trade success and exchange rate volatility in West Africa. We have examined in detail how erratic fluctuations in exchange rates impact both import and export activity throughout the region by applying cutting edge statistical techniques.

The relationship between trading practices and economic indicators is one important discovery. We noticed that a country prefers to export more when its GDP (gross domestic product) is larger. This makes sense because rising economies typically result in rising domestic and global demand for products and services. In a similar vein, an economy's greater money supply frequently results in higher imports. This might be the result of consumers being able to purchase more items from overseas and having more spending power.

But volatility in currency rates adds another level of complexity. On the one hand, it can increase sales overseas by lowering the cost of a nation's products in foreign markets. However, it also creates ambiguity, which can hinder business planning and discourage deals from being made by importers and exporters. We were able to comprehend the impact of this volatility's degree and persistence on trade through our investigation employing models such as GARCH.

Selecting the appropriate analytical methodology was essential. Fixed effects models, which take into consideration features unique to a certain country, were shown to have the best fit for our data using the Hausman test. This indicates that distinct factors affecting trade patterns are specific to each country in West Africa, and our study must take these into account. Additionally, we discovered evidence of cross-sectional dependence, which suggests that the economies of the region are interconnected and that changes in one nation may have an impact on others.

Beyond the figures, our analysis reveals some more general opportunities and problems. Risk management and meticulous preparation are necessary to control fluctuating exchange rates. To prevent trade disruptions, businesses and governments must create plans to deal with abrupt changes. To maintain sustainable trade growth, policymakers should concentrate on measures that guarantee currency market stability and encourage export competitiveness.

Comprehending the effects of currency rate fluctuation on trade is essential to West Africa's economic integration.

By tackling these obstacles and grasping the possibilities, the area can cultivate thriving commercial links and propel economic advancement. To sum up, our study offers important new perspectives on the intricate dynamics of trade and currency rate volatility in West Africa. We can strive toward a future in which trade plays a role in the prosperity and growth of the region by identifying these relationships and comprehending the subtleties.

C. Limitation of the Study

The study heavily relies on historical data, econometric models, and case studies. However, the availability, accuracy, and reliability of data, especially in West Africa, can be a significant constraint. Incomplete or inaccurate data may lead to biased results or limited generalizability of findings. While the research provides insights into the relationship between exchange rate volatility and trade performance in West Africa, the findings may not be universally applicable to all countries or regions within SSA. Economic, political, and social contexts can vary widely across countries, potentially limiting the generalizability of the conclusions.

Although the study employs advanced econometric models and statistical techniques, there may be inherent limitations in the methodologies used. For example, while fixed effects models are deemed appropriate for the data, they may not fully capture all relevant factors influencing trade patterns. Additionally, the choice of models and analytical techniques may introduce biases or overlook certain nuances in the data.

The research primarily focuses on the relationship between exchange rate volatility and trade performance in SSA. However, other factors influencing trade dynamics, such as political instability, infrastructure deficiencies, and regulatory barriers, are not extensively explored. Limiting the analysis to exchange rate volatility may overlook important determinants of trade behavior in the region. Although the study examines historical trends over the previous 20 years, the analysis may not fully capture recent developments or emerging trends in exchange rate dynamics and trade patterns. Economic conditions and policy environments can change rapidly, potentially affecting the validity and relevance of the study's findings over time.

While the research aims to provide insights for businesses, governments, and stakeholders, the level of stakeholder engagement throughout the research process is not explicitly addressed. Involving key stakeholders in the research design, data collection, and analysis phases could enhance the relevance and applicability of the findings to real-world decision-making.

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D. Further Research Direction

West Africa offers a fertile ground for further investigation and development when it comes to exchange rate volatility and trade performance. Here, we explore several directions for further study that could expand on the limits of previous studies and help us better understand this intricate relationship: The temporal dynamics of this relationship can be better understood by conducting longitudinal studies that monitor trade performance and exchange rate volatility over an extended period. Through the examination of historical trends, patterns, and structural changes, scholars can get a deeper comprehension of how exchange rate volatility impacts trade flows in West Africa and how these effects alter in response to shifting economic circumstances, policy changes, and external shocks.

Important geographic determinants that affect trade dynamics can be found by examining regional variations in exchange rate volatility and trade patterns among West African areas. Researchers can examine how trade behavior and the cross-border transmission of exchange rate volatility effects are influenced by market proximity, transportation networks, border policies, and regional integration initiatives by utilizing spatial econometric tools. Nuanced insights into the diverse effects of currency changes can be obtained by analyzing the sectoral composition of trade and its vulnerability to exchange rate volatility.

To evaluate how exchange rate volatility impacts supply chain dynamics, investment decisions, and competitiveness within each sector, future research may concentrate on particular industries or value chains, such as manufacturing, services, natural resources, and agriculture. Exchange rate volatility and trade performance can be mediated by institutional contexts. This can be clarified by looking into the function of institutional elements, such as trade policies, regulatory frameworks, institutional quality, and governance structures. The effectiveness of policy actions in reducing the negative effects of currency volatility on trade can be elucidated by comparative studies conducted across nations with varying institutional setups. Deeper insights into the lived experiences, attitudes, and decision-making processes of market players impacted by exchange rate volatility can be gained by combining quantitative analysis with qualitative research techniques such as case studies, interviews, and stakeholder consultations. Quantitative analysis could miss context-specific difficulties, coping mechanisms, and policy preferences; qualitative research might reveal these things. Evidence-based policy interventions in West Africa must be informed by an evaluation of the efficacy of policies designed to promote trade resilience and control exchange rate volatility. Future studies should assess the effects of regional integration agreements, trade facilitation programs, currency hedging strategies, and exchange rate regimes on trade performance and economic stability.

It is imperative to consider the wider worldwide framework and its consequences on the volatility of currency rates and trade dynamics within West Africa. Future research should examine the ripple effects on regional trade patterns of significant currency fluctuations, trends in the global financial markets, changes in commodity prices, and geopolitical developments. Policymakers and businesses can gain significant insights by comprehending the interplay between global causes and local dynamics.

Our knowledge of the intricate relationships between exchange rate volatility, trade, and more general socioeconomic phenomena in West Africa can be improved by embracing multidisciplinary viewpoints and incorporating ideas from economics, political science, sociology, geography, and other disciplines. Innovative solutions to urgent problems can be produced through collaborative research projects that make use of a variety of methods and areas of expertise.

In conclusion, there is a great deal of promise for knowledge advancement, policy formation, and socioeconomic development from continuing study on exchange rate volatility and trade performance in West Africa. Scholars may advance a more sophisticated knowledge of this crucial intersection and open the door for more equitable and robust trading systems in the area by embracing interdisciplinary techniques, utilizing a variety of data sources, and filling in growing research gaps.

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