AGRICULTURAL NON-OIL EXPORT AND INTERNATIONAL RESERVE ACCUMULATION IN NIGERIA

Dr. ADEBAYO A. T.
Department of Finance, Crescent University, Abeokuta

&

Prof. OLOYEDE J. A.
Department of Finance, Ekiti State University, Ado Ekiti

ABSTRACT

The foreign reserve of Nigeria has been fluctuating with time largely due to over dependence in crude oil earning. So it was the need to diversify its export and income base of the country. In this paper, the investigation of the non-oil export of agriculture and foreign currency accretion of international reserves was carried out in Nigeria during the period 1986-2023. These data were culled from World Development Indicators and the annual bulletin of the Central Bank of Nigeria, 2023, whose analysis was carried out by the Autoregressive Distributed Lag (ARDL). In the results part, it was established that, agricultural export, trade balance and degree of openness had a positive and significant (Prob. < 0.05) effect on accumulation of the international reserves, exchange rate had an insignificant effects, and external debt had significant negative effect on accumulation of international reserves. The study recommended that the government should aim to put in the required input along with the required investment that can assist in enhancing further accumulation in the agricultural export so that it can pile up a reserve in the nation.

Keywords: *Agricultural Non-oil Export, International Reserve Accumulation, Trade Balance, Degree of Openness Exchange Rate, External Debt*

1.0 INTRODUCTION

Nigeria stands as Africa's leading oil producer and has long relied on crude oil exports as a primary source of revenue and foreign exchange earnings (Ezenekwe, 2018; Titus & Muhammed, 2017; Abayomi et al., 2015). Despite this substantial endowment, the anticipated broad-based economic prosperity from oil wealth has remained elusive (David & Baba, 2021). A contextual analysis of Nigeria's export structure reveals a dual system, comprising oil and non-oil exports, though the former has overwhelmingly dominated since the 1970s. The discovery and commercialisation of crude oil led to the marginalisation of the non-oil sector, which had previously sustained Nigeria's economy in the early post-independence period (Nwolisa et al., 2023).

This overdependence on oil has made Nigeria vulnerable to the volatility of global oil markets, triggering macroeconomic instability and fiscal imbalances. In response, successive governments have acknowledged the necessity of economic diversification to mitigate risks associated with oil price shocks. The global decline in oil prices in recent years has further highlighted the fragility of oil-dependent economies and underlined the urgency of expanding the non-oil export base. From an economic standpoint, the export of goods and services remains a critical mechanism for generating foreign reserves. In resource-rich economies like

Nigeria, oil and non-oil exports represent the two primary channels for foreign exchange accumulation (Nnamaka et al., 2021). However, empirical evidence shows that over 90% of Nigeria's foreign reserves are derived from oil exports (Akighir & Kpoghul, 2020), with non-oil exports often underestimated in terms of their potential contribution to reserve growth (Inam & Oscar, 2018).

In light of this, the federal government has increasingly prioritised the promotion of non-oil exports, particularly in agriculture, as part of its economic diversification agenda. Non-oil exports such as cocoa, palm oil, and rubber have historically played a crucial role in Nigeria's external trade and remain viable channels for foreign exchange earnings (Uzoma & Okidim, 2021). As noted by Khalek and Rizk (2023), the accumulation of international reserves serves as a macroeconomic buffer, particularly in emerging economies. It helps mitigate the impact of financial crises, stabilise exchange rates, and safeguard against capital flight. However, the capacity of a nation to build and sustain its reserves is directly linked to the strength and diversity of its export base. In this regard, modern reserve management strategies advocate for robust trade performance as a prerequisite for sustainable reserve accumulation (Krugman et al., 2014).

Despite deliberate efforts by the Nigerian government to diversify the economy and strengthen the non-oil sector, the country's reserve profile remains suboptimal. As of 2020, Nigeria's foreign reserves were estimated at approximately USD 35 billion. The COVID-19 pandemic further exacerbated this situation, as declining oil prices constrained the inflow of export revenues (Awoderu et al., 2022). This underscores the urgency of identifying alternative export pathways, with non-oil agricultural exports emerging as a viable option. Existing literature presents mixed findings regarding the relationship between non-oil exports and international reserve accumulation. Studies by Awoderu et al. (2022), Nnamaka et al. (2021), Uzoma and Odungweru (2021), and Akighir and Kpoghul (2020) offer varied conclusions, with no clear consensus on the long-term contribution of non-oil exports to reserve build-up. These inconclusive outcomes point to a significant gap in the literature, justifying the need for further empirical investigation.

Moreover, several macroeconomic variables are believed to influence reserve accumulation either directly or indirectly. These include trade balance (which captures the net effect of exports and imports), trade openness (which reflects the degree of integration into global markets), external debt (which constrains reserve accumulation capacity), and the exchange rate (which affects the relative value of reserves). The inclusion of these variables provides a comprehensive framework for assessing the determinants of reserve build-up in Nigeria. While prior studies have largely focused on the link between non-oil exports and overall economic growth, often using GDP as a proxy, this study seeks to narrow the scope by specifically examining the role of agricultural non-oil exports in the accumulation of international reserves. These will contribute to the literature by addressing an underexplored dimension of Nigeria's economic diversification strategy.

2.0 LITERATURE REVIEW

2.1 Agriculture Non-Oil Export

Nigeria has agriculture taking up a leading position in the non-oil trade sector of the country and the industry is one of the biggest exports of Nigeria. The agricultural industry of Nigeria is diversified and consists of such products as cash crops and basic food. They are also mandatory in the non-oil trade of a nation being contributive to export earnings as well as beneficial to the agrarian economy (Nnamaka, et al., 2021; Uzoma & Odungweru, 2021). Nigeria is not an oil exporter hence the three big non-oil crops include; Cash Crops, Grains and Vegetables and Fruits. However, there are very good chances that some products in Nigeria that relate to the agricultural sector can be exported based on several reasons that have made Nigeria to be in a very good position in the world economy. These as seen in study by Adegboyo et al. (2019) are Large Population, Arable Land, Favourable climatic conditions, Value addition and processing and Market demand:

2.1.2 International Reserves Accumulation

During such acquisition, the amount of foreign exchange reserve of Nigeria is enhanced at a given period and thus, it is known as international reserves accumulation as Nnamaka et al. (2021) observe. It is comprised of purchases of foreign currency assets through various forms such as trade surpluses and other forms involving foreign direct investment and remittance in addition to other forms of purchases to boost the external balance of the country to bring about financial stability. International reserves hoarding is of special concern to oil producing nations and that is including Nigeria due to their susceptibility in the changes in oil prices and oil markets, shocks. A research study (Nwafor, 2017) has stated that a nation that has a strong international reserves is able to maintain a stable exchange rate, and more likely to receive foreign direct investment and it is also in a position to finance nervous foreign purchases in instances where economy is facing stressful times.

2.2 Empirical Review

Abina (2023) discusses the problems that confront Nigeria in the form of adequate reserves and introduction of structural changes so that the economy can be diversified and less dependent on imports and have the capacity to attract foreign direct investment also. The analyses which were grounded on the previous research were content analyses. The result revealed that weaknesses of fiscal discipline, inadequacy of foreign exchange supply and stability of the business environment has caused the losses that the Nigerian exchange rates have incurred, which in turn reduces the build up of the foreign reserve by the nation. In this path, they stated that there is an imperative need to get out of oil and into agro-mechanised industry and the re-engineering of financial system in support of the non-oil sector of the economy and the needed support.

In their analysis, Nwolisa et al. (2023) are trying to bring their observation based on non-oil export and how it impacts the volatility of exchange rate between 1981-2021. Volatility of exchange rate, volatility of non oil export, aggregate expenditure of the government, inflow of foreign investment and interest rate were the used variables. The applied method of analysis was ARDL and it indicated that non-oil export is negatively caused by exchange rate volatility. The reorganization of the economy was suggested to get back to her desirable state and it demands substantial investments in non-oil sector.

Shiro et al. (2023) utilized statistics on the determination of the impact of non-oil exports on the Nigeria economy between the year 1981 and 2020 to assist a study. It involved application of ARDL Co-integration. The F-statistic was used to confirm the long-term of the variables. They discovered that, the oil exports, non oil exports and exchange rate had no source of influencing growth prospect of Nigeria. However, R2 covers 79 percent of the independent factors.

The work of the authors was directed to the price which the emerging and developing economies had to pay in terms of accumulation of international reserves during 1990-2018 (Khalek and Rizk, 2023). The techniques of estimation that were used include panel regression analysis. As compared to the level that they require the funds, it was discovered that the cost accessing the international reserves as a way to protect them, in the emerging economies and the developing ones, is very high. More so, the report revealed that majority of the countries considered in the analysis had its precautionary reserve either very low especially in the year 2018 that made their external short-term debts to rise. They claimed that the emerging as well as the developing economy have to complement self-protection policies, which are implemented and restrict the liquidity management plan in order to make possible utilization of the reserve through crystallizing it in the shape of productive investment.

Benzarti and Tazhitdinova (2020) studied the impact of the introduction of value added tax on the level of trade between many countries across the EU between the years 1988 and 2016. Based on the levels of nomenclature that was gathered, they were classified and the panel regression model applied on them.

The finding was that the imposition of VAT did not yield any observable influence on the movement of trade, during the time of study. As per the results of the fixed effect regression model, the differences in VAT did not make significant changes in exports or imports; regardless of the countries of interest, the modifications of the reforms or the periods. In their study, Djatmiko and Sbm (2019) were trying to explore how oil and non-oil exports may be used to increase international exchange reserves and their work was conducted in the Indonesian language. This was offered in the period of 1996 to 2017. The learned techniques were the descriptive and OLS estimation techniques. Foreign exchange reserves, and oil and non oil and gas export were the regression variables. There was direct and parsimonious relationship between Indonesian and the foreign exchange reserve as shown by oil and non-oil and gas exportation.

3.0 METHODOLOGY

Annual data between 1986 and 2023 is considered based on CBN Bulletin 2023 and WDI, 2023 and 1984 was found to be used as the base, since things come to the fore since then or different financial reforms that have been done in the country since the SAP period and the inclusion of 2023 is because it gives a chance to see the current state of affairs on the topic of research. On the study the estimation variants that will be applied to check the long run relationships on the variables are Autoregressive Distributed Lag.

3.1 Model Specification

Since the research would examine the situation of agricultural non-oil export and international reserves formation in Nigeria, the study breakdown the model developed by Shiro et al. (2023) applied in analysing the efficiency of non-oil in enhancing economic growth in Nigeria. Paragraph The model developed by Shiro et al. (2023) can be presented in the form of:

$$RGDP = f(NONX, OILX, EXR, INF) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

RGDP is Real Gross Domestic Product; OILX is Oil Revenue; NONX is Value of non-oil Exports;
EXR is Exchange Rate; INF is Inflation Rate; descriptive notation.
This work has its model defined as follows.

$$\text{INTRA} = f(AGEX, TBAL, DOP, EXGR, EXD) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

In a more econometric form, the specified equations can be express as:

$$\text{INTRA} = \beta_0 + \beta_1 AGEX + \beta_2 TBAL + \beta_3 DOP + \beta_4 EXGR + \beta_5 EXD + \mu \ldots\ldots\ldots\ldots 3$$

Where: INTRA is International Reserves Accumulation; AGEX is Agricultural Export; TBAL is Trade
Balance; DOP is Degree of Openness, EXGR is Exchange Rate; ED is External Debt and as defined
Above; β_0 is Intercept, $\beta_{1\text{-}5}$ are Coefficient of the Estimates, is Error Term.

4.0 RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1: Descriptive Statistics of Variables

	INTRA	AGEX	TBAL	DOP	EXGR	EXD
Mean	16.96857	24.65436	13.16100	4.678565	4.28347	7.209417
Median	17.24127	24.79482	13.45017	5.400664	4.84601	6.866596
Maximum	24.21712	25.53634	15.88308	6.699762	6.45943	10.41178
Minimum	12.14158	23.63773	7.985144	-0.022149	1.19894	3.724546
Std. Dev.	2.366720	0.679435	2.151816	1.743157	1.43682	1.516816
Skewness	0.261223	-0.123378	-0.580426	-1.106055	-0.64466	0.068152
Kurtosis	3.692977	1.377386	2.255135	3.183476	2.25283	2.604219
Jarque-Bera	1.192514	4.265127	3.012136	7.801230	3.51593	0.277434
Probability	0.550870	0.118533	0.221780	0.020229	0.17240	0.870474
Sum	644.8057	936.8656	500.1182	177.7855	162.772	273.9579
Sum Sq. Dev.	207.2504	17.08039	171.3216	112.4280	76.3855	85.12703
Observations	38	38	38	38	38	38

Source: *E-view 12 (2025)*

As can be seen in the table of descriptive statistics (Table 1), the mean value of INTRA = 16.96857 and the range of values is 12.14158 to 24.21712. The mean Agricultural export (AGEX) is 24.65436 and the low and high point are 23.63773 and 25.53634, the average of Trade balance (TBAL) is 13.16100 and the low to high values are 7.985144 to 15.88308 and the degree of Openness (DOP) on the other hand averages 4.678565 with low and high values of – Skewness and kurtosis, INTRA, have the reflection of the normal skewness and it is leptokurtic (fat-tailed) as it is more than 3. The negative, platykurtic (1.37 < 3), negative and platykurtic (2.25 < 3), negative and leptokurtic (3.18 < 3), negative and platykurtic (2.25 < 3)

and positive and platykurtic (2.60 < 3) skewing of AGEX, TBAL, DOP, EXGR and EXD respectively. The Jarque-Bera statistic value 224.87 indicated that degree of openness are not normally distributed in the meanings that their probability value less than 5% in contrast to all the other variables which are normally distributed which include agricultural export, trade balance, exchange rate and external debt.

4.2 Correlation Analysis

Table 2 Correlation Analysis

	INTRA	AGEX	TBAL	DOP	EXGR	EXD
INTRA	1	0.607852	0.680504	0.886128	0.701348	0.729692
AGEX	0.607852	1	0.763232	0.886906	0.626444	0.712312
TBAL	0.680504	0.763232	1	0.863217	0.790031	0.499409
DOP	0.886128	0.886906	0.863217	1	0.650993	0.769237
EXGR	0.701348	0.626444	0.790031	0.650993	1	0.85808
EXD	0.729692	0.712312	0.499409	0.769237	0.85808	1

Source: *E-view 12 (2025)*

Table 2 presents the correlation interpretation of non-oil export and building up of international reserves in Nigeria. The result revealed that there exists a great positive correlation between INTRA and the other variables. The correlation values between AGEX, TBAL, DOP, EXGR and EXD and INTRA are 0.607852, 0.680504, 0.886128, 0.701348 and 0.729692 respectively. All the variables are positively related to AGEX. AGEX correlation value of AGEX with rest of the variables are 0.763232, 0.886906, 0.626444 and 0.712312 respectively. The findings of the correlation analysis implied that, the aspects of the models would be emphasized as good predictors of non-oil export and accumulation of international reserves in Nigeria.

4.3 Test for Stationary of Variables (Unit Root Test)

Table 3: ADF Unit Root Test

Variables	**ADF**			**Integration Order**
	Critical values @5%	**t- statistics**	**Prob.**	
INTRA	-2.943427	-3.651866	0.0094	I(1)
AGEX	-2.945842	-5.673193	0.0000	I(1)
TBAL	-2.948404	-6.890033	0.0000	I(1)
DOP	-2.943427	-3.666719	0.0089	I(0)
EXGR	-2.945842	-5.764158	0.0000	I(1)
EXD	-2.945842	-4.373255	0.0014	I(1)

Source: *Researchers' Computation, 2023*

The table 3 also revealed that DOP was in stationary (in the first differences) and the other variables (INTRA, AGEX, TBAL, EXGR, EXD) were not in stationary but after first differences they were in stationary. With this outcome, this research employed ARDL in calculating it.

4.4 Lag Length Selection

To find out whether or not there is any long-run relationship that exists between the variables, the study used the ARDL as far as the unit root test of conduct established the existence of intermixed order of integration of the variables. However, sensitivity exists in performing the ARDL to lie length based on any of the criteria put forward in the lag selection criteria.

Table 4: Optimal Lag Length for the Four Models

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-202.4302	NA	0.005995	11.91030	12.17693	12.00234
1	-27.70202	279.5651	2.23e-06	3.982972	5.849390*	4.627259
2	13.31147	51.55981	2.03e-06	3.696488	7.162692	4.893021
3	76.77708	58.02571*	7.40e-07*	2.127024*	7.193015	3.875803*

Source: *E-view 12 (2025)*

The selection of lag order that came in Table 4 showed that in model 1 of the five (5) suggestions in the criteria three (3) of them preferred Lag 3 and the other one (1) preferred lag 1. This is the reason why lag 3 was employed This was therefore being put into consideration when conducting the analysis of the short and long run ARDL outcome.

4.5 ARDL Bound Test Approach to Co-integration

Table 5: Co-Integration Result for the Four Models

F-Statistics	Lower Bound (5%)	Upper Bound (5%)
5.094837	2.39	3.38

Source: *E-view 12 (2025)*

According to the Table 5, study hypothesized the long run relationship between the explained and explained variables as F- Statistic is higher than the 5% upper bound value. Hence, long term confirmed relationship for the model. Thus, the long run coefficients were then, meaningful to the outcome discourses.

4.6 Long-Run Results

The long run outcome and it was given in table 4.10 involving ARDL technique:

Table 6: Long Run Result

Dependent Variable: INTRA

Long-run ARDL Result				
Variable	Co-efficient	Std. Error	T-Statistics	Prob.
AGEX	1.572858	0.697321	2.255572	0.0338
TBAL	1.311791	0.565130	2.321219	0.0284
DOP	1.431749	0.552871	2.589663	0.0155
EXGR	1.338966	0.952973	1.405041	0.1718
EXD	-0.796829	0.396221	-2.011072	0.0548
C	-10.502788	20.531401	-0.511548	0.6133
Short-run ARDL Result				
D(AGEX)	1.803461	1.392237	1.295369	0.2066

D(TBAL)	0.374329	0.116393	3.216073	0.0035
D(DOP)	0.006353	0.328236	0.019354	0.9847
D(EXGR)	-0.031449	0.533407	-0.058959	0.9534
D(EXD)	-0.636540	0.346066	-1.839357	0.0773
CointEq(-1)	-0.760994	0.109334	-6.960284	0.0000

Source: *E-view 12 (2025)*

The short and long run relationship between non-oil export (agriculture) and international reserve in the accretion in Nigeria was depicted in table 6. The coefficient of constant parameter resulted to be -10.502788 and this meaning that in a long run when all the variables are to be held constant INTRA will be but -10.502788. Also, in long-run, the coefficient of agricultural export is quite positive with high value of 1.572858. This implied that unit increase of agricultural export will be associated with 1.572858-unit increments in the accumulation of international reserve in Nigeria. Similarly in Nigeria, there exist Ng high positive coefficient of the L 1.311791 units that exists amidst the trade balances and accumulation of the reserve. What the outcome meant was that as the trade balance moved one unit up to the righthand side of the result table, there would be one and three tenths one unit increase in accumulation of reserves in Nigeria. Further, such big significant coefficient value of degree of openness of 1.431749 units with international reserve build up is also there. This will imply that rise in the level of openness will imply rise of 1.431749 unit on the reserve accumulation in Nigeria.

The exchange rate on the other hand is very significant and its coefficient on accumulation of international reserve is 1.338966 units. Here it implied that the one unit rise in the exchange rate will result in the one unit rise in the reserve accumulation in Nigeria. On contrast, the external debt is quite negatively correlated with international reserve to the limit of -0.796829 unit respectively. It would translate to the fact that when the level of external debt would increase by 1 unit then, it would result in a decrease in the accumulation of the reserve in Nigeria by 0.796829 units.

The result was -0.760994 units by specifying the coefficient of the error correction mechanism which depicts the rate of correction of the short and long-run. This value implied that long-run was used to take care of short-run inconsistencies with almost 76 percent of the short-run inconsistencies being addressed. This implies that model is comparatively quick to respond to short-run deviation. Similarly, the sign of this coefficient is also significant because the value of this coefficient is negative.

4.7 Diagnostic Tests

Table 7 ARDL Diagnostic Test

Normality		
Stat.	Values	Prob.
Jarque-Bera	1.861641	0.394230
LM Serial Correlation		
Stat.	Values	Prob.
Obs*R^2	1.22217	0.1809
Heteroskedasticity		
Stat.	Values	Prob.

Obs*R^2	25.74397	0.8641

Source: *E-view 12 (2025)*

Table 7 showed the diagnostic test that was performed on the model and it portrayed that the three estimations fit well. Lastly, there is not a single inference of serial correlation, absence of heteroskedastic problems too and also the data are normally distributed.

4.8 Stability Test Results

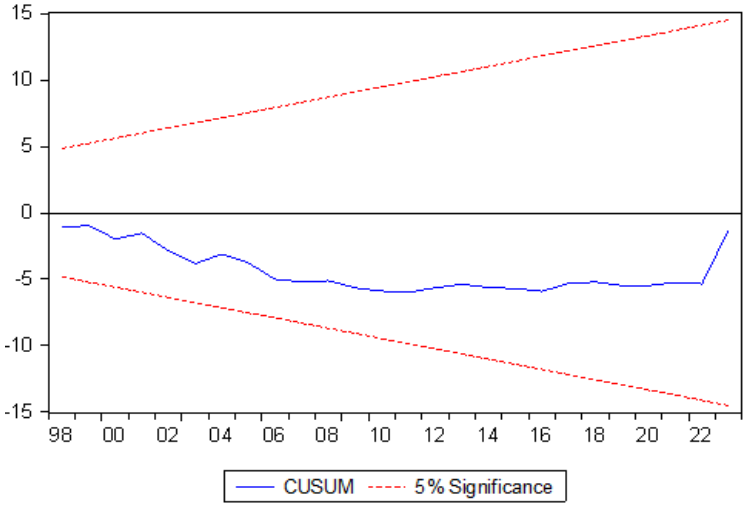

Figure 1 Stability Test

The table 7 showed the diagnostic test that was conducted on the model and it showed that the three estimations are well fit. Lastly, it does not have serial correlation issue, heteroskedasticity is not present and it has the normality of the data.

4.9 Discussion and Implication of Findings

This study examined the effect of non-oil agricultural exports on the accumulation of international reserves in Nigeria. The regression results indicate that non-oil agricultural exports exert a statistically significant and positive influence on international reserve accumulation. This outcome aligns with theoretical expectations and supports the findings of previous empirical studies such as Awoderu et al. (2022), Nnamaka et al. (2021), Uzoma and Odungweru (2021), Akighir and Kpoghul (2020), Djatmiko and SBM (2019), Ozigbu (2019), and Adegboyo et al. (2019). The observed positive effect may be attributed to Nigeria's agricultural advantages, including a large population, abundant arable land, favourable climatic conditions, rising demand for value-added agro-exports, and improved processing capacity.

However, the result contrasts with the submissions of Okoli et al. (2023), Bassey et al. (2019), Yaya (2018), Anthony et al. (2012), and Irefin and Yaaba (2011), who documented a negative relationship between agricultural exports and reserve accumulation. These contrary views emphasize challenges such as poor management of agricultural inputs, misappropriation of sectoral funds, import dependence, and increasing costs of production, especially in the wake of subsidy removals, leading to a diminished contribution of agriculture to reserve buildup.

Furthermore, the study finds that both trade balance and the degree of openness significantly and positively affect the accumulation of international reserves. The implication is that a favourable trade balance, where exports exceed imports, enhances a country's ability to grow its reserves. Similarly, greater trade openness, which promotes unrestricted cross-border trade flows, appears to facilitate reserve accumulation. These findings support the a priori expectations and are in consonance with earlier studies including those of Akighir and Kpoghul (2020), Djatmiko and SBM (2019), and Nteegah and Okpoi (2016).

Conversely, the coefficient of external debt was negative and statistically insignificant. This suggests that rising external debt burdens may have a dampening effect on reserve accumulation, consistent with economic logic and the study's theoretical assumptions. It implies that economies facing substantial external debt obligations are likely to divert resources toward debt servicing rather than reserve buildup, thereby weakening their reserve positions.

5.0 Conclusion and Recommendations

Based on the empirical findings of this study, it is concluded that non-oil agricultural exports, trade balance, and the degree of openness exert a positive and statistically significant influence on the accumulation of international reserves in Nigeria. These results align with theoretical expectations and previous empirical studies. Conversely, exchange rate was found to have no significant effect, while external debt exhibited a negative and statistically insignificant relationship with international reserve accumulation.

In light of these findings, the study recommends that the Nigerian government should intensify efforts to promote agricultural exports by providing the necessary inputs, subsidies, infrastructural support, and financial incentives to farmers and agro-exporters. Policies that enhance trade openness and improve the trade balance, such as export diversification, reduction of non-tariff barriers, and improvement of trade infrastructure, should also be prioritized. Furthermore, careful management of external debt is necessary to avoid adverse effects on reserve accumulation. These policy measures, if properly implemented, would strengthen Nigeria's external position and support macroeconomic stability.

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