Exchange Rate Management and Sectorial Export-Financing in Nigeria

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ABSTRACT

The monetary authorities in Nigeria adopted the flexible exchange rate system to stabilise the foreign exchange rate market and enable banks to finance the real sector of the economy. The impact of exchange rate management on export financing in the form of agricultural, manufacturing, and solid mineral sector loans was analysed to ascertain if exchange rate management influences the availability of loans to exporters in the agro-sector, manufacturing, and solid mineral sectors. The study used the Augmented Dickey-Fuller (ADF) test for stationarity of the time series, the Bound Test for Co-integration to check the long-term relationship, and the Autoregressive Distributed Lag model to test the relationship among the variables. The result showed that changes in the exchange rate have a short-run negative significant impact on export loans to the three sectors and a long-run positive significant impact on the agro sector. The study recommended that policymakers introduce monetary policies that encourage investors, reduce interest and inflation rates, and stabilise exchange rates.

Keywords: Export loans, manufacturing sector, solid minerals sector, agricultural sector, exchange rate

INTRODUCTION

Nigeria has different sectors, ranging from the agricultural sector to the manufacturing sector, the oil and gas sector, and even the solid mineral sector. Each of these sectors requires considerable finance to operate on a large scale. Macroeconomic variables influence the availability of finance to exporters across different sectors, including the manufacturing sector (Igogo et al., 2021) and the agricultural sector (Mesagan et al., 2021). Due to the gaps in the balance of trade, the need to increase non-oil exports becomes important and urgent. Even though export-led growth has less impact on developing economies, it still contributes to economic growth (Sannassee, 2014). Consequently, export financing becomes a priority in the country. The exchange rate is highly volatile due to the gap between foreign exchange demand and supply. The Central Bank of Nigeria keeps intervening in the foreign exchange market to manage the rate; however, to date, the rate is not stable, with several impacts on different sectors of the country.

The management of exchange rates is critical to any economy, as volatility in the exchange rate influences macroeconomic variables (Kim & Park, 2018). Exchange rate volatility can be a significant challenge in any economy, particularly in mono-export economies like West African countries. Exchange rate problems create instability in the economies, and the rate is often left in the hands of the government, which frequently leads to the perpetual overvaluation of the currency (Obikili, 2019). Effective exchange rate management addresses the challenges associated with the foreign exchange market and other financial sectors of emerging economies (Tiwary et al., 2022). A country's exchange rate is the amount of its local currency required to purchase one unit of another country's currency to exchange the local currency for foreign currency (Okorontah, 2020). It is the current market price at which a national currency is exchanged for another currency (Central Bank of Nigeria (CBN), 2021).

The rate can influence a country's imports and exports: a country can decide to export its tradeable goods and import those needed; however, the rate can make exports cheap compared to other countries or make imports expensive in local currency. The exchange rate is a critical variable that affects a country's tradables and non-tradables via its impact on the relative prices of goods and services (Ufoeze et al., 2018). The rate plays a key role in any economy because, most of the time, imports and exports constitute the mainstay of the economy,

and the exchange rate impacts the imported goods and services as well as exported items and services (CBN, 2021).

The stability of the rate has a significant impact: a stable exchange rate generates confidence in the system, thereby encouraging investors to bring in capital and building trust for trading partners to do more with a country. In their studies, Mehtiyev et al. (2021) concluded that the exchange rate has both positive and negative impacts on international trade, affecting international trade and balances indirectly. Gachunga (2018) opined that favourable macroeconomic variables targeted at stable real exchange rates enhance trade. Trades are settled through an exchange of values; however, when the exchange rate is volatile, it may be difficult to trade with counterparties, especially when the payment term is not in sight due to the risk of default.

In Nigeria, the CBN closely monitors the exchange rate, ensuring its stability and price stability. During post-independence, before introducing the Structural Adjustment Programme (SAP) in 1986, Nigeria's exchange rate system changed from one system to another. Immediately after independence, a fixed exchange rate system was adopted up to the early 1970s; during this period, the exchange rate was tied to the Great Britain Pound (GBP) and the United States Dollar (US) (CBN, 2021). Specifically, Nigeria's currency was pegged to GBP until 1967, then to US$, especially after the breakdown of the International Monetary Fund (IMF) par value system in December 1971. In 1978, the Naira was pegged to a basket of twelve currencies. However, by 1985, the Naira was quoted against US$ only (CBN, 2021).

High volatility in the exchange rate also raises the risk of companies trading with international partners; the volatility in the rate does make companies increase prices in local currency to accommodate changes in the rate and the inherent exchange rate losses (Fofanah, 2020). The management of the exchange rate can affect the availability of finance if the exchange rate is constantly changing; the availability of loans or credit exporters may be difficult. This absence of funding can hinder international trade and have a negative economic impact. Trade expansion is impeded during high exchange rate volatility (Oseni et al., 2019), investors are withdrawn, and overall economic growth will slow down.

Small and medium-scale exporters face financing challenges (Ayemibo, 2021); consequently, large-scale exports are small in Nigeria. In developed economies, trade finance is readily available to bridge the funding gap between when the exporter demands payment and when the importer pays. However, in developing economies, this is different (International Finance Corporation (IFC) & World Trade Organization (WTO), 2022). Trade finance is the process of financing trade from the seller's point to the buyer's point. It plays a significant role in global trade, and most often, it is supplied by the private sector (Abrams, 2022). Due to the funding gaps from the delivery of goods and payment date, financial institutions intervene to provide trade finance to address the gaps (Prior et al., 2020); this is never enough. According to Beck et al. (2023), the trade finance gap reached US$2.5 trillion in 2022, accounting for 10% of all global trade, restricting trade growth.

The instability in exchange rates in Nigeria is consistently on the rise despite different interventions by the CBN; the country needs to increase its export proceeds to reduce the gap between the demand and the supply sides and aid economic growth (Kumar, 2020). Many scholars have studied the impact of exchange rates on different sectors of the economy; however, there have only been a few studies on the impact of exchange rate management on sectorial export loans. This study examined the impact of exchange rate management on three major sectors in Nigeria: solid minerals, the manufacturing sector, and the agricultural sector.

LITERATURE REVIEW

Theoretical Review

Trade-off-theory

Aside from retained earnings, firms can also finance investment by debt or equity; both have their costs; however, firms try to strike a balance to achieve the ultimate mix. The classic trade-off theory by Kraus and Litzenberger was developed in the early 1970s, and it entails balancing the debt mix with equity financing by seeking optimal capital structure, which is the combination of debt and equity with the lowest weighted

average cost of capital (Ai et al., 2020). There are two forms of trade-off theory: the static trade-off theory and the dynamic trade-off theory.

Pecking-Order Theory (POT) of Capital Structure

Donaldson introduced the Pecking Order theory in the early 1960s, but Myers and Majluf modified the theory in 1984. The theory centred on internally generated rather than external finance, with no optimal debt-to-equity ratio due to information asymmetry (Brealey et al., 2020). According to the theory, the internally sourced fund should form a larger proportion of equity; even though debt financing is an option, it should be used sparingly. The Pecking order theory rests on the assumption of asymmetric information between investors and managers, which influences the choice of finances. The proponents of this theory stated that firms have different sources of finance; however, they prefer retained earnings in funding their investments to raising external fund; they only go for the external fund when the internal fund is inadequate. They rated retained earnings as the highest in the hierarchy of financing investment. (Agyei et al., 2020). Where the internal funding is not sufficient, the firm goes for debt financing but low-risk debt rather than issuing fresh equity (Yıldırım & Çelik, 2020).

Empirical Review

Rashid et al. (2022) studied the impact of exchange rate volatility on Pakistani exports under two conditions: firms' financial constraints and level of financial development. They collected panel data from publicly traded companies and used the GMM estimator to analyse the influence of financial constraints on export volume. The results showed a positive appreciation in the real effective exchange rate, significantly affecting the company's exports. Export decisions were significantly and negatively impacted by movement in the exchange rate. Financial development encouraged export businesses. Kousar et al. (2022) studied the asymmetric effect of oil prices on export performance in Pakistan. They found a positive and significant impact of export financing schemes and oil prices on the volume of exports pre-global and post-global financial meltdown of 2008. The impact of export financing was significant for textile exports but insignificant for non-textile exports. Kurban (2022) studied the influence of US Export-Import Bank public financing on export growth. The study found that the termination of the U.S. Export-Import Bank resulted in a 2.2% decline in exports from firms that had previously received financing support. In Asia, Padmaja and Sasidharan (2021) examined the influence of financing constraints on exports by analysing data from Indian manufacturing firms. They found that financial constraints did not affect the export margin but had a significant effect on export participation. Mukherjee and Chanda (2021) found that an increase in external financing constraints led to decreased exports at the firm level, while internal financing positively affected export volume.

Gong and Du (2021) examined the external financing of enterprises and the impact of RMB exchange via financial channels in China. They found a direct relationship between exchange rate fluctuations and the external financing of export-oriented Chinese companies. Bergin et al. (2021) investigated trade performance vis-a-vis financing, finding that exporters are more leveraged than non-exporters when considering long-term debt. Dai et al. (2021) examined the exchange rate elasticity of exports and the accessibility of finance using Chinese firm-level data. They found that firms with limited access to external financing respond more rapidly to exchange rate changes and benefit more from the devaluation of the local currency. Bahmani-Oskooee and Kanitpong (2021) studied the asymmetric effects of exchange rate fluctuations on Thailand's inflows and outflows to its major counterparties. Cheng et al. (2021) investigated the heterogeneous effects of finance on exports using data from a large developing nation. Defever et al. (2020) evaluated the firm export performance induced by export finance support using data from Pakistan. Li (2020) investigated the effect of reliance on external financing in ASEAN5 countries. He found that financial constraints resulting from high capital account openness or exchange rate depreciation negatively impact the average savings of firms using minimal external financing. However, it increases the average savings of firms using more external financing. Shim et al. (2020) analysed firm-level leverage data from 10 emerging market economies. They found that firms increase their foreign currency debts when the local currency appreciates and vice versa when it depreciates.

Financial institutions are crucial in financing trade by providing finance facilities to exporters. Studies have shown that Sharia and macroeconomic variables significantly influence Indonesian exports, with Foreign Exchange Islamic Bank financing, LPEI sharia financing, inflation, and exchange rate significantly influencing

Indonesian exports. Cho et al. (2019) found that existing bank debtors experience lower interest rates during real exchange rate appreciation, allowing them to export more profitably or increase their export volume. Small Colombian exporters prefer settlement in a currency with an established financial market and use vehicle currency during extreme exchange rate volatility periods. Bruno and Shin (2019) found that an appreciation of the U.S. dollar led banks to rely on wholesale Dollar funding to reduce their credit supply to firms. Fosu and Abass (2019) found that domestic credit improves export diversification in Africa but has a negligible effect on other economies. Silva and Pinto (2019) found that export intensity has an inverse relationship with the leverage ratio, with firms with a greater propensity for expansion being more leveraged. Sanati (2018) examined export financing in the form of subsidised export packaging credit as a significant determinant of India's export growth, finding that pre-shipment credit facilitates exports, with medium exporters being the most sensitive to pre-shipment credit. Gezici et al. (2018) found that limited capital on exports affects Turkish manufacturing firms, making firms more productive, profitable, and expansive with fewer constraints. St-Pierre et al. (2018) found that local collaboration among SMBs positively influences export growth and external financing availability. Hwang and Im (2017) found that declines in trade loans and documentary bills negatively affect Korean exports, especially small and medium-sized enterprises. These studies highlight the importance of adequate finance in promoting export growth and reducing constraints. Internal financing is a crucial trade finance source, particularly among multinational corporations and overseas subsidiaries.

Theoretical considerations and methodology

The study used an ex-post facto research design, examining data from the CBN, the Nigerian Bureau of Statistics, and the Nigerian Export-Import Bank. It covered twenty-two years from 2000 to 2022, focusing on Nigeria's democratic dispensation from 2000 to 2022.

The empirical presentation adopted for the study is similar to Isibor et al. (2018) but with slight modifications, as stated below:

Model 1: Agricultural Output

$$LGDPa = \beta0 + \beta1\ LRER + \beta2\ LYF + \beta3\ LMS + \beta4\ LINT + \mu \quad (1)$$

Model 2: Manufacturing Output

$$LGDPm = \beta0 + \beta1\ LRER + \beta2\ LYF + \beta3\ LMS + \beta4\ LINT + \mu \quad (2)$$

Where: YF = Foreign Income, proxied by Foreign Direct Investment; RER = Real effective exchange rate; MS= Money Supply; GDPa = Output for agricultural output; INT= Interest rate on Lending; GDPm= Stands for Output for Manufacturing Sector and μ= Stochastic error term

The functional models

$$SMEXL = f(EXCH, INTR, INFR, FPI) \quad (3)$$

$$MFEXL = f(EXCH, INTR, INFR, FPI) \quad (4)$$

$$AGEXL = f(EXCH, INTR, INFR, FPI) \quad (5)$$

The above functional models are transformed into econometric models, as shown below.

The model specification

$$SMEXL = \beta_0 + \beta_1 EXCH_t + \beta_2 INRT_t + \beta_3 INFR_t + \beta_4 FPI_t + \mu_t \quad (6)$$

$$MFEXL = \beta_0 + \beta_1 EXCH_t + \beta_2 INRT_t + \beta_3 INFR_t + \beta_4 FPI_t + \mu_t \quad (7)$$

$$AGEXL = \beta_0 + \beta_1 EXCH_t + \beta_2 INRT_t + \beta_3 INFR_t + \beta_4 FPI_t + \mu_t \quad (8)$$

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Where:

EXCH = exchange rate

INTR = Lending interest rate

INFR = inflation rate

FPI = foreign portfolio investment

SMEXL = Export loan to the solid mineral sector

MFEXL= Export loan to the manufacturing sector

AGEXL = Export loan to the Agricultural sector

β_0 = intercept

μ = stochastic variable

$\beta_1 - \beta_4$ = coefficients to be estimated f = functional notation

t = time subscript

RESULT, ANALYSIS, AND DISCUSSION

Table 4.1: Descriptive Statistics

	SMEXL	MFEXL	AGEXL	EXCH	INTR	INFR	FPI
Mean	585,134.40	3,972,408.00	8,266,177.00	198.8626	24.47913	12.57565	2.93E+09
Maximum	2,428,867.00	19,839,250.00	56,948,630.00	424.0800	30.60000	18.87000	1.50E+10
Minimum	7,767.37	25,627.56	68,893.68	101.7000	18.36000	6.330000	3,385,590.00
Std. Dev.	60,8851.00	4,754,681.00	15,133,755.00	100.0078	4.062014	3.546610	4.32E+09
Observations	23	23	23	23	23	23	23

Source: Author's Computation (2023): Export loan to the Solid Mineral sector (SMEXL), Export loan to the Manufacturing sector trade (MFEXL), Export loan to the Agricultural sector (AGEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI).

Table 4.1 presents descriptive statistics for various variables. SMEXL represents export loans to the solid mineral sector, with a mean of approximately ₦585,134.40, with a minimum of ₦7,767.37 and a maximum of ₦2,428,867.00. The standard deviation is ₦608,851.00, indicating a relatively large variation in loan amounts during the period. Similarly, MFEXL represents export loans to the Manufacturing sector. The mean export loan to Manufacturing sector trade is approximately ₦3,972,408.00, with a minimum of ₦25,627.56 and a maximum of ₦19,839,250.00. The standard deviation is ₦4,754,681.00, indicating a significant variation in loans to the Manufacturing sector. AGEXL represents export loans to the Agricultural sector. The mean export loan amount to the Agricultural sector is approximately ₦8,266,177.00 with a minimum of ₦68,893.68 and a maximum of ₦56,948,630.00. The standard deviation is ₦15,133,755.00, indicating a large variation in loan amounts to the agricultural sector.

EXCH represents the exchange rate. The mean exchange rate is approximately 198.8626, with a minimum of 101.70 and a maximum of 424.08. The standard deviation is 100.0078, indicating some variation in exchange rates. INTR represents interest rates. The mean interest rate is approximately 24.47913%, with a minimum of 18.36% and a maximum of 30.60%. The standard deviation is 4.062014, indicating a relatively small variation in interest rates. The INFR variable represents inflation rates. The mean inflation rate is approximately 12.57565%, with a minimum of 6.33% and a maximum of 18.87%. The standard deviation is 3.54661, indicating a moderate variation in inflation rates. FPI represents foreign portfolio investment. The mean investment amount is approximately US$2.93 billion, with a minimum of US$3,385,590.88 and a maximum of US$15 billion. The standard deviation is 4.32 billion, indicating a large variation in investment amounts.

Trends and pattern

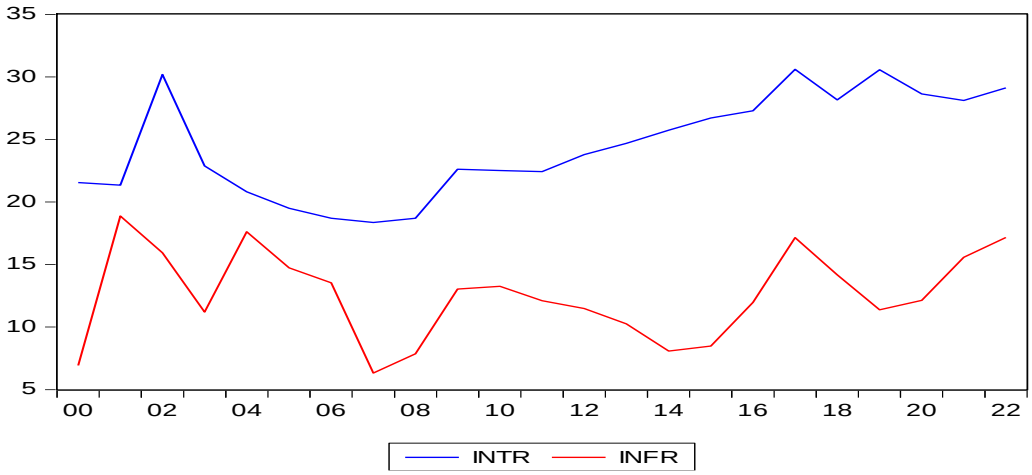

Figure 1: Trend of Interest Rate and Inflation Rate between 2000-2022.

Figure 1 shows the trend of the interest rate and inflation rate in Nigeria. The interest rate represents the cost of borrowing money from Nigerian Export-Import Bank (NEXIM). The interest rate fluctuated throughout the period, ranging from 18.36% in 2007 to 30.60% in 2017. There was never a single time where the rate was a single digit. The inflation rate measures the general increase in prices of goods and services over time. The inflation rate varied all through the twenty-three years. Five of the twenty-three years had a single-digit inflation rate, while others were double-digits. The minimum inflation rate was 6.33% in 2007 and peaked at 18.87% in 2001. This showed that Nigeria experienced periods of high inflation during this period.

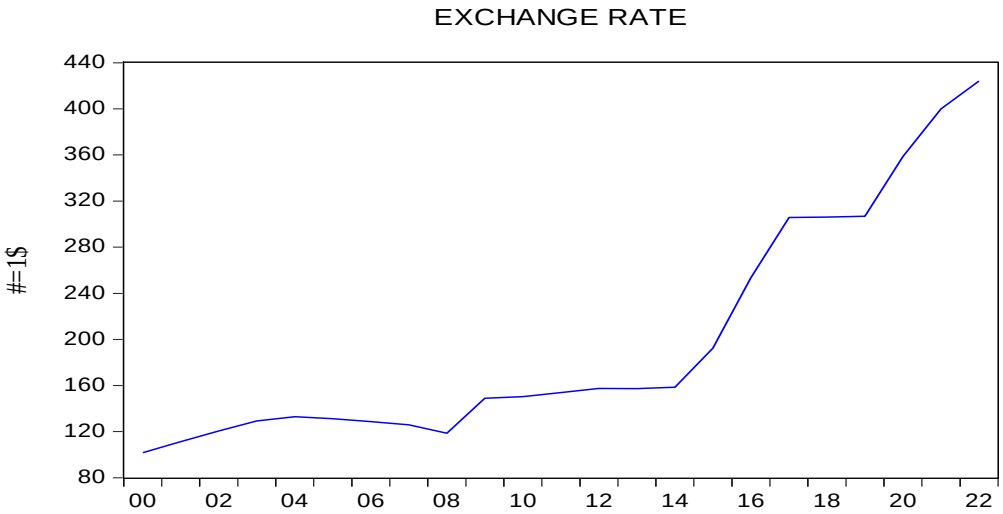

Figure 2: Trend of Exchange Rate (NGN/USD) between 2000-2022

Figure 2 presents the trend of exchange rates between 2000 and 2022. In the figure, the exchange rate shows the number of Naira required to purchase one US Dollar. The rate ranged from 101.70 in 2000 to 424.08 NGN/USD in 2022. There was over 200% depreciation in Naira within the twenty-three years. The rate

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depreciated all through the period except for the years 2005, 2006, 2007, 2008, and 2013, when the rate appreciated slightly by 1.22%, 2.00%, 2.21%, 5.75%, and 0.12% respectively.

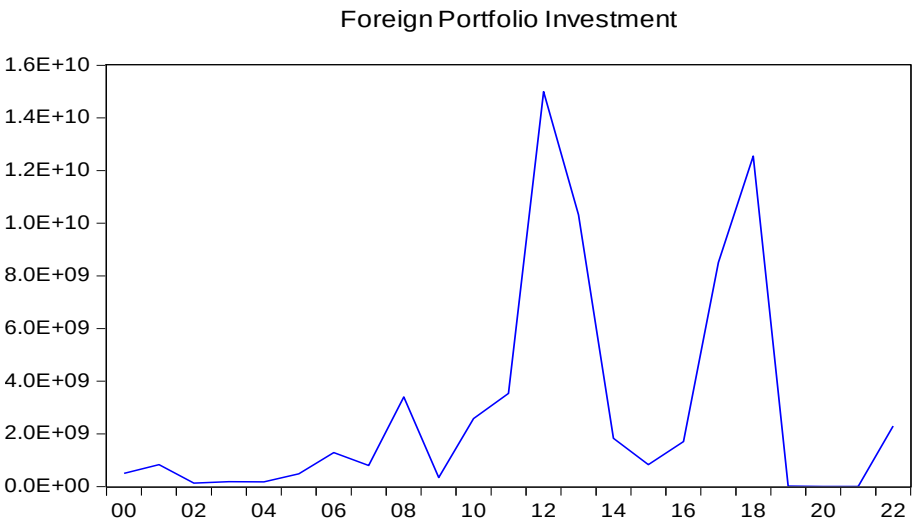

Figure 3: Trend of Foreign Portfolio Investment (USD) between 2000-2022. 3,385,589.88

Figure 3 provides data on Foreign Portfolio Investment (FPI) in USD millions. FPI represents the investment made by foreign individuals or institutions in Nigeria's financial assets, such as stocks and bonds. From 2000 to 2022, the FPI in Nigeria experienced fluctuations. It started at US$502.26 million in 2000, reached the lowest of US$3.9 million in 2021 and its peak at US$14.99 billion in 2012, and varied over subsequent years. In 2022, it amounted to US$2.3 billion. The FPI data reflects the interest of foreign investors in Nigeria's financial market and their confidence in the country's economy.

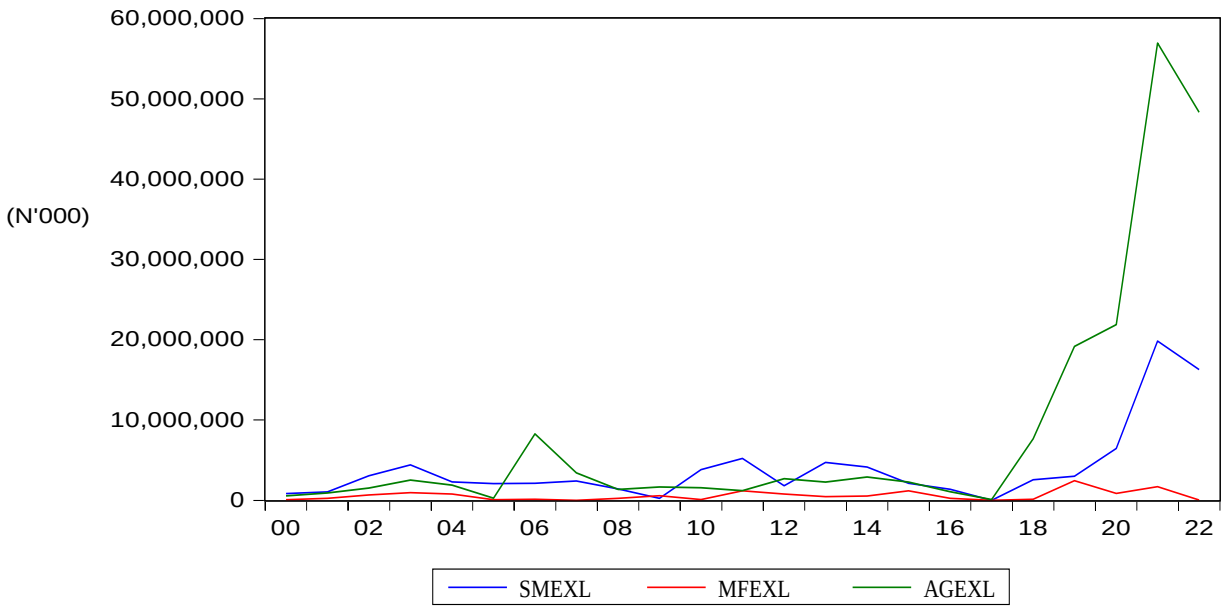

Figure 4: Trend of loans to the three sectors (NGN) between 2000-2022.

Figure 4 provides data on various loans allocated to different sectors, including manufacturing, agriculture, and solid minerals. The figure depicts that the loans to the manufacturing sector varied over the years, ranging from ₦25,627.56 million in 2017 to ₦19.84 billion in 2021. The sector experienced substantial growth in loan allocations, indicating support for industrial development. Loans allocated to the agriculture sector also showed significant variations. The data ranges from ₦68,893. 68 million in 2017 to ₦56,95 billion in 2021. The sector received increased attention and financial support, emphasising agricultural development and food security. The solid mineral sector includes mining and exploration activities for Nigeria's rich mineral

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resources. The loans allocated to the solid mineral sector also fluctuated, ranging from ₦7,767.37 million in 2017 to ₦2.43 billion in 2019.

Table 4.2: Correlation Matrix and Variance Inflation Factor

	LNSMEXL	LNMFEXL	LNAGEXL	EXCH	INTR	INFR	FPI	VIF
LNSMEXL	1							2.667910
LNMFEXL	0.467995	1						4.000985
LNAGEXL	0.412102	0.752542	1					3.840178
EXCH	0.005078	0.246855	0.584043	1				2.422124
INTR	0.175753	0.052055	0.296585	0.745325	1			1.183563
INFR	-0.067584	-0.073952	0.010797	0.319733	0.278577	1		1.082634
FPI	-0.176772	-0.196342	-0.132786	0.087071	0.150734	0.003771	1	2.667910
								2.838

Source: Author's Computation (2023): Export loan to the Solid Mineral sector(SMEXL), Export loan to the Agricultural sector (AGEXL), Export loan to the Manufacturing sector trade (MFEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI)

Table 4.2 presents a correlation matrix and the Variance Inflation Factor (VIF) for the variables included in the analysis. The correlation matrix provides information on the strength and direction of the relationships between the variables, while the VIF helps assess multicollinearity by measuring the extent to which the variance of an estimated regression coefficient is inflated due to correlation with other variables.

The exchange rate (EXCR) has a weak positive correlation of 0.005 with LNSMEXL, a slightly weaker positive correlation of 0.247 with LNMFEXL, and a moderate positive correlation of 0.584 with LNAGEXL. These correlations suggest that the exchange rate has a relatively weak or moderate relationship with export loans in the analysed sectors. Interest rates (INTR) show a weak positive correlation of 0.176 with LNSMEXL, a very weak positive correlation of 0.052 with LNMFEXL, and a slightly weak positive correlation of 0.297 with LNAGEXL. Inflation rates (INFR) exhibit a weak negative correlation of -0.068 with LNSMEXL, a weak negative correlation of -0.074 with LNMFEXL, and a very weak positive correlation of 0.011 with LNAGEXL. These correlations suggest that inflation rates have a weak relationship with the analysed variables. Foreign portfolio investment (FPI) shows a weak negative correlation of -0.177 with LNSMEXL, a weak negative correlation of -0.196 with LNMFEXL, and a weak negative correlation of -0.133 with LNAGEXL; these correlations indicate that foreign portfolio investment has a weak negative relationship with the analysed variables.

The VIF values in the last column of the table indicate the level of multicollinearity in the regression models that include these variables. Higher VIF values suggest higher levels of multicollinearity. In this case, the VIF values range from 1.083 to 4.001, indicating that multicollinearity is not a severe concern among the analysed variables.

Table 4.3: Augmented Dickey-Fuller Test in Intercept Model at Levels and First Difference

Variables	ADF		Critical Value	Lag Length	Order of Integration
	Levels	First Difference			
LNSMEXL	-3.6258	-	-3.004861	2	I(0)
LNMFEXL	-3.2139	-	-3.004861	2	I(0)
LNAGEXL	-2.3343	-6.0470	-3.004861	2	I(1)
EXCH	2.0223	-3.0289	-3.004861	2	I(1)
INTR	-1.62017	-6.17644	-3.004861	2	I(1)
INFR	-3.321451	-	-3.004861	2	I(0)
LNFPI	-3.58403	-	-3.004861	2	I(0)

Source: Author's Computation (2023): Export loan to the Solid Mineral sector (LNSMEXL), Export loan to the Agricultural sector (LNAGEXL), Export loan to the Manufacturing sector trade (LNMFEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI).

Table 4.3 presents the results of the Augmented Dickey-Fuller (ADF) test for the variables included in the analysis. The ADF test is commonly used to determine whether a time series is stationary or non-stationary. The table provides the ADF test statistic, critical value, lag length, and the order of integration for each variable at the levels and after taking the first difference. The ADF test results indicate that LNSMEXL (-3.6258.), LNMFEXL(-3.2139), INFR (-3.3215), and LNFPI (-3.5840) are stationary at the levels (I(0)) against the critical value of -3.0049, meaning they do not require differencing. LNAGEXL (-2.3343), EXCH (2.0223), and INTR (-1.6202), on the other hand, are not stationary at the levels (I(0)), but they become stationary after taking the first difference (I(1)) (LNAGEXL (-6.0470), EXCH (3.0289), INTR(-6.1764)). These results provide insights into the order of integration and the stationarity properties of the variables, which are crucial for time series analysis and modelling.

Table 4.4: Bound Test for Co-integration Test

	F-statistic	K		Lower Bound	Upper bound
Model 1	4.971262	4	10%	2.45	3.52
Model 2	5.714701	4	5%	2.86	4.01
Model 3	5.080445	4	1%	3.74	5.06

Source: Author's Computation (2023): Export loan to the solid mineral sector (LNSMEXL), Export loan to the Agricultural sector (LNAGEXL), Export loan to the Manufacturing sector trade (LNMFEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI)

Table 4.4 presents the results of the Bound Test for Co-integration. This test examines whether a set of variables is co-integrated, indicating a long-term relationship among them. The table includes the F-statistic,

the number of variables (K), and the lower and upper bounds for different significance levels. The F-statistic for the first model is 4.971262, the lower bound is 5%, with a value of 2.86, and the upper bound is 4.01. Since the F-statistic exceeds both the lower and upper bounds, we can conclude that there is evidence of co-integration among the variables in model one. Similarly, The F-statistic for model 2 is 5.714701 as against the critical values of the lower and upper bounds values of 2.86 and 4.01, respectively, indicating evidence of co-integration among the variables in Model 2. Lastly, the F-statistic for the third model is 5.080445, which surpasses both the lower and upper bounds, suggesting the presence of co-integration among the variables in Model 3. In summary, the Bound Test for Co-integration results indicate evidence of co-integration among the variables in all three models. This finding suggests that there is a long-term relationship among the analysed variables, which is important for understanding their joint behaviour and conducting further analysis.

Table 4.5: Autoregressive Distributed Lag Model on Foreign Exchange Management and Export loan to the Solid Mineral sector in Nigeria

Variables	**Coefficient**	**Stand. Error**	**T-Statistics**	**P–Value**
Dependent Variable: LNSMEXL				
Short-run Coefficient and Error Correction Model				
D(EXCH)	-0.049623	0.020779	-2.388111	0.0328
D(INFR)	-0.019675	0.083574	-0.235422	0.8175
D(INTR)	0.182663	0.108074	1.690165	0.1148
D(LNFPI)	-0.378653	0.120876	-3.132583	0.0079
CointEq(-1)	-0.811590	0.208689	-3.889003	0.0019
Long-Run Coefficient				
EXCH	-0.009417	0.005957	-1.580951	0.1379
INFR	-0.284030	0.158570	-1.791195	0.0966
INTR	0.396999	0.185030	2.145590	0.0514
LNFPI	-0.466557	0.173108	-2.695186	0.0184
C	18.613613	4.547193	4.093429	0.0013
R-Squared	0.747599			
Adjusted R-Squared	0.541089			
F-Statistics	3.620164***(0.024248)			
Durbin Watson	2.22756			
Diagnostics Test				

Breusch-Godfrey Serial Correlation LM Test	1.19533 (0.3390)
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.62817 (0.7413)
Jargue-Bera Normality Test	0.484561 (0.8464)
Cusum Test	Stabled
Cusum Square Test	Stabled

Source: Author's Computation (2023): Export loan to the Solid Mineral sector (LNSMEXL), Export loan to the Agricultural sector (LNAGEXL), Export loan to the Manufacturing sector trade (LNMFEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI)

Table 4.6 presents the results of an Autoregressive Distributed Lag (ARDL) model applied to the relationship between exchange rate management and export loans to the solid mineral sector in Nigeria. The table includes coefficients for the short run, error correction model, and long-run coefficients. The error correction term represents the error correction coefficient, indicating the speed at which the system corrects deviations from the long-run equilibrium. The coefficient is -0.811590, implying that if the system is not in equilibrium, it will adjust at approximately 0.811590 units per period. This coefficient is statistically significant at a 1% significance level (p-value = 0.0019).

The short-run coefficient for EXCH is -0.049623, indicating that a one-unit increase in the exchange rate (EXCH) leads to a decrease of approximately 0.049623 units in the LNSMEXL. The coefficient is statistically significant at a 5% significance level (p-value = 0.0328). In the short run, the INFR coefficient is -0.019675, but it is not statistically significant at conventional significance levels (p-value = 0.8175). Furthermore, the INTR coefficient is 0.182663, suggesting that a one-unit increase in the change of interest rates (INTR) leads to an increase of approximately 0.182663 units in LNSMEXL. However, this coefficient is not statistically significant (p-value = 0.1148). LNFPI coefficient is -0.378653, indicating that a one-unit increase in the change of foreign portfolio investment (LNFPI) results in a decrease of approximately 0.378653 units in LNSMEXL. This coefficient is statistically significant at a 1% significance level (p-value = 0.0079).

In the long run, the EXCH coefficient is -0.009417, suggesting that in the long run, a one-unit increase in the exchange rate (EXCH) corresponds to a decrease of approximately 0.009417 units in LNSMEXL. However, this coefficient is not statistically significant (p-value = 0.1379). INFR coefficient is -0.284030, indicating that in the long run, a one-unit increase in inflation rates (INFR) results in a decrease of approximately 0.284030 units in LNSMEXL. This coefficient is not statistically significant at a 5% significance level (p-value = 0.0966). INTR coefficient is 0.396999, implying that in the long run, a one-unit increase in interest rates (INTR) leads to an increase of approximately 0.396999 units in LNSMEXL. This coefficient is marginally significant at a 10% significance level (p-value = 0.0514). LNFPI coefficient is -0.466557, suggesting that in the long run, a one-unit increase in foreign portfolio investment (LNFPI) corresponds to a decrease of approximately 0.466557 units in LNSMEXL. This coefficient is statistically significant at a 5% significance level (p-value = 0.0184).

The coefficient of determination is 0.541089, suggesting that the independent variables explain approximately 54.11% of the variation in the dependent variable. The F-statistic is 3.620164, indicating overall model significance. The associated p-value is 0.024248, suggesting the model is statistically significant at a 5% significance level.

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Diagnostics Tests:

Breusch-Godfrey Serial Correlation LM Test: The test statistic is 1.19533, with a p-value of 0.3390, indicating no evidence of serial correlation in the model residuals. Heteroskedasticity Test: Breusch-Pagan-Godfrey: The test statistic is 0.62817, with a p-value of 0.7413, suggesting no significant evidence of heteroskedasticity in the model residuals. Jarque-Bera Normality Test is 0.484561, with a p-value of 0.8464, indicating that the residuals of the model are normally distributed. Cusum and Cusum Square Tests suggest that the model is stable, indicating that the estimated coefficients remain consistent throughout the analysed period.

Table 4.6: Autoregressive Distributed Lag Model on foreign exchange management and export loans to the Agricultural sector in Nigeria.

Variables	**Coefficient**	**Stand. Error**	**T-Statistics**	**P–Value**
Depend-Var: LNAGEXL				
Short-run Coefficient and Error Correction Model				
D(EXCH)	-0.045621	0.019648	-2.321869	0.0371
D(INFR)	-0.185918	0.096834	-1.919974	0.0771
D(INTR)	0.086975	0.123396	0.704847	0.4933
D(LNFPI)	-0.242204	0.121347	-1.995953	0.0673
CointEq(-1)	-1.294181	0.272725	-4.745374	0.0004
Long-Run Coefficient				
EXCH	0.009495	0.003678	2.581835	0.0228
INFR	-0.231514	0.088565	-2.614061	0.0214
INTR	0.067205	0.092514	0.726434	0.4804
LNFPI	-0.453652	0.123703	-3.667281	0.0028
C	24.008574	2.707237	8.868294	0.0000
R-Squared	0.717980			
Adjusted R-Squared	0.544430			
F-Statistics	4.137010***(0.011701)			
Durbin Watson	2.428345			
Diagnostics Test				
Breusch-Godfrey Serial Correlation LM Test	2.87225 (0.4184)			

Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.62817 (0.7413)
Jargue-Bera Normality Test	2.5589 (0.2782)
Cusum Test	Stabled
Cusum Square Test	Stabled

Source: Author's Computation (2023): Export loan to the Solid Mineral sector(LNSMEXL), Export loan to the Agricultural sector (LNAGEXL), Export loan to the Manufacturing sector trade (LNMFEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI)

Table 4.6 presents the results of the relationship between foreign exchange management and export loans to the Agricultural sector in Nigeria (LNAGEXL). The coefficient for the lagged error correction term is -1.294181. It is statistically significant with a t-statistic of -4.745374 and a p-value of 0.0004, suggesting a strong and significant long-term relationship between the variables, and any deviations from this relationship are corrected in the short run. In the short run, the EXCH coefficient is -0.045621. It is statistically significant with a t-statistic of -2.321869 and a p-value of 0.0371, suggesting that changes in the exchange rate have a negative and significant impact on export loans to the Agricultural sector in the short run. INFR coefficient of is -0.185918. It is not statistically significant at the conventional 5% level, with a t-statistic of -1.919974 and a p-value of 0.0771. This suggests that changes in the inflation rate may have a negative impact on export loans to the Agricultural sector, but it is not statistically significant. INTR coefficient is 0.086975. It is not statistically significant, with a t-statistic of 0.704847 and a p-value of 0.4933, indicating that changes in interest rates do not have a significant effect on export loans to the Agricultural sector in the short run. LNFPI coefficient is -0.242204. It is not statistically significant at the conventional 5% level, with a t-statistic of -1.995953 and a p-value of 0.0673. This suggests that changes in foreign portfolio investment may have a negative impact on export loans to the Agricultural sector, but it is not statistically significant.

In the long run, the coefficient for the exchange rate (EXCH) is 0.009495. It is statistically significant with a t-statistic of 2.581835 and a p-value of 0.0228, suggesting that the exchange rate has a positive and significant impact on export loans to the Agricultural sector in the long run. INFR long run coefficient is -0.231514. It is statistically significant with a t-statistic of -2.614061 and a p-value of 0.0214, indicating that the inflation rate negatively and significantly affects export loans to the Agricultural sector in the long run. INTR coefficient is 0.067205. It is not statistically significant, with a t-statistic of 0.726434 and a p-value of 0.4804, suggesting that the interest rate does not have a significant impact on export loans to the Agricultural sector in the long run. LNFPI coefficient is -0.453652. It is statistically significant with a t-statistic of -3.667281 and a p-value of 0.0028, indicating that foreign portfolio investment has a negative and significant effect on export loans to the Agricultural sector in the long run.

The adjusted R-squared value is 0.54443, indicating that the model explains approximately 54.4% of the variation in export loans to the Agricultural sector. The F-statistic is 4.137010, indicating that the overall model is statistically significant. The p-value (0.011701) suggests that the model is significant at a 5% significance level.

Diagnostics Tests:

The table includes several diagnostic tests for the model, including the Breusch-Godfrey Serial Correlation LM Test, the Heteroskedasticity Test (Breusch-Pagan-Godfrey), and the Jarque-Bera Normality Test. The statistics and p-values indicate the absence of significant serial correlation, heteroskedasticity, and normality violations in the model residuals. The Cusum Test and Cusum Square Test are reported as "Stable," suggesting stability in the model's coefficients over time.

Table 4.7: Autoregressive Distributed Lag Model on Foreign Exchange Management and Export Loan to the Manufacturing Sector Nigeria

Variables	**Coefficient**	**Stand. Error**	**T-Statistics**	**P–Value**
Dependent Variable: LNMFEXL				
Short-run Coefficient and Error Correction Model				
D(EXCH)	-0.047744	0.014243	-3.352089	0.0047
D(INFR)	-0.173548	0.080600	-2.153208	0.0492
D(INTR)	0.143742	0.102775	1.398610	0.1837
D(LNFPI)	-0.067446	0.113500	-0.594234	0.5618
CointEq(-1)	-0.979318	0.197327	-4.962925	0.0002
Long-Run Coefficient				
EXCH	0.001041	0.004367	0.238489	0.8150
INFR	-0.177213	0.077749	-2.279302	0.0388
INTR	0.146778	0.106864	1.373501	0.1912
LNFPI	-0.522634	0.149671	-3.491880	0.0036
C	24.457303	3.214186	7.609174	0.0000
R-Squared	0.747599			
Adjusted R-Squared	0.541089			
F-Statistics	3.620164***(0.024248)			
Durbin Watson	2.22756			
Diagnostics Test				
Breusch-Godfrey Serial Correlation LM Test	1.19533 (0.3390)			
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.62817 (0.7413)			
Jargue-Bera Normality Test	4.0922 (0.12924)			
Cusum Test	Stabled			
Cusum Square Test	Stabled			

Source: Author's Computation (2023): Export loan to the Solid Mineral sector(LNSMEXL), Export loan to the Agricultural sector (LNAGEXL), Export loan to the Manufacturing sector trade (LNMFEXL), Exchange Rate (EXCH) interest rate (INTR) inflation rate (INFR) foreign portfolio investment (FPI)

Table 4.7 presents the results of an Autoregressive Distributed Lag (ARDL) model applied to the relationship between exchange rate management and export loans to the Manufacturing sector in Nigeria. ECT (-1) represents the error correction coefficient, indicating the speed at which the system corrects deviations from the long-run equilibrium. The coefficient is -0.979318, implying that if the system is not in equilibrium, it will adjust at approximately 0.979318 units per period. This coefficient is statistically significant at a 5% significance level (p-value = 0.0002).

In the short run, the EXCH coefficient is -0.047744, indicating that a one-unit change in the exchange rate (EXCH) leads to a decrease of approximately 0.047744 units in the LNMFEXL. The coefficient is statistically significant at a 5% significance level (p-value = 0.0047). INFR coefficient is -0.173548, suggesting that a one-unit increase in inflation rates leads to a decrease of approximately 0.173548 units in LNMFEXL. This coefficient is statistically significant at a 5% significance level (p-value = 0.0492). INTR coefficient is 0.143742, indicating that a one-unit increase in interest rates (INTR) increases approximately 0.143742 units in LNMFEXL. However, this coefficient is not statistically significant (p-value = 0.1837). LNFPI coefficient is -0.067446, suggesting that a one-unit increase in the change of foreign portfolio investment (LNFPI) corresponds to a decrease of approximately 0.067446 units in LNMFEXL. This coefficient is not statistically significant (p-value = 0.5618).

In the long-run, the EXCH coefficient is 0.001041, suggesting that a one-unit increase in the exchange rate (EXCH) in the long run corresponds to an increase of approximately 0.001041 units in LNMFEXL. This coefficient is not statistically significant (p-value = 0.8150). INFR coefficient is -0.177213, indicating that in the long run, a one-unit increase in inflation rates (INFR) leads to a decrease of approximately 0.177213 units in LNMFEXL. This coefficient is statistically significant at a 5% significance level (p-value = 0.0388). INTR coefficient is 0.146778, implying that in the long run, a one-unit increase in interest rates results in an increase of approximately 0.146778 units in LNMFEXL. However, this coefficient is not statistically significant (p-value = 0.1912). LNFPI coefficient is -0.522634, suggesting that in the long run, a one-unit increase in foreign portfolio investment (LNFPI) corresponds to a decrease of approximately 0.522634 units in LNMFEXL. This coefficient is statistically significant at a 5% significance level (p-value = 0.0036).

The coefficient of determination is 0.5411, suggesting that the independent variables explain approximately 54.1% of the variation in the dependent variable. The F-statistic is 3.620164, indicating overall model significance. The associated p-value is 0.024248, suggesting the model is statistically significant at a 5% significance level.

Diagnostics Tests:

Breusch-Godfrey Serial Correlation LM Test is 1.19533, with a p-value of 0.3390, indicating no evidence of serial correlation in the model residuals. Similarly, the Heteroskedasticity Test of Breusch-Pagan-Godfrey is 0.62817, with a p-value of 0.7413, suggesting no significant evidence of heteroskedasticity in the model residuals. Jarque-Bera Normality Test is 4.0922, with a p-value of 0.12924, indicating that the model's residuals are normally distributed. Lastly, Cusum and Cusum Square Tests suggest the model is stable, indicating that the estimated coefficients remain consistent throughout the analysed period.

DISCUSSION OF RESULT

The three sectors had the lowest loans in 2017, largely due to an over 160% drop in Bank of Industry refinancing facility lending to exporters. This reduction affected the borrowers in the three sectors. However, in 2019, NEXIM's focus, among other areas, was the solid mineral sector. As a result, the sector got its peal loans in 2019. The manufacturing and agriculture sectors experienced the highest rise in 2021, being post-COVID-19. This was needed to revive the economy and recover from COVID-19 losses.

The result showed that exchange rate, inflation rate, interest rate and foreign portfolio investment jointly influence the availability of loans to manufacturing, solid mineral, and agricultural sectors. The findings from this study have important implications for understanding the relationship between foreign exchange management and export loans in Nigeria, specifically in the manufacturing, solid mineral, and agricultural

sectors. The study reveals that changes in the exchange rate have a significant short-run impact on export loans to the solid mineral sector. A devaluation in the exchange rate leads to a decrease in export loans, highlighting the importance of exchange rate stability for promoting export activity in this sector. Mining is capital-intensive and requires much input. The output of this sector serves as input for other sectors like manufacturing, construction, and transportation. This study aligns with Igogo et al. (2021) and Ajie et al. (2019). The result also showed that changes in the exchange rate negatively and significantly impact export loans to the agricultural sector in the short run. This demonstrates how lending to agriculture reduces as Naira depreciates; this is explained by the fact that Naira depreciation causes imported inputs like plant and machinery to be more expensive, which can negatively affect the demand for loans in agricultural loans; this relates to Mesagan et al. (2021) but differs from Ndubuaku et al. (2019). The findings further showed a long-run significant positive impact on loans in this sector. The result aligns with the fact that when the exchange rate depreciates, the exports become cheaper in the international market, increasing demand. In order to meet the rise in demand, more loans will be required, hence the increase in loans. This result is similar to Isibor et al. (2018) and Ali (2020). The result of both the short-run and long-run impact on the export loans is akin to Adekunle and Innocent (2018). The finding showed that changes in the exchange rate have a significant short-run impact on export loans to the manufacturing sector. The devaluation of the exchange rate led to a fall in manufacturing export loans. This is likened to the fact that when the Naira depreciates, it costs more to import, and since the majority of input required by manufacturers is imported, the products become more expensive, which can cause manufacturers to slow down if sales reduce. This is similar to Vo et al. (2019), Doki et al. (2021) and Rasbin et al. (2021). This finding is contrary to those of Kousar et al. (2022), Ali (2020), and Olubiyi et al. (2020), which found a positive long-run relationship between exchange volatility and export.

The result showed that inflation rates have short-run and long-run impacts on loans to the manufacturing and agricultural sectors; higher inflation rates are associated with decreased export loans, emphasising the need to control inflation to support trade activities. Contrarily, changes in inflation have an insignificant impact on loans to solid minerals. The lending rate has no short-run significant impact on loans to manufacturing, agricultural and solid mineral sectors and no long-run significant impact on manufacturing and agricultural loans; an increase in interest rate will not necessarily increase or decrease available loans to the sectors; this is similar to Taiga and Adofu (2021) but differs from Sobko and Klonowska-Matyyna (2019) However, the rate has a long-run positive impact on loans to solid minerals.

Furthermore, the study highlights the role of foreign portfolio investment in the solid mineral, agricultural, and manufacturing sectors. Changes in foreign portfolio investment have had a significant long-run effect on export loans to the three sectors, indicating the influence of foreign investors on the financing of exports. This underscores the importance of attracting and maintaining foreign investment for sustaining export activities in Nigeria. In the long run, the study suggests that foreign portfolio investment plays a significant role in predicting export loans. This implies that maintaining a conducive investment climate and implementing measures to control inflation is crucial for the long-term sustainability of export activities.

CONCLUSION AND RECOMMENDATIONS

The findings from this study have important implications for understanding the relationship between foreign exchange management and export loans in Nigeria, specifically in the agricultural, solid minerals and manufacturing sectors. The study reveals that changes in the exchange rate have a significant short-run impact on export loans to the three sectors. A depreciation in the exchange rate leads to a decline in export loans, highlighting the importance of exchange rate stability for promoting export activity in these sectors. Changes in the inflation rate do not significantly impact loans to solid mineral and agro sectors; however, loans to manufacturing sectors are adversely impacted when the inflation rate rises. There is a need for a single-digit inflation rate to support export performance in the manufacturing sector.

The government needs to introduce monetary and fiscal policies to control the inflation rate, like a reduction in the money supply through sales of government securities, an increase in the cash reserve ratio of banks and judicious funding of government expenditure. The interest rate has a significant impact on solid minerals and agricultural sectors; policymakers need to reduce lending rates to support lending to the two sectors. The FPI also has a significant impact on the three sectors; the monetary policies need to encourage foreign portfolio

investment. The government needs to continue introducing policies that will support export growth, maintain a conducive investment climate, and implement measures to reduce interest rates and inflation rates and stabilise the exchange rate for the long-term sustainability of export activities.

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