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Nigeria's Financial Sector Development and Crude Oil Exports: Is There a Link?

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ABSTRACT

Using yearly data from 1986 to 2020, the study looked at whether the Nigeria's financial sector development is connected to the country's ever increasing crude oil exports. The results of the utilized autoregressive distributed lag model demonstrated that, both in the short and long periods, there is no connection between Nigeria's financial sector development and crude oil exports. Additionally, the research indicated that the country's financial system is not yet adequately established to sustain exports of goods other than crude oil in the short term.

Keywords: Financial sector development, Crude oil exports, Autoregressive distributed lag model, Nigeria

JEL Classifications: F12, G20, O16

1. INTRODUCTION

International trade is inseparable from financial sector development, as it signifies a source of comparative advantage that predicts trade flows. More specifically, theoretical evidence suggests that nations with a well-developed financial sector would always have comparative advantage in industries with high *scale economies*¹ and hence, exports more from these industries (Beck, 2002). Surprisingly, on the contrary, Nigeria has recorded an increased share of crude oil export in overall exports in the past decades, despite the underdeveloped state of the country's financial sector. More particularly, in the last six decades, the share of crude oil export in overall exports increased from 2.5% in 1960 to about 87.7% in 2020 (Central Bank of Nigeria, 2021). Although credit to the private sector as a share of Gross Domestic Product (financial sector development indicator) increased from 3.6% in 1960 to 11.2% in 2020 but has remained shallow and significantly less developed when compared to other developing economies. For instance, Malaysia's credit to the private sector as a share of GDP increased from 8.0% in 1960 to about 133.9% in 2020 (World Development Indicator, 2022).

However, the persistent decline in the proportion of non-crude oil exports to total exports is a significant issue that is grabbing the attention of academics and policymakers in Nigeria. For instance, the percentage of exports other than crude oil, which was 97.5% of total exports in 1960, decreased to roughly 12.3% in 2020. Although there have been recent efforts to diversify the export base away from crude oil to exports of non-crude oil products (including the adoption of a flexible exchange rate system and the provision of incentives to boost the production and export of non-crude oil products), this is reasonable given the vast and largely untapped employment opportunities in the non-crude oil exports sector, which might help to accelerate economic growth and reduce poverty in order to accomplish the United Nations' Sustainable Development Goals by 2030. But regrettably, these efforts did not provide the intended outcomes.

Undoubtedly, the level of financial sector development in the country may be accountable for the ongoing decline in the proportion of non-crude oil exports to total exports. The reason is not hard to find. Evidence implies that a strong financial system

may offer more credits to the private sector and assist in reducing the liquidity limitations that most businesses experience. As a result, the lack of a robust financial sector may result in a lesser quantity of credit that may not be sufficient to sustain trade, acting as a trade barrier that may stop a number of exporting enterprises that depend on external financing, from entering the global market. However, the steady rise in crude oil exports over the past few decades may have given the wrong impression to the government and policymakers that the country's financial sector is sufficiently developed to support trade, which may have prevented them from paying more attention to the financial sector's level of development. Besides, available evidence (Babatunde and Fowowe, 2010) has suggested that crude oil exports may be influenced by some fundamentals other than the levels of financial sector development. In particular, since crude oil exports in Nigeria are financed by trading partners, the local financial sector might not be connected to crude oil exportation.

Beck (2002) argued that manufacturing, agriculture and natural resources industries might all exhibit scale economies. Because of this, the main focus of this study is on whether the development of Nigeria's financial sector is related to crude oil exporting. Though attempts have been made to show how financial sector development impacted total merchandise exports of Nigeria and other Sub-Saharan African nations (Adeboje et al., 2021; Babatunde and Fowowe, 2010; Raifu and Folarin, 2020) however, these studies have serious flaws. The studies were conducted with the presumption that regardless of the export item, the effect of financial sector development on goods exported is the same. Sadly, this makes it impossible for us to independently assess how the financial sector's development has affected exports of crude and non-crude oil.

The study therefore adds to the literature in the following way:

The research investigates the separate effect of financial sector development on crude and non-crude oil exports in Nigeria. The results from our study demonstrate that, both in the short and long periods, there is no relationship between Nigeria's financial sector development and crude oil exports. Additionally, the research indicated that the country's financial system is not yet adequately established to sustain exports of goods other than crude oil in the short term. Furthermore, results show that Nigeria's financial sector development and non-crude oil exports do not move together in the long term. The following discussion is divided into four parts. In Section 2, the corpus of literature is addressed. Section 3 discusses the technique, data, and model. Section 4 discusses the empirical results, while Section 5 marks the conclusion of the study.

2. THEORETICAL AND EMPIRICAL LITERATURE REVIEW

2.1. Review of Theoretical Literature

Kletzer and Bardhan (1987) used the Heckscher-Ohlin trade model to demonstrate that industries that rely heavily on outside financing and are located in nations with strong financial sectors

will have comparative advantage, which clarifies the disparity in trade composition across nations. Another is Baldwin's theoretical viewpoint. Baldwin (1989) asserts that nations with robust financial sectors usually diversify their risks as they have greater chance to do so. Consequently, countries will specialize in manufacturing riskier items with minimal risk premiums. This hypothesis advanced by Kletzer and Bardhan (1987) was examined by Beck (2002). According to his theoretical model, bigger scale economies are more advantageous for nations with a more developed financial sector. Nations with greatly developed financial sectors would concentrate on industries with bigger scale economies as a result of comparative advantage. In particular, a relative high or low degree of financial sector development is connected with exporting more or less of manufactured goods.

2.2. Review of Empirical Literature

Adeboje et al. (2021) examined how the financial sector's development affects Nigeria's overall export. According to the study, the financial sector has a considerable and favorable long-term impact on overall merchandise export. Babatunde and Fowowe (2010) looked at the relationship between trade and the level of financial sector development in 22 Sub-Saharan African economies. The authors, however, were unable to prove a connection between the level of development of these nations' financial sectors and the total amount of exports they made. In terms of the development of the Croatian financial sector and openness to trade, Bilas et al. (2017) recently discovered the long-term and short-term linkages. The authors found that trade openness is positively and significantly impacted in the short run by Croatia's expanding financial sector. Though, the long-term effects are negative and severe. Beck (2002) investigated the relationship between the size of 65 countries' financial sectors and the export of manufactured products. The author's research indicates that countries with better developed financial sectors have an edge over others in the manufacturing sector and therefore export more newly produced commodities.

For six European countries, Caporale et al. (2022) looked into the flows of trade. The results showed that the financial sector has a long-term impact on trade variety and volume. The authors discovered that the financial sector had good long-term advantages on exports and trade openness; although, they are more noticeable in manufacturing trade than in the trading of agricultural commodities. Demir and Dahi (2011) explored how the degree of specialization in South-North and South-South exports across 28 developing countries was impacted by the financial sector's development. According to their degree of development, the South's financial sector has been shown to have a favorable and considerable impact on all items exported between South and South economies. However, it has been established that the financial sector has a negligible impact on exports between South and North countries.

For a panel of 87 OECD and non-OECD countries, Kim et al. (2010) examined the link between trade openness and financial sector development in terms of both their short- and long-term levels of development. The authors made the point that the degree of financial sector development in OECD nations had minimal

impact on trade openness over the short- and long-term. A more recent research, Kurul (2021), used a panel of 64 countries to assess the threshold impact of the financial sector's level of development on trade openness. The author discovered that, up to a limit in its expansion, the financial sector increases trade openness; nevertheless, beyond that point, further sector development results in a decline in trade openness. Raifu and Folarin (2020) looked at the connection between Nigeria's financial sector's development and the number of goods sold globally. It was important to find out that the financial sector's development had both a favorable long-term and short-term influence on total merchandise exports.

Sare et al. (2019) also looked at how the financial sector and global trade are related to each other's growth. The authors discovered that in a sample of 46 African countries, the financial sector's effect on global trade is negligible over both the long and short terms. In a panel of 29 African nations, Wamboye and Mookerjee (2014) investigated the connection between the expansion of the financial sector and exports of manufactured products. The study discovered that, as opposed to financial sector development being Granger induced by manufactured exports in 7 of the 29 nations, manufactured exports is Granger caused by financial sector development in 11 of the 29 nations.

3. MODEL, DATA AND METHODOLOGY

3.1. Model and Data

This study presents a model that connects the development of the financial sector, exports, and a number of other control factors. Beck (2002) served as a model inspiration. Thus,

$$EX_t = \alpha_0 + \beta FSD_t + \psi CV + \mu_t \tag{1}$$

Where EX stands for exports (of both crude and non-crude oil), FSD for financial sector development, CV for a group of control variables, and μ_t for error term. Official exchange rates between the US dollar and the Nigerian naira (OER), real GDP growth (RGDPG), and a dummy for the worldwide financial crisis (DUMWFC) serve as the controls. Theoretically, a decline in the currency rate should boost export business. Using the real GDP growth, the relationship between income growth and exports (of crude and non-crude oil) is taken into account. It is believed that rising exports should occur in tandem with rising income. Crude oil and non-crude oil exports are predicted to suffer as a result of the 2007 and 2008 financial crises, which may have decreased the country's export capacity by weakening its financial sector.

Natural logarithms were used to represent all variables, with the exception of the real GDP growth and dummy variables for the worldwide financial crisis. The analysis examined annual data from 1986 to 2020. The schedule was deliberately planned to coincide with the liberalization of international trade and the financial sector. Real exports, including real exports of crude and non-crude oil, were used in the study. To obtain the actual amounts, the nominal exports statistics from the CBN web database, 2021, represented in millions of Nigerian Naira, were deflated by the regional consumer price index (CPI). The information for the CPI was gathered using the WDI online database, 2022. The most

popular and often used statistic in the literature to determine how developed a financial sector is is the ratio of private sector credit to GDP acquired from the WDI online database, 2022. Since the US dollar is the most active currency in the Nigerian foreign exchange market, the official exchange rates between the Nigerian Naira and the US dollar are utilized. The CBN online database, 2021, provided information on the official exchange rates between the Nigerian Naira and the US dollar. The WDI's online database, 2022, provided information on real GDP growth. The financial crisis indicator is set to 1 for the 2007–2008 global financial crisis; otherwise, it is set to 0.

3.2. Methodology

The autoregressive distributed lag (ARDL) model, developed by Pesaran and Shin in 1995, is the estimate technique. This model allows us to report on the short and long-term effects of financial sector development on exports (of crude and non-crude oil). Its advantages over other estimate algorithms are larger since it can handle I(1) and I(0) variables. When there is a tiny sample size, Monte Carlo simulation has demonstrated that results are objective (Ahmad et al., 2017; Pesaran and Shin, 1995). It successfully fitted endogenous variables because it can handle endogeneity issues when more lags of variables are considered, improving the model's dynamism (Pesaran and Shin, 1995; Vuong et al., 2019). It also provides short-run dynamics with a straightforward linear function responsive to error correction.

As a result, Equation (1) is revised to use the ARDL form.

$$\begin{aligned} \Delta EX_t = & \alpha + \vartheta_1 EX_{t-1} + \vartheta_2 FSD_{t-1} + \vartheta_3 OER_{t-1} \\ & + \vartheta_4 RGDPG_{t-1} + \vartheta_5 DUMWFC_{t-1} + \sum_{i=1}^p \delta_i \Delta EX_{t-i} \\ & + \sum_{i=0}^p \gamma_i \Delta FSD_{t-i} + \sum_{i=0}^p \lambda_i \Delta OER_{t-i} \\ & + \sum_{i=0}^p \sigma_i \Delta RGDPG_{t-i} + \sum_{i=0}^p \xi_i \Delta DUMWFC_{t-i} + \mu_t \end{aligned} \tag{2}$$

Where the representation of the first difference operator is Δ ; the long-term projections are displayed by $\vartheta_i \forall i = 1-5$; the short-term forecasts are $\delta, \gamma, \lambda, \sigma, \xi$. The lag lengths are chosen ideally using the least lag number from the SIC, AIC, and HQ, as per Vuong et al. (2019). To establish the existence of long-run connections, an F-test for the combined significance of the coefficients of the lagged level series in Equation (2) is conducted. The null hypothesis $H_0: \vartheta_1 = \vartheta_2 = \vartheta_3 = \vartheta_4 = \vartheta_5 = 0$ is tested alongside the other hypothesis, $H_0: \vartheta_1 \neq \vartheta_2 \neq \vartheta_3 \neq \vartheta_4 \neq \vartheta_5 \neq 0$. For decision criteria, the boundaries (lower and upper) critical values of a known significance level proposed by Pesaran et al. (2001) are used.

4. DISCUSSION OF EMPIRICAL RESULTS

Before completing model estimate, we carefully reviewed the descriptive statistics and the stationarity of the study's variables. Table 1 lists the properties of sample statistics, including the

standard deviation, mean, and median. The variables' closeness to their median and mean demonstrates that they have a normal distribution. This implies that the variables are also quite reliable. Furthermore, the fact that the standard deviations of the variables are relatively small suggests that the actual data in the variables does not deviate significantly from their mean value.

We utilize the correlation matrix to further determine whether or not the independent variables are connected. None of the criteria shown in Table 2 clearly show that they are significantly linked. The models are hence devoid of the multicollinearity problem.

The ADF test findings in Table 3 show that RNCOEX, RCOEX, FSD, and OER are I(1) variables after their initial difference when tested with intercept alone and concurrently when tested with linear trend and intercept. RGDPG and DUMWFC are I(0) variables because they are stationary in their initial values.

The Phillips-Perron test demonstrates that after a single difference, RNCOEX, RCOEX, FSD, OER, and DUMWFC become stationary. RGDPG stays steady at its initial levels. However, the ADF test may not properly reject the null hypothesis if there is a significant discontinuity in a series. This research therefore accepts the results of the Phillips and Perron (1988) test, which refuted the ADF test.

Now, it is crucial to construct precise lag duration for the ARDL models indicated in Equation (2) in order to prevent inaccurate

findings. As seen in Table 4, SIC has a minimum lag time of 1, making it appropriate for Equation (2). Following the selection of the suitable lag periods, we apply the models to determine the long-term relationships among the variables. The predicted F-statistic from model 2 in Equation (2) is clearly higher than the upper bound critical values of Pesaran et al. (2001) at 10% level of significance, as shown in Table 4. As a consequence, RCOEX and the regressors have long-term associations. The model thus rejects Equation (2)'s null hypothesis. However, Table 4 further demonstrates that, when RNCOEX is utilized as the dependent variable in Equation (2), the predicted F-statistic from model 1 is obviously lower than the upper bound critical values of Pesaran et al. (2001). The explanatory variables and RNCOEX are not co-integrated as a result. As a result, the model was unable to rule out the null hypothesis in Equation (2).

The outcomes of the ARDL models are shown in Table 6. The findings of model 1 demonstrate that, in the short-run, non-crude oil exports are negatively and significantly impacted by financial sector development, as shown by credit to the private sector as a percentage of GDP. This result contrasts with that of Babatunde and Fowowe (2010), who found no relationship between the overall amount of products exported from Sub-Saharan African countries and the development of their financial sectors. The findings of this study also disagree with those of Adeboje et al. (2021) and Raifu and Folarin (2020), who found that that the short-term impact of the financial sector on the total number of products exported from Nigeria was beneficial and significant.

Table 1: Results of descriptive statistics

STATISTICS	RNCOEX	RCOEX	FSD	OER	RGDPG	DUMWFC
Mean	7.765057	10.91385	2.205395	4.092163	4.203170	0.057143
Median	7.646154	10.91749	2.131239	4.795544	4.230061	0.000000
Maximum	9.391715	11.76930	2.975710	5.882795	15.32916	1.000000
Minimum	6.309009	9.172681	1.598990	0.703382	-2.035119	0.000000
Standard deviation	0.869102	0.609357	0.348804	1.430280	3.961522	0.235504
Observations	35	35	35	35	35	35

Source: Research findings

Table 2: Results of correlation matrix

	RNCOEX	RCOEX	FSD	OER	RGDPG	DUMWFC
RNCOEX	1.000000					
RCOEX	0.604249	1.000000				
FSD	0.674054	0.552016	1.000000			
OER	0.642570	0.708403	0.747676	1.000000		
RGDPG	0.203583	0.413706	0.088481	0.124998	1.000000	
DUMWFC	0.177892	0.323430	0.395747	0.124524	0.156027	1.000000

Source: Research findings

Table 3: Unit root test results

Variable	Constant	Constant, trend	Remark	Constant	Constant, trend	Remark
	ADF test	ADF test		PP test	PP test	
RNCOEX	-7.16***	-7.09***	I (1)	-7.79***	-8.54***	I (1)
RCOEX	-3.34**	-4.91***	I (1)	-3.35**	-10.4***	I (1)
FSD	-5.44***	-5.40***	I (1)	-8.28***	-8.46***	I (1)
OER	-5.83***	-6.01***	I (1)	-5.84***	-6.13***	I (1)
RGDPG	-3.68***	-3.57**	I (0)	-3.56***	-3.44*	I (0)
DUMWFC	-4.13***	-4.09***	I (0)	-3.20**	-11.82***	I (1)

*, ** and *** imply 10%, 5% and 1% significance level respectively.

Source: Research findings

Table 4: Results of lag lengths

Panel A: Model 1 (F (RNCOEX FSD OER RGDPG DUMWFC))						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-152.5471	NA	0.017864	10.16433	10.39562	10.23973
1	-57.78131	152.8481*	0.000203*	5.663310	7.051040*	6.115676
2	-42.23431	20.06065	0.000429	6.273181	8.817352	7.102518
3	-19.95880	21.55695	0.000753	6.448955	10.14957	7.655262
4	35.71994	35.92176	0.000261	4.469681*	9.326735	6.052960*

*Implies lag order selected by the criterion.

Source: Research findings

Panel B: Model 2 (F (RCOEX|FSD OER RGDPG DUMWFC))

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-135.6323	NA	0.005999	9.073048	9.304337	9.148443
1	-56.07022	128.3259*	0.000182	5.552917	6.940647*	6.005283
2	-36.92286	24.70627	0.000304	5.930507	8.474678	6.759843
3	-11.53685	24.56711	0.000437	5.905603	9.606215	7.111910
4	45.73702	36.95088	0.000137*	3.823418*	8.680472	5.406696*

*Implies lag order selected by the criterion

Source: Research findings

Table 5: Panel (A): Bounds (co-integration) tests results from Equation (2)

Model	K	Computed F-statistic	Remarks
F (RNCOEX FSD OER RGDPG DUMWFC)	3	1.85	Do not reject H ₀
F (RCOEX FSD OER RGDPG DUMWFC)*	3	3.93	Reject H ₀

*** and ** Signifies to 5%, 10%, and 1% significance levels respectively.

Source: Research findings

Panel (B): Pesaran et al. (2001) F-table

K	10%		5%		1%	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
3	2.72	3.77	3.23	4.35	4.29	5.61

Source: Pesaran et al. (2001)

The study's findings show that the country's financial system is not yet developed enough to sustain non-crude oil exports in the short-term, which explains its detrimental impact on non-crude oil exports. The nation's level of financial sector development is too low, according the information that is currently available (WDI, 2022), and is below the 83.2 percent criterion that Kurul (2021) suggests for both developed and developing economies. It is suggested that the government implement measures that would swiftly enhance Nigeria's financial sector in terms of a noticeable rise in the mobilization of savings and the provision of improved access to credit in order to encourage non-crude oil exports.

Results from model 1 also show that Nigeria's exports of non-crude oil items are not significantly impacted in the short term by either official exchange rates or income growth. These findings are in line with studies by Adeboje et al. (2021) and Raifu and Folarin (2020) who discovered that aggregate merchandise exports in Nigeria were not significantly impacted by real exchange rates in the near term. Shockingly, the worldwide financial crisis seems to be having a big, positive immediate impact on exports of non-crude oil. During a financial crisis, a local currency's devaluation

Table 6: Results of the ARDL Models

Dependent variable	RNCOEX	RCOEX
Independent variables	Model 1	Model 2
Short-run		
D (FSD)	-0.90* (-1.70)	-0.16 (-0.53)
D (OER)	-0.01 (-0.18)	0.14* (1.73)
D (RGDPG)	0.02 (1.46)	0.02* (1.90)
D (DUMWFC)	0.85** (2.28)	0.39 (1.39)
C	1.17* (1.73)	
CointEq(-1)		-0.57*** (-3.87)
Long-run		
FSD		-0.29 (-0.51)
OER		0.24* (1.88)
RGDPG		0.05* (1.94)
DUMWFC		0.69 (1.36)
C		10.3*** (11.6)
Adj. R2	0.80	0.61
DW	1.99	1.74

I is used as the lag length.

t-statistic in parentheses and *****signifies 10%, 1% as well as 5%. Levels of significance respectively.

Source: Research findings. ARDL: Autoregressive distributed lag

(depreciation) might lead to an increase in non-crude oil exports. A 2005 research by Ma and Cheng (2005) that shown that export often increases during financial crises but may drop later lends validity to these findings.

According to Model 2 on Table 6, there is no connection between the development of the financial sector and Nigeria's crude oil exports over the long as well as short-time periods. Additionally, the worldwide financial crisis has minimal effect on crude oil

Table 7: ARDL model's diagnostic test

Diagnostic tests	Model 1	Model 2
Serial correlation LM tests (Breusch Godfrey)	1.11 (0.34)	0.84 (0.44)
Heteroscedasticity tests (Breusch-Pagan-Godfrey)	0.46 (0.82)	0.86 (0.51)
Jarque-Bera* (Normality test)	Pass	Pass
CUSUM	Stable	Stable
CUSUM of squares	Stable	Stable

Probability of F-Statistic in parentheses. ARDL: Autoregressive distributed lag

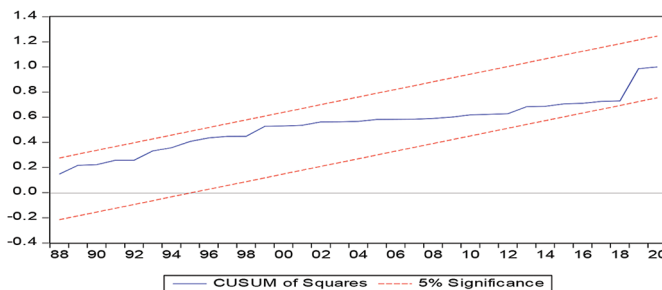
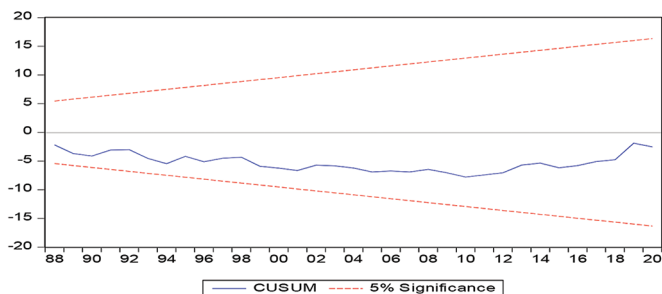
shipments over the long as well as short durations. The computed model's CointEq(-1) error correction component, which is correctly signed (-0.57) and highly significant at 1%, makes it clear that changes in the independent variables would take a very long time to bring crude oil exports back to equilibrium.

4.1. Diagnostic Tests

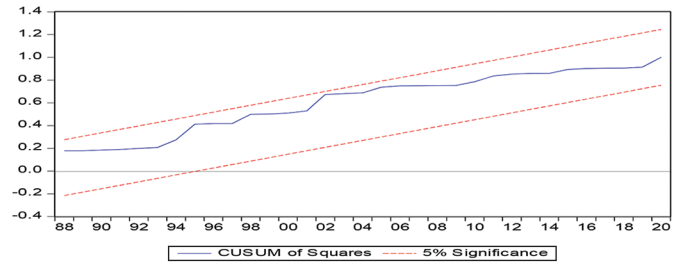
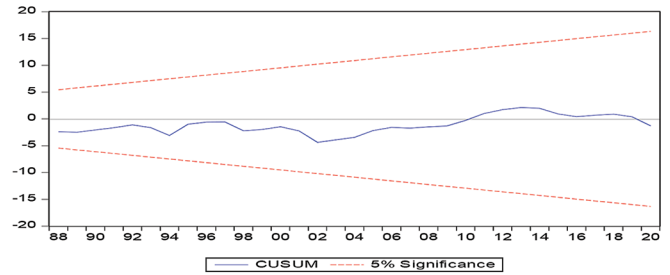
We examine various diagnostic results linked to the anticipated ARDL models. The results in Table 7 show that there is no serial correlation issue with the estimation since the F-values required by the Breusch-Godfrey LM test for serial correlation are not significant. Since the models satisfy the Jarque-Bera test for normality, the distribution of the errors is also correct. Since neither model meets the F-values needed by the Breusch-Pagan-Godfrey test, neither model has a problem with heteroskedasticity.

To examine the stability of the projected regression coefficients in both models throughout the reference period, we utilize the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests created for structural stability to make sure they are not biased. The predicted regression coefficients are accurate and are below the lower and higher limits of significance for the CUSUM and CUSUMSQ test statistics at the 5% level, as shown in Table 7.

Model 1



Model 2



5. CONCLUSION AND POLICY IMPLICATIONS

This study looked at how the development of Nigeria's financial sector affected both crude and non-crude oil commodity exports. The results show that both in the short and long periods, there is no correlation between Nigeria's financial sector development and crude oil exports. Additionally, there is no long-term correlation between the development of Nigeria's financial sector and its exports of non-crude oil goods. Results, however, indicate that the country's finance system is not yet sufficiently advanced to sustain non-crude oil exports in the short period.

In order to achieve the goal of increasing the share of non-crude oil exports in total exports, this study urges Nigerian policymakers and the government to ensure that the financial sector is adequately developed.

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