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Does Nigeria's underdeveloped financial sector harm non-crude oil export trade? Empirical evidence from linear and non-linear models

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ABSTRACT

The purpose of this study is to determine the effect of financial sector development on Nigeria's non-crude oil export trade. For this reason, we employ a battery of econometric models and tools, including the Autoregressive Distributed Lag model and the sequentially determined threshold model. The study found that financial sector development and export of non-crude oil merchandise are unrelated in the long term, which challenges theoretical view that financial sector development and trade are linked at any time. The study further showed that, in the short term, the country's level of financial sector development, though shallow and seeming underdeveloped, is able to support exports of non-crude oil products. This finding challenges theoretical view that lower levels of financial sector development could hinder non-crude oil export trade flows. The study, however, found a threshold effect showing a minimum level of financial sector development that promotes non-crude oil export trade, which indicates that the relationship between financial sector development and non-crude oil export is non-linear, which contradicts the theoretical view. The study recommends that Nigerian policymakers and the government adhere strictly to the minimum level of financial sector development; otherwise, non-crude oil export trade may worsen.

Contribution/Originality: The study, unlike previous studies, accounts for the minimum level of financial sector development that promotes non-crude oil export trade.

1. INTRODUCTION

Since the discovery of crude oil in great volume in 1970s, the Nigerian economy has remained monocultured. For instance, the Central Bank of Nigeria notes in its 2021 report that, on average, the volume of crude oil exports in overall merchandise exports has remained about 95% in the last four decades. With this development, one might expect to see improved development outcomes, but sadly, the country tends to have higher rates of poverty as well as lower rates of economic stability and growth. In fact, the country has been recently ranked as the global capital of extreme poverty in spite of its oil wealth (see World Bank (2022)).

Nevertheless, since the structural adjustment programme in 1986, efforts to diversify the Nigerian economy have abound due to the country's failure to benefit abundantly from its oil wealth. The key policy has remained how to boost exports of non-crude oil items. For instance, since 1986, succeeding government in Nigeria has continued

to put in place policies that will promote development of the financial system ,which in turn, should facilitate non-crude oil export expansion (see Anthony and Mustafa (2011)). This is rational given the massive and mostly unexploited economic activity in the non-crude oil export sector, which may assist in speeding up economic growth and lessening poverty in that country, thus serving as a way to achieve the United Nations' Sustainable Development Goals in the area of poverty reduction by 2030. But sadly, these efforts have not provided the intended results. For instance, in the last four decades, non-crude oil export share, on the average, has remained about 5% of total exports (Central Bank of Nigeria, 2021).

Without a doubt, Nigeria's underdeveloped financial system may be a contributing factor that impedes export diversification in that nation. For instance, despite improvements from 8% in 1986 to 11% in 2020, private sector credit to GDP (Gross Domestic Product) has remained very low and appears undeveloped when evaluated with the rest of the world. For example, according to the World Development Indicator for 2020, Malaysia's private sector credit to GDP increased from 101% in 1986 to around 134% in 2020. The theoretical literature (see Beck (2002)) acknowledges that without a robust financial system, expanding the share of non-crude oil exports in total exports, particularly manufactured exports, will be challenging. The basis for this is that, in contrast to the crude oil export sector, where businesses exhibit scale economies as a result of rising returns on labour and land, businesses in non-crude oil export sector typically exhibit scale economies as a result of rising returns on capital. Additionally, these businesses heavily depend on external financial support, which can only come from a fully developed financial sector. Due to this, if a number of non-crude oil exporting companies, for example, lack the funds to support trade, the domestic financial sector, which should support the funding of trade if not sufficiently developed, would only present a lesser and insignificant amount of credit, which may not be adequate to fund trade, and as a result, might serve as a trade barrier that could prevent a number of non-crude oil exporters from taking part in global trade (Caglayan, Dahi, & Demir, 2013; International Monetary Fund, 2009).

Surprisingly, however, while a number of theoretical and empirical studies (Beck, 2002; Caporale, Sova, & Sova, 2022; Mazengia, Bezabih, & Chekol, 2023; Ogunjumo, 2024; Paudel & Alharthi, 2021; Qiu, Lu, & Wang, 2022; Xinzhong, 2022) have affirmed that the link between financial sector development and trade is linear, evidence in the literature (see (Kurul, 2021; Sare, Aboagye, & Mensah, 2019)) has also suggested that the relationship may be non-linear. For instance, Kurul (2021) asserted that the expansion of the financial sector can help export up to a certain point, but that once it crosses that line, it may start to harm it. This suggests that too much finance might harm international trade flows, but sadly, the minimum level of financial sector development that could promote trade is yet to be established in the literature, which is critical to countries like Nigeria, for instance, where the level of financial sector development is extremely low.

In order to better understand how Nigeria's undeveloped financial system has affected non-crude oil export businesses, this study aims to address that question. It specifically asks what level of financial sector expansion is necessary to support non-oil export businesses in the nation. Although attempts have been made in the literature to show how exports and financial system in Nigeria are linked (Adeboje, Raifu, Ogbeide, & Orija, 2021; Bank-Ola, 2022; Raifu & Folarin, 2020), these studies, regrettably, suffer from a number of significant flaws. First off, because the focus of these studies was solely on aggregate merchandise exports (consisting of non-crude oil and crude oil), it is hard to determine how financial sector development (FSD) has influenced export of non-crude oil products. Furthermore, these studies only looked at the linear link, ignoring the non-linear relationship between the financial system and trade.

Second, these earlier studies solely gauged the development of the financial sector by looking at the private sector's credit to GDP. Evidence suggests that this proxy only takes into account financial depth and does not reflect the multidimensional character of financial system (see International Monetary Fund (2022)). It has been determined that the three main characteristics of a financial sector development are financial depth, financial accessibility, and financial efficiency (International Monetary Fund, 2022). For instance, it is acknowledged that a

highly developed financial system is useless if it is difficult for people, enterprises, and firms to acquire credit (see Aizenman, Jinjarak, and Park (2015)). Additionally, if a financial sector is inefficient yet robustly deep and accessible, its contribution to economic growth will be minimal. Therefore, focusing just on private sector credit to GDP may impede us from fully knowing how advanced the country's financial system is.

This research hence contributes to the literature as follows:

1. Unlike the previous studies, which have focused exclusively on aggregate merchandise exports (a combination of crude and non-crude oil exports), this study investigates the impact of financial development on export of non-crude oil items.

2. Unlike the previous studies, which have focused on the maximum level of financial sector development above which financial sector development hurts trade, this study verifies the minimum level of financial sector development that could promote non-crude oil export trade.

3. Unlike the previous studies, which have focused wholly on private sector credit to GDP, this study utilizes a comprehensive financial sector development index that covers the complex nature of financial system with respect to depth, accessibility, and efficiency.

The results showed that no connection existed between the development of the financial system and export of non-crude oil products. Despite Nigeria's shallow level of financial development, the results also showed that its finance system is capable of financing exports of non-crude oil goods in the short term. However, other findings indicated that there is no linear association between non-crude oil export growth and financial sector expansion. This suggests that maintaining a certain minimum level of financial sector development is necessary for the financial sector to sustain non-crude oil export business. The remaining sections are grouped into four. Section 2, which is the next, evaluates the body of literature, both theoretical and empirical. Section 3 discusses the theoretical framework, model with data, and methodology used in the study. Section 4 reveals the empirical findings, whereas Section 5 ends the research.

2. REVIEW OF LITERATURE

2.1. Theoretical Literature

Theoretically, the linkage between financial sector development and trade is due to Kletzer and Bardhan (1987). To explain the differences in the pattern of trade among economies, Kletzer and Bardhan (1987) studied the behaviour of firms across nations. Their theoretical findings affirmed that firms that depend heavily on external financial support and are located in countries with highly developed financial sectors will exhibit comparative advantage. However, from Baldwin (1989) theoretical perspective, firms in economies with highly developed financial sectors will typically spread their risks. These businesses will focus on producing risky items with the lowest possible risk. According to Beck (2002) theoretical model, countries with highly developed financial sectors will always have a competitive edge in non-crude oil industries. His concept suggests a correlation between having a highly developed or less developed financial sector and exporting more or less manufactured products. According to theory, Xinzhong (2022) found that the growth of the financial sector is essential for export business, particularly in companies that heavily rely on outside financial support.

2.2. Empirical Literature

Xinzhong (2022) investigated the impact of Jiangsu's export business in China between the years of 1985 and 2016. We found a weak correlation between the expansion of the financial system and the composition of exports. The impact of financial depth on China's 145 trading partners' international business between 2000 and 2016 was examined by Sun and Muganyi (2019). The authors discovered that financial strength has a significant influence on global trade flows. However, using export growth as a proxy for export business reveals a more substantial influence. Paudel and Alharthi (2021) examined the impact of Nepal's financial system on export performance

between 1980 and 2017. Results indicated that there is no relationship between export growth and financial sector development over the long and short durations. However, breaking down the financial sector into the market and financial institution reveals no correlation between the two. Instead, the growth of the financial markets had a significant negative impact on exports, both immediately and over time. Yakubu, Aboagye, Mensah, and Bokpin (2018) and Sare et al. (2019) focusing on African data, confirmed the effects of financial sector expansion on trade flows in 46 African nations. The authors did discover a threshold effect, though.

Mazengia et al. (2023) confirmed the effects of the financial sector's expansion on Ethiopia's export diversification strategy between 1980 and 2019. Results showed that the growth of the financial sector during the reference period had a negative impact on Ethiopia's export performance. Qiu et al. (2022) looked at how the financial sector's growth affected China's export business between 1987 and 2018. They showed that the overdevelopment of the financial sector severely influenced the extend of international exchange. The rise of the financial industry also had a less significant impact on the export trade's makeup and a smaller overall impact on processing trade. Tsaurai (2020) investigated whether the growth of the financial sector has enhanced business in emerging nations. The author found that the approach used in how the rise of the financial sector affected trade between 1994 and 2014. Caporale et al. (2022) concentrating on European nations, investigated how the expansion of the financial sector has impacted the trade flows of 6 European Union nations. The authors discovered that between 1996 and 2018, the expansion of the financial sector had a favourable influence on exports in these nations. When compared to exports of manufactured goods, the effect is less noticeable in agricultural export business.

For a panel of 64 economies between 1970 and 2014, Kurul (2021) evaluated the impacts of financial sector expansion on exports, imports, and the degree of openness to trade. The findings could potentially harm export and trade openness. In particular, the authors discovered that, up to a threshold point, the financial sector increases export and trade openness, but that once financial sector expansion exceeds the threshold point, the benefit is fleeting. However, Bilas, Bošnjak, and Novak (2017) discovered that while the expansion of Croatia's financial system had a negative and severe long-term impact, it had a complete and considerable impact on openness to trade in the short term. Babatunde and Fowowe (2010) looked at how financial strength affected the total amount of products exported from 22 Sub-Saharan African nations. The authors, however, found no connection between the county's financial system and the total number of exported goods.

Raifu and Folarin (2020) and Adeboje et al. (2021) looked at the effect of financial strength on the total amount of commodities sold outside of Nigeria. The results showed that the expansion of the financial system has a beneficial influence on all varieties of exports. Bank-Ola (2022) in contrast, found a negative and significant impact of financial depth on the country's overall merchandise exports.

3. THEORETICAL FRAMEWORK, MODEL, DATA AND SOURCE, AND METHODOLOGY

3.1. Theoretical Model

Beck (2002) theoretical model served as the foundation for this investigation. The theoretical model supported the relationship between financial industry growth and world trade. The model demonstrated that firms in the manufactured export sector typically show signs of large scale economies and are often found to rely heavily on external financial support. Beck (2002) emphasized that manufactured exporters operating in economies where financial sectors are fully developed will export more due to availability, of external financial support, and thus will have a greater share of manufactured exports in total merchandise exports. Though, the Ricardian and Heckscher-Ohlin trade models argued that global trade flows are forecasted based on an economy's endowment of land, labour, and physical capital as well as technological disparities among economies, Beck (2002) emphasized that financial sector development constitutes part of the production technology and that of physical capital. This basic model has been confirmed by researchers (see, for instance, Xinzhong (2022)) who theoretically, arrived at the same finding that financial sector development influences trade flows significantly.

3.2. Model, Data and Source

The empirical model that link the development of financial system and export of non-crude oil items was influenced by Xinzhong (2022); Paudel and Alharthi (2021) and Beck (2002). The model is described as

$$E_t = \sigma_0 + \delta FSD_t + \gamma CON_t + \varepsilon_t \tag{1}$$

Where CON is a group of control independent variables, E is a measure of non-crude oil exports, FSD is a measure of financial sector development, and εt is the error term. Foreign direct investment (FDI), the working-age population (WPP), the growth rate of real GDP per capita (NGR), and real exchange rate (REER) are the group of control independent variables. Companies engage in the exportation of non-crude oil products. A vast quantity of FDI that flows-in is meant for the oil sector. It is predictable that a rise in FDI inflows will influence non-crude oil exports harmfully since the vast quantity of FDI inflows will encourage more exploration and exportation of crude oil, which in turn will amplify resource curses and Dutch disease where the non-crude oil export sector is neglected. The working-age population signifies the quantity of labour force in the country, and there is a tendency that an increase in labour force will increase trade. Per capita GDP growth considers the relationship between export trade and income level. It is thought that exports should increase along with the growth of income. Over the years, the Nigerian naira has consistently depreciated against currencies of her trading partners; thus, theoretically, this should increase exports.

We displayed all the variables as natural logarithms, except for WPP and NGR. In this analysis, annual data from 1986 through 2020 was used. We thoughtfully choose this time frame to encompass the period of financial and trade liberalization in Nigeria. The total real non-crude oil export flow (RNO) was used to calculate the exports of non-crude oil. The Central Bank of Nigeria Statistical Bulletin's total nominal export trade in non-crude oil products, expressed in millions of local currency, was deflated by the CPI of the nation to get the real size. We gathered information for the consumer price index using the IMF's online database. These actual values were used to identify non-crude oil shipments in a research by Akinlo and Adejumo (2014) on the impact of exchange rate volatility on non-crude oil exports. However, to test the model's robustness, we used the percentages of non-crude oil exports in GDP denoted as NOG and total merchandise exports represented by NOS.

The most often used metric in the literature to measure financial system development is the ratio of private sector credit to GDP. Unfortunately, this measure is unable to adequately capture the complex nature of financial sector development. This research uses the financial system development index (FSDI), to calculate the degree of financial sector expansion. We collect data for the index from the IMF's online database. In contrast to the private sector credit share of GDP, which solely evaluates the depth of financial institutions, the FSDI analyzes the depth, accessibility, and efficiency of financial markets and institutions. We collected data on the working-age population (WPP), defined as the proportion of people between the ages of 15 and 64 in the total population, using the World Bank online database (WDI). Per capita GDP growth (constant local currency) was used to calculate the growth of real GDP per capita and was taken from WDI. To measure actual exchange rate, real effective exchange rate, or REER, was utilized. We obtained the exchange rate data from the IMF's web database. Net FDI inflows to GDP extorted from WDI were used to calculate foreign direct investment (FDI).

Thus, the final empirical equation is

$$E_t = \sigma_0 + \delta\, FSD_t + \gamma_1 FDI_t + \gamma_2 WPP_t + \gamma_3 NGR_t + \gamma_4 REER_t + \varepsilon_t \tag{2}$$

Unexpectedly, earlier research on Nigeria (see (Adeboje et al., 2021; Bank-Ola, 2022; Raifu & Folarin, 2020)) relied on the linear link between the development of the financial sector and export trade and disregarded the potential of non-linear impacts. The evidence of threshold effects discovered by Kurul (2021) and Sare et al. (2019) suggests that the influence of financial sector development on exports is also non-linear; therefore, models in earlier

research may be excessively limiting. A single model with a two-regime specification is therefore defined in accordance with Zainudin, Ibrahim, Hussain, and Hadi (2017) which is different from the linear models in earlier works.

$$y_t = \begin{cases} \theta_0 + \varphi y_{t-1} + \gamma x_t + \phi_1 d_t + \varepsilon_t & if \propto \prec d_t \prec \eta \\ \theta_0 + \varphi y_{t-1} + \gamma x_t + \phi_2 d_t + \varepsilon_t & if \eta \leq d_t \prec \propto \end{cases}$$

(3)

This study uses y_t as a vector of non-crude oil export measures. φ is the autoregressive coefficient. d_t is the threshold variable, with parameters indicating regime when the threshold variable is split into two. η is the particular estimated threshold value. X_t is a collection of control variables. However, it is assumed that the control variables have comparable coefficients across regimes.

The breakpoint representation foundation, established by Perron (2006) and Bai and Perron (2003) to estimate an unknown threshold value, serves as the basis for the threshold model's framework. Hansen (2017) made a similar assumption, which he referred to as the kink model in the middle of an unknown threshold. Most previous investigations used the discontinuous threshold approach under the assumption that the threshold was already known. Hansen (1999) proposed the use of multiplier bootstrapping to solve the Davies paradox; however, this method leaves out important information about the structure of time series that might lead to finite sample distortion (Hansen, 2017; Zainudin et al., 2017). Therefore, to resolve this shortcoming, the Sup-F test statistics of Bai and Perron (2003) were utilized in this study. The procedure does not necessitate the bootstrapping testing method to spot thresholds, it identifies thresholds by the means of a continuous sequential procedure (Bai & Perron, 2003; Zainudin et al., 2017). Therefore, we explicitly specify the threshold model

$$E_t = \sigma_0 + \varphi E_{t-1} + \gamma CON_t + \phi_1 FSD_t I\left[FSD_t^* \prec \eta\right] + \phi_2 FSD_t I\left[FSD_t^* \geq \eta\right] + \varepsilon_t$$

(4)

Where the threshold variable is FSD^*, the indicator functions are $I\left[FSD_t^* \prec \eta\right] \text{ and } I\left[FSD_t^* \geq \eta\right]$; a function that presume one if the expression in bracket is right and zero if not. The threshold point of financial sector expansion is η. The model displays 2 periods. When $FSD^* < \eta$, the impact of financial system expansion on export of non-crude oil items is ϕ_1. When $\eta \leq FSD^*$ the impact of financial system expansion on export of non-crude oil items is ϕ_2.

3.3. Methodology

To ascertain the impact of financial system growth on non-crude oil exports, we applied the Autoregressive Distributed Lag (ARDL) method created by Pesaran and Shin (1995). This is because the technique allows, at the same time, variables that are stationary at levels and after first difference. More particularly, its generated coefficients have been confirmed by Monte Carlo simulation to be unbiased when sample size is small (Ahmad et al., 2017). The ARDL technique effectively addresses the endogeneity dilemma when taking into account additional lags of progression. In this manner, it integrates endogenous variables successfully (Vuong, Ho, Nguyen, & Nguyen, 2019). As a result, the ARDL structure modifies Equation 2.

$$\begin{aligned} \Delta E_t = \psi &+ \zeta_1 E_{t-1} + \zeta_2 FSD_{t-1} + \zeta_3 FDI_{t-1} + \zeta_4 WPP_{t-1} + \zeta_5 NGR_{t-1} + \zeta_6 REER_{t-1} \\ &+ \sum_{i=1}^{p} \delta_i \Delta E_{t-i} + \sum_{i=0}^{p} \gamma_i \Delta FSD_{t-i} + \sum_{i=0}^{p} \eta_i \Delta FDI_{t-i} + \sum_{i=0}^{p} \lambda_i \Delta WPP_{t-i} \\ &+ \sum_{i=0}^{p} \pi_i \Delta NGR_{t-i} + \sum_{i=0}^{p} \rho_i \Delta REER_{t-i} + \varepsilon_t \end{aligned}$$

(5)

Equally important is determining if the variables behave consistently across time. An F-test for the overall significance of the lagged level variables in Equation 5 is carried out to determine if long-term links exist or not. H_0: $\zeta_1 = \zeta_2 = \zeta_3 = \zeta_4 = \zeta_5 = \zeta_6 = 0$ is the tested null hypothesis in opposition to its alternative H_1: $\zeta_1 \neq \zeta_2 \neq \zeta_3 \neq \zeta_4 \neq \zeta_5 \neq \zeta_6 \neq 0$. For decision making, we compare computed F-statistic with the critical bound-values (upper and lower) of Pesaran, Shin, and Smith (2001).

Furthermore, to verify the minimum level of financial sector development that could promote non-crude oil export trade, this study adopts a threshold model specified in Zainudin et al. (2017).

4. EMPIRICAL ANALYSIS AND DISCUSSION OF RESULTS

In order to examine the properties of the variables and to confirm the applicability of the methods used, we attentively evaluated the descriptive statistics as well as the stationarity of variables prior to model estimate. Table 1 lists the calculated mean, standard deviation, and median. The close proximity of mean and median in Table 1 clearly demonstrates the normal distribution of the variables. The variables are further implied to be quite constant by this. The fact that the variables' mean and median values fall between their minimum and maximum values further demonstrates their strong state of stability. Additionally, because the standard deviations of the investigated variables are small, the sample mean is quite close to the population's real mean.

Table 1. Descriptive statistics.

Variable	Obs.	Mean	Median	Std. dev	Max.	Min.
RNO	35	7.76	7.64	0.86	9.39	6.30
NOG	35	-15.39	-15.07	1.91	-12.32	-19.55
NOS	35	1.40	1.62	0.66	2.77	0.24
FSD	35	-1.69	-1.68	0.19	-1.30	-2.10
FDI	35	0.25	0.37	0.73	1.75	-1.63
WPP	35	52.80	52.82	0.51	53.50	51.79
NGR	35	1.51	1.59	3.80	12.27	-4.50
REER	35	4.61	4.60	0.40	5.60	3.90

Furthermore, Table 2's result (panels A, B, and C) show that the variables are stable at either level or at the first difference. Thus, the ARDL technique is suitable for assessing how the growth of the financial system may affect exports of items other than crude oil. To avoid inaccurate results, it is essential to set correct lag for the ARDL model. It is evident from Table 3 that the lag produced by the Schwarz criteria is short and hence suitable for the ARDL model.

Table 2. Unit root test results.

Panel A			
ADF			
Variable	**Level**	**First difference**	**Remark**
RNO		-7.09***	I(1)
NOG		-6.76***	I(1)
NOS		-6.02***	I(1)
FSD		-4.49***	I(1)
FDI	-4.01***		I(0)
WPP	-3.49**		I(0)
NGR	-3.66**		I(0)
REER	-3.67**		I(0)

Note: ADF denotes augmented dickey-Fuller unit root test. ** as well as *** connote 10% as well as 1% significance level correspondingly

Panel B			
PP			
Variable	**Level**	**First difference**	**Remark**
RNO		-8.54***	I(1)
NOG		12.71***	I(1)
NOS		10.37***	I(1)
FSD		-7.05**	I(1)
FDI	-3.99***		I(0)
WPP		-3.32*	I(1)
NGR	-3.54**		I(0)
REER	-3.75**		I(0)

Note: PP denotes Phillips-Perron unit root test. **, * as well as *** connote 5%, 10% as well as 1% significance level correspondingly

Panel C			
KPSS			
Variable	**Level**	**First difference**	**Remark**
RNO		0.34***	I(1)
NOG		0.39***	I(1)
NOS		0.21**	I(1)
FSD		0.15**	I(1)
FDI	0.15**		I(0)
WPP	0.13*	-3.32*	I(0)
NGR	0.15**		I(0)
REER	0.39***		I(0)

Note: KPSS denotes Kwiatkowski-Phillips-Schmidt-Shin unit root test. **, * as well as *** connote 5%, 10% as well as 1% significance level correspondingly

Table 3. Results of lag lengths.

Panel A, model 1(F(RNO|FSD FDI WPP NGR REER))		
Lag	AIC	SIC
0	10.0	10.3
1	3.05	4.97
2	0.23	3.80*
3	-0.69*	4.53
Panel B, model 2 (F(NOG|FSD FDI WPP NGR REER))		
Lag	AIC	SIC
0	11.03	11.30
1	3.08	5.00
2	0.03	3.60*
3	-0.95*	4.26
Panel C, model 3 (F(NOS|FSD FDI WPP NGR REER))		
Lag	AIC	SIC
0	10.20	10.48
1	2.90	4.83
2	-0.16	3.40*
3	-1.46*	3.75

Note: AIC signifies Akaike information criterion. SIC represents Scvhwarz information criterion. *implies lag order selected by the criterion

The ability to determine whether variables move together or apart over the long run is one of the benefits of the ARDL approach. Table 4 demonstrates that the predicted F-statistic from ARDL bound tests in models 1, 2, and 3 is much below the upper critical limit values of Pesaran et al. (2001). As a result, there are no long-term relationships between the variables. Because of this, the models were unable to rule out the null hypothesis of no co-integration.

Examining multicollinearity among the independent regressors is equally crucial. The Variance Inflation Factor (VIF) is used in this study to test for multicollinearity among the independent variables. We implicitly

assume that multicollinearity occurs and tends to be a cause for concern when the VIF across independent variables is more than 5.0. It is clear from the results shown in Table 5 that the VIF of independent variables is consistently less than 5.0 for each model. As a consequence, no multicollinearity-related problem was discovered.

Table 4. Panel (A): ARDL bound tests results (H0: No co-integration).

Panel (A): ARDL bound tests results (H_0: No co-integration)			
Model	K	Calculated F-statistic	Comments
F(RNO|FSD FDI WPP NGR REER))	5	1.53	Do not reject H_0
F(NOG|FSD FDI WPP NGR REER))	5	0.58	Do not reject H_0
F(NOS|FSD FDI WPP NGR REER))	5	3.33	Do not reject H_0
Panel (B)			

K	10%		5%		1%	
5	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Bounds	2.26	3.35	2.62	3.79	3.41	4.68

Table 5. VIF analysis.

Panel A, model 1(F(RNO|FSD FDI WPP NGR REER))		
Variable	VIF	1/VIF
FSD	3.2	0.31
FDI	1.58	0.63
WPP	1.87	0.53
NGR	1.17	0.85
REER	1.89	0.52
Mean VIF	1.86	
Panel B, model 2(F(NOG|FSD FDI WPP NGR REER))		
Variable	VIF	1/VIF
FSD	5.40	0.18
FDI	1.79	0.55
WPP	1.31	0.76
NGR	1.17	0.85
REER	2.41	0.41
Mean VIF	2.23	
Panel C, model 3(F(NOS|FSD FDI WPP NGR REER))		
Variable	VIF	1/VIF
FSD	1.67	0.59
FDI	2.10	0.47
WPP	2.27	0.44
NGR	1.34	0.74
REER	2.39	0.41
Mean VIF	1.88	

The study implements an ARDL model that is robust enough to display co-integration between non-crude oil exports and its explanatory variables and at the same time, confirms the short-and long-term effects of the explanatory variables on non-crude oil exports.

We note, based on the ARDL process, that non-crude oil exports and their explanatory variables are not co-integrated (see Table 4), and for this reason, long-term effect does not exist. The short-term results are displayed in Table 6. According to the findings, particularly from model 1, financial sector development has a positive effect, which is significant, on total non-crude oil commodities exported from Nigeria in the reference period; this result challenges theoretical view that lower level of financial sector development could hinder export trade flows. The findings of Bank-Ola (2022) and Babatunde and Fowowe (2010) are in conflict with this result, which is in accordance with Raifu and Folarin (2020) and Adeboje et al. (2021).

Interestingly, this result remains valid regardless of the methods used to measure non-crude oil exports, including the GDP percentage and the total amount of products exported (see models 2 and 3 on Table 6). Additionally, we discovered that overall non-crude oil exports are falling as the working-age population (WPP) rises (see model 1, Table 6).

However, Paudel and Alharthi (2021) findings lend credibility to this result, as long as the non-crude oil export share in total merchandise exports accurately reflects non-crude oil exports (see models 3, Table 6).

This conclusion accurately captured the genuine makeup of the Nigerian labour force, showing that a higher proportion of people of working age want to work in industries other than those unrelated to the non-crude oil industry. However, we discovered that the overall amount of genuine non-crude oil exporting has no relation to FDI, REER, and NGR. Raifu and Folarin (2020); Paudel and Alharthi (2021) and Adeboje et al. (2021) all support this point of view.
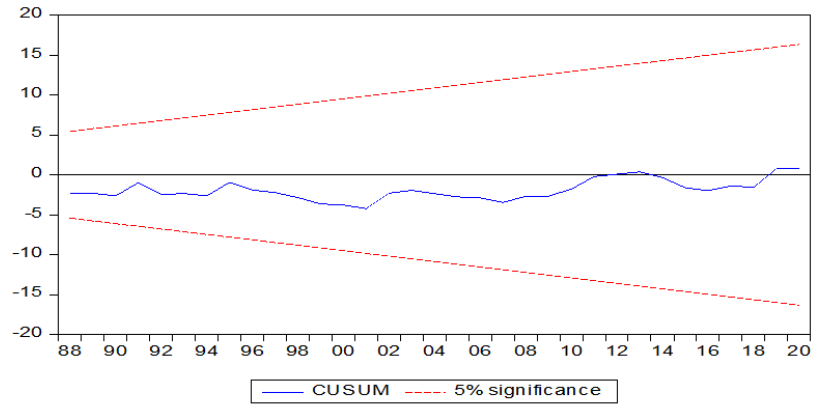
Table 6. Short-term ARDL estimates.

Variable	Model 1	Model 2	Model 3
D(FSD)	1.84***	1.44*	0.98**
	(3.01)	(1.92)	(2.30)
D(FDI)	–0.18	–0.21*	0.06
	(–1.55)	(–1.76)	(0.52)
D(WPP)	–0.41**	0.11	–0.45**
	(–2.25)	(0.74)	(–2.31)
D(NGR)	0.03	0.01	0.02
	(1.62)	(0.40)	(1.28)
D(REER)	0.14	0.39	0.59**
	(0.57)	(1.48)	(2.24)
C	29.1***	–4.86	26.1**
	(2.60)	(–0.57)	(2.37)
Diagnostic test			
Serial correlation	0.46(0.63)	1.32(0.28)	1.2(0.2)
Heteroscedasticity	0.64(0.73)	1.64(0.16)	1.4(0.2)
Jarque-Bera	2.35(0.30ρ)	2.03(0.36ρ)	3.4(0.1ρ)
Ramsey RESET	0.80(0.37)	1.37(0.25)	2.1(0.1)
CUSUM	Stable	Stable	Stable
CUSUM of sqrs	Stable	Stable	Stable

Note: We have used lag length 1 based on the information on Table 3. **,*** and * suggest 5%, 1% and 10% significance levels in that category and in addition, t-statistic values are enclosed in brackets for the short-term ARDL findings while F-Statistic's probabilities are in brackets for the diagnostic tests. Additionally, ρ connotes Jarque-Bera's probability
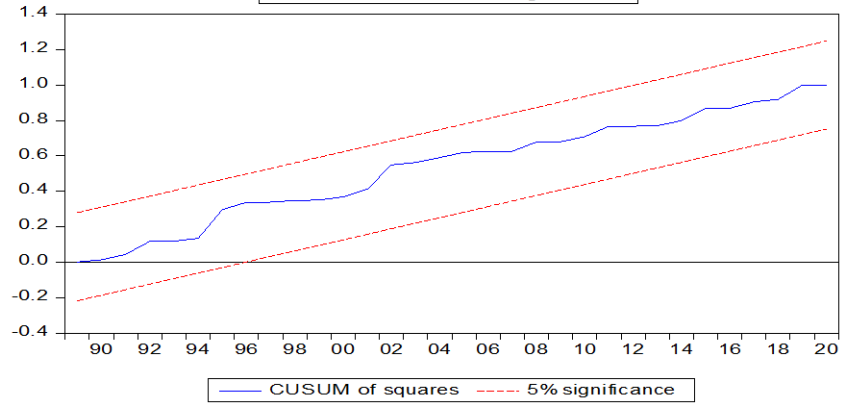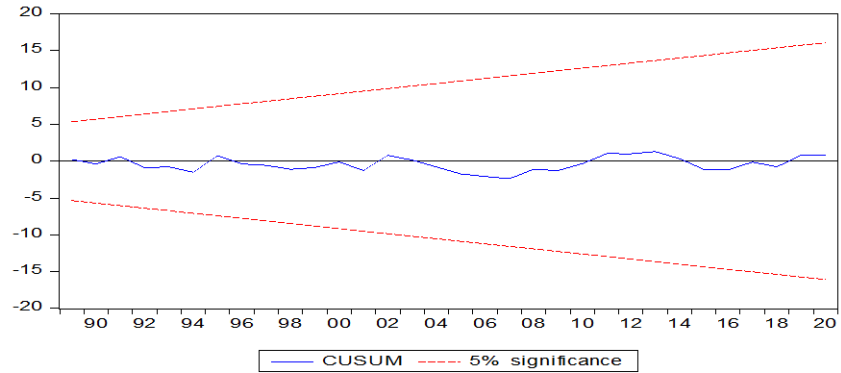
Additionally, Table 7 presents the threshold regression's results. Our results hint at a critical level of financial sector development (0.18) for both the real amount of non-crude oil exports and their contribution to GDP (models 1 and 2, respectively).

The percentage of total non-crude oil exports in total exports, however, does not reach a threshold point of financial sector expansion (see model 3, still on Table 7). However, the findings reveal that the collected threshold point divides the observations into two groups. Models 1 and 2 show that before the threshold point, the financial sector's level of development is insufficient to support trade, leaving it to do nothing to promote non-crude oil export trade for about 13 years. However, once the threshold point is passed, financial sector development significantly increases non-crude oil exports, establishing, in the case of Nigeria, the minimal level of financial sector development that could facilitate trade.
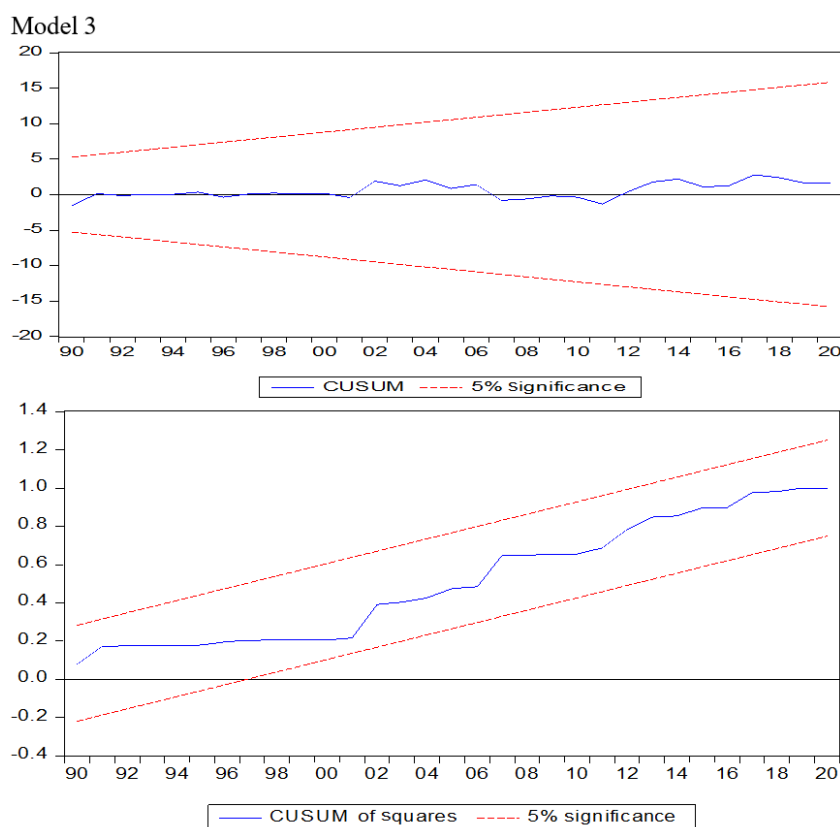
Model 1

Model 2

Figure 1. Cumulative Sum (CUSUM) and CUSUM of Squares of the estimated ARDL models.

Figure 1 Illustrates the Cumulative Sum (CUSUM) and CUSUM of Squares of the estimated ARDL models.

Table 7. Threshold regression results.

Threshold regression	Model1	Model2	Model3
Sequential F-statistic			
determined thresholds	1	1	0
Threshold test:			
Scaled-F	14.58	19.77	7.15
Critical value$^\delta$	13.98	13.98	13.98
Threshold estimates (η)	0.176**	0.177**	–
FSD			1.01** (2.24)
C			22.57* (1.93)
Regime1 (FSD <η)			
RNO (-1)	–0.21 (0.85)		
NOG(-1)		0.13 (0.68)	
FSD	0.33 (0.34)	0.39 (0.40)	
C	22.88** (2.26)	–72.69*** (–3.62)	
Observation	12	13	
Regime2 (η<= FSD)			
RNO(-1)	0.69*** (5.52)		
NOG(-1)		1.19*** (9.86)	

Threshold regression	Model1	Model2	Model3
FSD	1.94***	2.50***	
	(2.60)	(3.00)	
C	22.88**	-52.47***	
	(2.26)	(-3.43)	
Observation	22	21	
Non-threshold independent variables			
FDI	-0.18*	0.08	-0.13
	(-1.19)	(0.76)	(-0.99)
WPP	-0.32*	1.06***	-0.40*
	(-1.80)	(3.50)	(-1.94)
NGR	0.04***	0.04**	0.01
	(2.61)	(2.20)	(0.72)
REER	0.01	0.59***	0.24
	(0.02)	(2.79)	(1.07)

Note: **,*** and * suggest 5%, 1% and 10% significance levels in that category. $^{\delta}$ signifies Bai and Perron (2003) critical value. The procedure for obtaining threshold does not necessitate the bootstrapping testing method, it identifies thresholds by the means of continuous sequentially procedure (see Bai and Perron (2003)). The Sup-F test statistics was used to test for the existence of threshold effect and was set under the null hypothesis H_0: $\eta=0$. t-statistic values are enclosed in brackets while F-Statistic's Probabilities are in brackets for the diagnostic tests.

5. CONCLUSION AND POLICY IMPLICATIONS

The key outcome of this study is that Nigeria's financial sector encourages exports of non-crude oil items. The study also found a minimum level of finance sector development needed to support non-crude oil exports. In light of these results, the study recommends the following suggestions: To expand non-crude oil exports and speed up the nation's export diversification plan, Nigeria's government and policymakers should seek financial sector reforms that would promote development of the finance sector. Second, the study calls on the government and policymakers in Nigeria to strictly adhere to the minimum level of financial sector development set forth in this study; otherwise, the financial sector won't support exports of non-crude oil products, which could obstruct efforts to diversify the nation's export. Finally, policymakers and the government in Nigeria should consider reducing the high share of crude oil foreign direct investment in the overall foreign direct investment inflow because the study's findings show that foreign direct investment inflow has a negative impact on the performance of non-crude oil export trade.

5.1. Limitation of the Study

This study explores the impact of financial development on non-crude oil exports to avoid the aggregate bias that arises from analyzing the effect of financial development on aggregate exports (combination of crude oil and non-crude oil exports). By focusing on total non-crude oil exports, the authors have assumed that the impacts of financial development are consistent throughout the spectrum of exported goods other than crude oil. The financial sector's development may, however, have a number of effects on exports of non-crude oil goods. For instance, compared to exports of agricultural commodities, the effect of the financial development on exports of manufactured goods may be different. As a result, our research still exhibits aggregation bias because it only looked at the total export of non-crude oil goods.

5.2. Suggestions for Future Research

This study looked at how the financial sector's development affected overall non-crude oil exports. Since the degree of reliance on external finance may differ among exporting enterprises (see Caglayan et al. (2013)), future research might expand this analysis by examining the influence of financial sector development on disaggregated non-crude oil-exported items.

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