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Impact of Agricultural Output on Exchange Rate in Nigeria

Yahaya Yakubu

Department of Economics, Faculty of Social Sciences Sa'adu Zungur University, Bauchi State - Nigeria

* Corresponding Author's; E - mail: yahayayakubu@basug.edu.ng

Abstract

The Federal Government of Nigeria recently floated the country's exchange rate. As a result, the value of foreign currency in terms of Naira, in relative comparison to foreign currency, has depreciated due to high demand and limited supply of the latter. This has caused untold hardship on the citizens, and informed the need to strengthen the agricultural sector with a view to reducing imports while increasing exports. Against this background, this study investigates the impact of agricultural output on exchange rate in Nigeria. The study utilizes annual data on Exchange Rate, Agricultural Output, Exports of Goods and Services, and Foreign Direct Investment (FDI) from the Central Bank of Nigeria 2023 Statistical Bulletin for the period 1985-2022. The study employs Autoregressive Distributed Lag approach to analyze the data. The results confirm the existence of a long-run relationship among the variables at the 5% significance level. The long-run model estimation indicates that agricultural output significantly reduces exchange rate. This highlights agriculture's potential to stabilize the exchange rate by reducing the demand for foreign currency. Although FDI and exports exhibited negative impacts on exchange rate in the long run, these effects were statistically insignificant. In the short run, however, agricultural output and exports demonstrated positive and significant effects on exchange rate, while FDI showed an insignificant negative effect. The findings underscore the importance of agriculture and export diversification in achieving exchange rate stability in Nigeria. Hence, the study recommends total repositioning of the agricultural sector to reduce importation and promote exports, thereby reducing the pressure on foreign currencies.

Keywords: Agricultural Output, Exchange Rate, Exports, Foreign Direct Investment, Nigeria **JEL Classification:**

1.0 Introduction

Agriculture has historically served as the backbone of Nigerian economy, playing a critical role in job creation, boosting food security, and economic growth. The sector once provided the majority of the country's foreign exchange earnings and contributed substantially to its Gross Domestic Product (GDP). However, the crude oil discovery in the 1960s marked a significant turning point for Nigeria's economy. This shift has led to the marginalization of agriculture, with dire consequences on economic stability and the exchange rate of the Nigerian naira. Before the discovery of crude oil, Nigeria's economy was heavily dependent on agriculture, which contributed over 60% of the nation's GDP and about 90% of its foreign exchange earnings (Ahungwa, Haruna, & Abdusalam, 2014). The exportation of agricultural commodities, such as cocoa, groundnuts, rubber, and hides, positioned Nigeria as a key player in global agricultural trade (Gbaiye et al., 2013). Furthermore, the sector provided employment for approximately 70% of the country's working population (Awe et al., 2023). The robust performance of the agricultural sector during this period laid a foundation for



economic growth and stability. However, this dominance began to wane with the oil boom in the 1970s. The new source of wealth led to a significant economic transformation, resulting in an over-reliance on oil revenues. The oil boom of the 1970s brought unprecedented revenue inflows but also marked the beginning of Nigeria's economic challenges. Policymakers shifted focus from agriculture to crude oil exploration and production, neglecting the development of the agricultural sector. The result was a gradual erosion of Nigeria's agricultural competitiveness in the global market and a significant decline in foreign exchange earnings from agricultural exports (Okoh, 2004). The consequences of this shift became evident as Nigeria transitioned from a net exporter of agricultural products to a net importer of food and raw materials. This dependency on imports increased pressure on foreign exchange reserves, exacerbating the country's vulnerability to external shocks and exchange rate volatility.

Exchange rate is defined as the price of one currency in terms of another. It is a critical indicator of a country's economic health. In Nigeria, the over-reliance on crude oil revenues has created an unstable situation where exchange rate stability is highly sensitive to global oil price dynamics. Consequently, the contribution of the agricultural sector weakened contribution to foreign exchange earnings became significantly weakened. The discovery of oil not only diverted attention from agriculture but also contributed to Dutch Disease—a phenomenon where resource wealth leads to currency appreciation, making non-oil exports less competitive in global markets (Corden & Neary, 1982). This economic distortion has weakened Nigeria's ability to diversify its export base, further compounding exchange rate challenges. As of 2023, Nigeria's exchange rate remains under significant pressure due to declining foreign reserves and increasing demand for imported goods. The National Bureau of Statistics (NBS) (2023) reports that food inflation was at 24.8%, reflecting the high cost of imported food items. This situation highlights the need to revitalize the agricultural sector to reduce dependency on imports and stabilize the exchange rate.

The weakening of the agricultural sector has had negative implications on Nigeria's economy. The reduced foreign exchange earnings from agricultural exports diminished the country's ability to manage its external trade balance effectively. Further, the high dependence on food imports has contributed to persistent trade deficits, putting additional pressure on the naira. For example, Nigeria spends an estimated \$10 billion annually on food imports, including staples such as rice, wheat, and sugar (United Nations Food and Agriculture Organization (UNFAO, 2022). This expenditure underscores the critical role that agriculture can play in reducing import dependency and alleviating the pressure on foreign exchange reserves.

The volatility of oil prices has exposed the limitations of relying on a single commodity for foreign exchange earnings. The crash of oil prices in 2020, driven by the COVID-19 pandemic for instance, resulted in a sharp decline in foreign reserve and a significant depreciation of the naira. During this period, exchange rate in the parallel market soared to over \$500 per dollar, further illustrating the vulnerabilities of Nigeria's oil-dependent economy (Central Bank of Nigeria (CBN), 2022). Recently, the exchange rate has



skyrocketed to over №1,500 per dollar. Revitalizing Nigeria's agricultural sector offers a viable pathway for addressing the country's exchange rate challenges. Through the improvement of agricultural productivity and expanding export markets, Nigeria can enhance its foreign exchange earnings and reduce its reliance on crude oil revenues. Additionally, promoting agricultural value chains and agro-industrialization can create employment opportunities, increase rural incomes, and contribute to economic diversification. Government initiatives such as the Anchor Borrowers' Programme (ABP) and the Agricultural Transformation Agenda (ATA) aim to boost agricultural productivity and enhance food security. However, the impact of these programs on exchange rate stability remains limited due to structural bottlenecks, including inadequate infrastructure, limited access to credit, and inefficient market systems (International Monetary Fund (IMF), 2022).

Given the critical role of agriculture in Nigeria's economic development, this study seeks to explore the relationship between agricultural output and exchange rate dynamics. It hypothesizes that improvements in agricultural output can increase export performance and reduce the demand for foreign currency used for imports, thereby easing pressure on the exchange rate. By examining the relationship between agricultural performance and exchange rate, the study aims to provide empirical evidence to inform policymaking. The remaining parts of the paper are structured into literature review, methodology of the study, findings and discussion, and conclusion.

2.0 Literature Review

Theoretically, this study is grounded within the framework of Purchasing Power Parity (3PPPs) Theory and Supply and Demand Model of Foreign Exchange to explore the relationship between agricultural output and exchange rate in Nigeria. These theories provide insights into the relationship between agricultural output and exchange rate and how it can be analysed and understood. The 3PPPs theory posits that exchange rates adjust to equalize the purchasing power of different currencies. In the context of agriculture, it can be discerned that changes in the prices of agricultural commodities, driven by variations in output, can influence Nigeria's export revenues and import costs. These changes affect the relative demand and supply of foreign exchange, subsequently impacting the exchange rate (Edwards, 1989). For instance, an increase in agricultural out could lower the domestic prices of exportable commodities, enhancing Nigeria's trade competitiveness and stabilizing the naira.

The supply and demand model of foreign exchange underpins the direct relationship between agricultural exports and exchange rates. Increased agricultural output leads to higher export volumes and reduces imports, which enhances foreign exchange supply. On the other hand, lower agricultural output can reduce export earnings, creating foreign exchange scarcity and contributing to exchange rate depreciation. This framework provides a straightforward mechanism for analysing how shifts in agricultural performance influence exchange rates (Deaton & Miller, 1996).



Empirically, the relationship between agriculture and exchange rate has been given little attention, particularly in most developing economies that rely majorly on agriculture. The empirical review examines recent studies that analyse the impact of agricultural output on exchange rates in Nigeria with insights from related studies in other countries. One of the recent studies was by Adekunle and Salisu (2021). The study highlights the significant role of agricultural output in influencing Nigeria's exchange rate. Their findings suggest that increased agricultural productivity contributes to foreign exchange stability, particularly during periods of reduced oil revenue. Similarly, Nwafor and Obinna (2022) analyzed the relationship between agricultural productivity and exchange rate fluctuations in Nigeria. Using time-series data from 2000 to 2020, the results revealed a strong negative correlation between agricultural output shocks and exchange rate depreciation. They emphasize the importance of policy reforms aimed at boosting agricultural exports. These studies have revealed the significance of agriculture to the exchange rate policy, hence the need for deliberate government intervention in agriculture to stabilize the country's exchange rate. In this aspect, Eze and Ibe (2023) investigated the effectiveness of government interventions in enhancing agricultural output and stabilizing exchange rates. The study demonstrated that targeted subsidies and export incentives positively impact exchange rate stability. However, inconsistent policy implementation undermines these benefits, highlighting the need for coordinated efforts to sustain agricultural growth.

Beyond the shore of Nigeria, several studies have also demonstrated the impact of agriculture on exchange rate. In a study by Kraipornsak (2020) the determinants of exchange rates in Thailand and other Asian economies were explored, focusing on macroeconomic variables, including agricultural exports. The study found that agricultural output plays a crucial role in stabilizing exchange rates in economies with diversified export portfolios. These findings resonate with the Nigerian context, where studies revealed that agriculture has the potential to mitigate exchange rate volatility amid oil price shocks. Furthermore, Phuc and Duc (2021) examined exchange rate pass-through effects in the Asia-Pacific region, emphasizing the role of agricultural productivity in influencing currency stability. They concluded that countries with robust agricultural sectors experience lower exchange rate volatility. Malik, Abbas, Shabbir, and Ramos-Meza (2024) analyzed the relationship between business cycles, foreign direct investment (FDI), and exchange rates in Asian economies. The findings highlight that agricultural output, alongside other macroeconomic factors, significantly impacts exchange rate stability. While these studies focus on Asian countries, the insights are applicable to Nigeria, particularly in understanding how agricultural growth can stabilize the naira. However, while these studies controlled for FDI, the studies in Nigeria as reviewed in this study did not. Foreign Direct Investment (FDI) in agriculture can enhance productivity and technology transfer, leading to increased agricultural output. This, in turn, can strengthen the local currency by improving the balance of payments and reducing the need for imports. The current study therefore attempts to control the role of FDI.



3.0 Methodology of the Study

3.1 Data Source

This section describes the methodological approach employed in this study to examine the impact of agricultural output on exchange rate in Nigeria from 1985 to 2022. The choice of the time frame is based on the availability of data on the variables The study utilizes timeseries data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin (2022). The dependent variable is the Exchange Rate (EXR), representing the official exchange rate of the Nigerian naira to the US dollar. The independent variables include Foreign Direct Investment (FDI), measured as the annual inflows of foreign direct investment in Nigeria (in millions of US dollars); Exports (EXP), capturing the total value of exports (both oil and non-oil), expressed in millions of US dollars; and Agricultural Outputs (AGOUT), representing the total value of agricultural production, measured in constant prices to adjust for inflation.

3.2 Model Specification

To investigate the relationship between agricultural output and exchange rate, the study adopts an econometric model as expressed in equation 2. The functional relationship is presented in equation 1.

Where;

 $EXR_t = Exchange Rate at time t$

 $FDI_t = Foreign \ Direct \ Investment \ at \ time \ t$

 $EXP_t = Exports of Goods and Services at time t$

 $AGOUT_t = Agricultural Outputs at time t$

 $\beta_0 = is$ the constant term

 $\beta_1, \beta_2, \beta_3 = Coeeficients of the independent variables$

 $\varepsilon_t = Error term$

ln = Natural log

3.3 Analytical Technique

The study employs the Autoregressive Distributed Lag (ARDL) modelling approach proposed by Pesaran, Shin, and Smith (2001). The ARDL technique was chosen due to its suitability for analyzing time-series data with variables integrated at different levels,



provided none of the series is integrated beyond first difference, I(1). The stationarity of the variables was determined through the Augmented Dickey-Fuller (ADF) test, which revealed all the series to be stationery at first difference. Hence, the use of ARDL. From equation 1, the ARDL equation for testing the existence of long-run relationship among the variables can be expressed as presented in equation 3:

$$\begin{split} \Delta EXR_t &= \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta EXR_{t-i} \sum_{i=1}^n \beta_{2i} \Delta lnAGOUT_{t-i} + \sum_{i=1}^n \beta_{3i} \Delta lnEXP_{t-i} \\ &+ \sum_{i=1}^n \beta_{4i} \Delta lnFDI_{t-i} + \alpha_1 EXR_{t-1} + \alpha_2 lnAGOUT_{t-1} + \alpha_3 lnEXP_{t-1} \\ &+ \alpha_4 lnFDI_{t-1} + \varepsilon_t \dots \dots \dots 3 \end{split}$$

Equation 2 is the ARDL unrestricted error correction regression model that tests the long-run level relationship hypotheses:

$$\begin{split} H_0: \alpha_1 &= \alpha_2 = \alpha_3 = \alpha_4 = 0 \ (Long \ run \ relationship \ does \ not \ exist) \\ H_1: \alpha_1 &\neq \alpha_2 \neq \alpha_3 \neq \alpha_4 = 0 \ (Long \ run \ relationship \ exists) \end{split}$$

The ARDL technique offers several advantages, including its ability to estimate short and long-run relationships simultaneously and its robustness when applied to small sample sizes (Nkoro & Uko, 2016). If the long run relationship is determined, the long run and short run coefficients of the variables are estimated using equation 4 and 5, respectively (Yakubu et al., 2015).

4.0 Findings and Discussion

The analysis begins with stationarity tests of the variables using the Augmented Dickey-Fuller (ADF) technique. The results confirmed that all the variables: Exchange Rate (EXR), Agricultural Output (AGOUT), Foreign Direct Investment (FDI), and Exports (EXP), were



stationary at first difference. These findings, as shown in Table 1, established that the variables were integrated of order (1). Stationarity at first difference is crucial in time-series analysis as it eliminates spurious results and ensures reliable estimation of the relationship among the variables (Nkoro & Uko, 2016).

Table 1: Augmented Dickey-Fuller Stationarity Test

Series	ADF Test Statistics	P - Value	Order of Integration
EXCR	-4.904674***	0.0004	I(1)
AGR	-5.616610***	0.0001	I(1)
EXP	-4.953390***	0.0003	I(1)
FDI	-11.46416***	0.0000	I(1)

Note: *, **, *** denote 10%, 5%, and 1% level of significance, respectively

The Bounds Test approach was employed to determine the presence of a long-run relationship among the variables. The F-statistics of 4.926987, as presented in Table 2, exceeded the upper critical bound at 2.5% significance level, confirming the existence of cointegration. This implies that a long-run equilibrium exists between the dependent variable (EXR) and the independent variables (AGOUT, FDI, and EXP). The confirmation of cointegration justified the estimation of both the long-run and short-run models, as the ARDL framework effectively handles such relationships (Pesaran, Shin, & Smith, 2001).

Table 2. ARDL bound Test Results	Table 2:	ARDL	Bound	Test	Results
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Variables	F - Statistics	Lag	Level of Significance	Lower Bound	Upper Bound
				<i>I</i> (0)	I(1)
F(EXCR,AGR,EXP,	4.926987**	2	10%		
FDI,)				2.72	3.77
			5%	3.23	4.35
			2.5%	3.69	4.89
			1%	4.29	5.61

Note: ** denotes 5% level of significance

The long-run estimation results, presented in Table 3, revealed that Agricultural Output (AGOUT) had a statistically significant and negative impact on the Exchange Rate (EXR) at the 5% significance level. Specifically, a 1% increase in AGOUT was associated with a reduction in EXR by approximately 4 units. This finding aligns with theoretical expectations that increased agricultural output reduces the demand for foreign currency, particularly for food imports, thereby alleviating pressure on the exchange rate. For Foreign Direct Investment (FDI) and Exports (EXP), the long-run results indicated negative coefficients as well, suggesting their potential to reduce the exchange rate. However, these effects were



statistically insignificant. The negative coefficients for FDI and EXP suggest that inflows of foreign capital and higher export revenues could provide foreign currency reserves, stabilizing the exchange rate. Nonetheless, the lack of statistical significance imply that the magnitude of these effects is insufficient or subject to external factors such as trade imbalances and global economic conditions.

I	e ,		
Variable	Coefficient	T- statistics	P-Value
AGR	-3.929060	2.372282	0.0254**
EXP	-0.903641	-1.406440	0.1714
FDI	-1.009173	-0.919499	0.3663

 Table 3: ARDL Long Run Estimation Results

 Dependent Variable: Exchange Rate (EXR)

Note: *, **, *** denote 10%, 5%, and 1% level of significance, respectively

The short-run results, as shown in Table 4, presented a contrasting dynamic. Agricultural Output (AGOUT) exhibited a positive and significant impact on the Exchange Rate (EXR) at the 5% significance level. Similarly, Exports (EXP) demonstrated a significant positive effect at the 10% level. This finding suggests that in the short-run, an increase in agricultural output and exports lead to increase in the exchange rate. It implies that foreign currencies would appreciate against the Naira with increase in agricultural output. The finding contradicts previous studies such as Adekunle and Salisu (2021), Nwafor and Obinna (2022), and Kraipornsak (2020). One of the possible reasons for this contradiction could be the time lag needed for adjustment before agricultural output begins to exert influence on exports, and consequently on the exchange rate. The long-run result buttresses this position. On the other hand, Foreign Direct Investment (FDI) revealed an insignificant negative effect on the exchange rate in the short run. This result indicates that FDI inflows reduce the exchange rate, though insignificant as in the long-run results. The consistently negative and insignificant impact of FDI in the long and short run could be that the volume of FDI inflows might not be substantial enough to create a significant impact on the exchange rate. When FDI inflows are relatively small compared to the total capital flows in the economy, their effect on the exchange rate can be minimal and statistically insignificant (Elmawazini et al., 2015).



Dependent Variable: Ex	change Rate (EXR)		
Variables	Coefficients	T- Statistics	P-Value
AGR	0.579551**	2.362399	0.0259
EXP	0.217751*	1.994343	0.0567
FDI	-0.07891	-0.7521	0.4587
ECT t-1	-0.147504**	-2.213077	0.0359
R-square	0.501527		0.181478
F-statistics	4.359881**		0.003567
DW-statistics	2.154598		

Table 4: ARDL Short Run Estimation Results
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Note: *, **, *** denote 10%, 5%, and 1% level of significance, respectively

The Error Correction Term (ECT), a critical component of the ARDL framework, fulfilled all three conditions, negative, significant, and less than one. The ECT coefficient indicates the speed of adjustment to equilibrium following a shock. In this study, the significance and appropriate sign of the ECT implies that deviations from the long-run equilibrium are corrected in subsequent periods with a speed of 14%, reinforcing the robustness of the model. The Durbin-Watson (DW) statistic of approximately 2.1 indicates the absence of serial autocorrelation, further validating the reliability of the model. Additionally, the R-squared value of 0.50 suggests that the independent variables explain 50% of the variation in the exchange rate. While this level of explanatory power is moderate, it underscores the importance of other macroeconomic factors not included in the model, such as inflation, monetary policy, and crude oil prices.

The results of this study have several important implications for policy and practice in Nigeria. The significant negative impact of agricultural output on the exchange rate in the long run underscores the potential of agriculture as a stabilizing force for the Nigerian naira. Policies aimed at boosting agricultural productivity and self-sufficiency can reduce dependence on food imports, thereby easing pressure on foreign reserves and stabilizing the exchange rate. Furthermore, the insignificant effects of FDI in both the short and long run suggest a need to attract and channel foreign investments toward productive sectors, including agriculture. Investments that focus on enhancing agricultural value chains and infrastructure can amplify the sector's contribution to exchange rate stability. The study emphasizes the importance of integrated macroeconomic policies that align agricultural development with exchange rate management. Addressing structural issues such as poor infrastructure, limited access to finance, and inefficiencies in agricultural markets is critical for realizing the full potential of agriculture in stabilizing the exchange rate.

5.0 Conclusion

The study investigates the impact of agricultural output on the exchange rate in Nigeria. The study utilizes annual data on Exchange Rate, Agricultural Output, Exports of Goods and Services, and Foreign Direct Investment (FDI) from the Central Bank of Nigeria 2023



Statistical Bulletin for the period 1985-2022. The findings of the demonstrate the vital role of agriculture in shaping Nigeria's exchange rate dynamics. While the long-run results underscore the stabilizing impact of agricultural output, the short-run effects reveal the contrary. Generally, the study highlighted the need for deliberate government intervention in agriculture, which the Government can leverage to achieve sustainable exchange rate stability and broader economic resilience. The study recommends future studies on the impact of different agricultural sub-sectors (e.g., cash crops, food crops, livestock) on the exchange rate to identify which sectors have the most significant influence and how they contribute to exchange rate stability. This would guide appropriate and specific government intervention.

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