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Foreign Exchange Rate Factors and Firm Performance: An Empirical Analysis of Nigeria's Manufacturing Sector

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Abstract: *This study investigates the impact of key macroeconomic variables on the return on equity (ROEQ) of listed manufacturing firms in Nigeria. Using Ordinary Least Squares (OLS) regression analysis, the research examines the influence of real effective exchange rate (REER), interest rate (INTR), inflation rate (INF), and market structure and pricing (MSP) on firm performance. Diagnostic tests, including heteroskedasticity tests, Ramsey RESET test, and Augmented Dickey-Fuller (ADF) test, were conducted to ensure model validity. The Granger causality test identified bidirectional relationships between REER and ROEQ, as well as INF and ROEQ. The OLS results indicate a strong predictive power, with an adjusted R^2 value of 0.984, confirming that the independent variables explain 98% of the variations in ROEQ. The findings highlight the critical role of exchange rate fluctuations, interest rate policies, and inflation stability in shaping firm performance, offering valuable insights for policymakers and industry stakeholders.*

Keywords: *Macroeconomic variables, Return on equity, Granger causality, OLS regression, Model validation*

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1.0 Introduction

Economically, nations can be stratified into industrialized (developed) and non-industrialized (developing) nations based on the consideration that developmental drives are pioneered by the industrial sectors (Chet *et al*., 2017). This also suggests that the contribution of other sectors is minimal in ascertaining the ranking of a nation. Although the consequences vary, efficient governance operates under this foundation and those that have achieved the concept are among the developed nations while those that are yet to attain industrialization are ranked among the developing nations. However, Nigeria is one of the nations that are in the classification termed, developing, indicating that we are still faced with challenges and hurdles that have impeded industrial acceleration and subsequent upgrading to the developed and industrialized nations of the world (Philip *et al*., 2019).

The industrial development of a nation can be significantly affected by foreign exchange, especially when most of the raw materials need to be imported. Fluctuation in the foreign exchange rate refers to the persistent fluctuations of the exchange rate, which often results in persistent depreciation of the home currency. A (Morina *et al*., 2020).

In Nigeria, several factors have been responsible for the fluctuation in the EXR. Before 1883, the exchange rate (EXR) regarding the dollar was above the naira with zero decimal places because all economic factors were operating mutually towards a

well-defined course. Reported data indicated from 0.55 to 0.89 between 1980 to 1985; between 1986 and 1991, the exchange rate rose from 2.02 to 9.11 naira per dollar. A further increase up to 102.10 was observed in 1999. However, between 2001 and 2015, the rate rose from 111.93 to 196.99. The worst observation set in around 2016 with EXR figure of 305.22 and up to date no significant positive growth has been achieved concerning the exchange rate (as illustrated in Fig. 1). Several factors are responsible for the fluctuation in FEXR in Nigeria. Currently, a dollar is been exchanged at one thousand naira. Given the unsteady nature of the Nigerian economy, the exchange rate and the need to encourage industrial development as a solution to the existing economic problem, the present study seeks to investigate the state of the nation's industrial sector concerning the performance of some firms in the country.

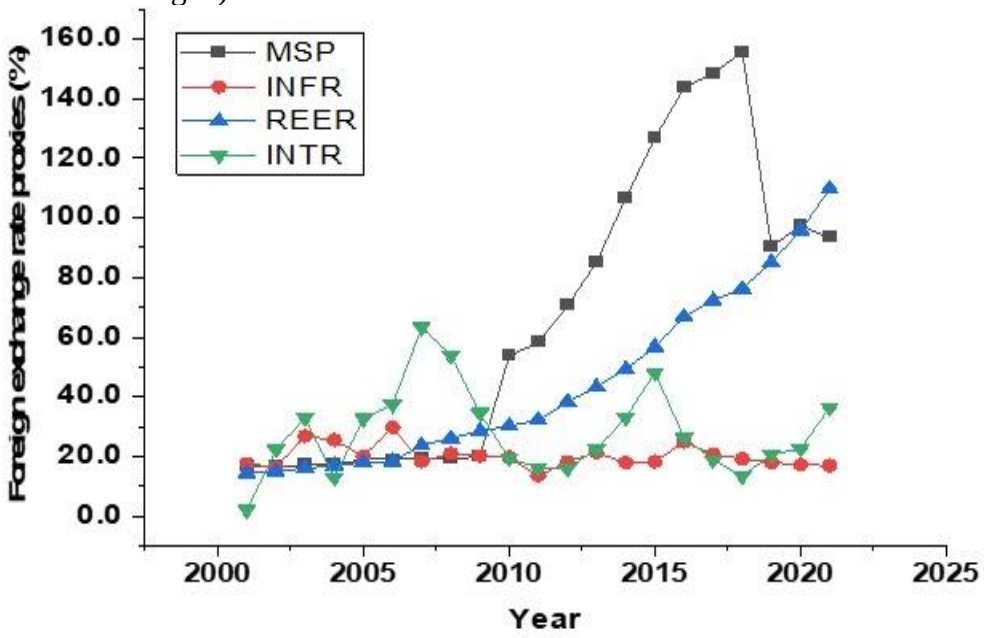

Fig. 1: Trend in Foreign exchange rate proxies between 2001 and 2021

1.1 Literature Review

According to Vogler *et* al. (2019), an exchange rate (EXR) is the measuring power of one currency to another and is often represented as the average rate over time or at a terminal time. Based on the IMF (2006)classification, EXR can be grouped into the market EXR, the official EXR and those that align with the listed two groups. However, other classifications are operative in several countries these include a conventional exchange rate (CFER) and crawling/Galloping Peg ER (Filardo *et al*., 2022; Frankel, 2003). Others include (C/GER), the floating EXR (Arslanalp, *et al*, 2022; Ca' Zorzi *et al*., 2022; Gebremariam, *et al*., 2022; Shaukat *et al*., 2022; Stošić *et al*, 2015; Thevakumar & Jayathilak, 2022).

The exchange rate can be affected by factors such as the inflation rate (INFR) which may impact a negative impact (Adekoya, 2022; Atigala, *et al*., 2022; Bashir, 2022; Sisay *et al*. 2022) or a minor impact (Chen (2022). Studies have also shown that the EXR of a nation can be affected by the prevailing interest rate

(INTR)(Ajayi *et al*., 2017; Apere & Akarara, 2019; Lee & Werner, 2022; Mushtaq & Siddiqui, 2016; Mohsen *et al*. (2022) and money supply (MSP) (Matres & Le, 2021; Omankhanlen *et al*., 2022; Omodero, 2019; Razia & Omarya, 2022; Salisu, 2022; Uche, 2018).

1.2 Empirical Review

The reports of the study conducted by Ali (2020) focused on the influence of exchange rate fluctuation (ERF) on the productivity of some manufacturing firms in Nigeria between 1981 to 2016. The source of data for the study was the World Band and Statistics; a bulletin of the Central Bank of Nigeria. The results of the study gave strong evidence that matched a positive correlation between the growth of the investigated firms with the ERF, although the correlation was insignificant at 0.05 level.

The employment of return on asset and equity for the evaluation of the pattern of changes between EXRF and industrial productivity was adopted by Bostan *et al*. (2019) for some firms in Ghana. The study was conducted to cover a period extending from 2009 to 2017 and the control variables employed for the study were imports, foreign direct investment and nominal INTR. Regression analysis did not fail to confirm that the growth of the selected manufacturing firms correlated negatively with the listed indices.

In Nigeria, the analysis reported Tams-Alasia *et al*. (2018) for the modelling of the relationship between the deregulation of ER and outputs from some Nigerian-based manufacturing firms was facilitated through the employment of ARDL test on annual time series data from 1986-2017. It was indicative that the results of the tests confirmed a negative relationship between industrial productivity and the prevailing ERF.

Victoria (2019) adopted the Cobb-Douglas model on growth and the Neo-Classical theory for the assessment of the impact of manufacturing strength, and exchange rate volatility on the economic growth of Nigeria between 1981 and 2015, A time series analysis of data was analysed using the Johansen Co-integration and Normalized Co-integration models indicated a long term relationship between the investigated variables and the nation's; economy and industrial productivity (Hjalmarsson & Österholm, 2007).

Alola *et al*. (2023), examined the effect of exchange rates on the productivity of some food industries. They reported an asymmetric pass-through relationship between exchange rate and monetary policy uncertainty and the growth of those sectors. The asymmetric casualty was interpreted as a positive shock in the exchange rate causing a positive shock in the tested sector.

The use of the panel vector autoregression model in the analysis of data to establish the relationship between EXR volatility and industrial productivity rate, consumer price inflation and short-term INTR for ten OECD countries was advocated by Ozceibi (2018). From the results obtained, the author deduced that exchange rate volatility is a secondary factor for the variation of EXR parity

Kassim *et al*. (2022) analysed the pattern of variation of EXR with income in some manufacturing sectors in Nigeria (2011-2020). Sixteen firms were observed and the study was supported by pooled panel regression statistics. They reported that EXR irregularity created effects on the financial earnings of the studied firms, especially in production outputs and sales. Short-term impacts were more severe than long-term impacts on the firms' productivity.

Bosnjak *et al*. (2021) carried out an analytical study on the dependence of industrial productivity on the EXR of Croatia. A positive relationship was observed between industrial growth and EXR. Depreciation was identified as a major that can slow down industrial growth. They employed correlation and

wavelet coherence analysis to deduce information from primary data.

1.3 Theoretical Framework

A theoretical framework is relevant in the consideration of theories that match exchange rate fluctuation. Consequently, some of the frameworks are highlighted as follows:

Balance of Payment Theory of Exchange Rate (BPTER)

The BPTER postulates that a foreign EXR in equilibrium will not shift from equilibrium as long as it maintains a stable account balance (Melvin & Norrbin, 2017). The theory backs the option that foreign EXR is determined solely by the trade deficit. Based on the BPTER, the trade deficit arising from excessive importation will face foreign EXR devaluation. Also, the theory supports the existence of a trade surplus for countries that are exporting more goods than the rate of imports, and hence the EXR would be strengthened (Musa, 1977).

Purchasing Power Parity Theory (PPPT)

The PPPT relates the exchange rate as a function of the ratio of one country's currency to the other currency. Consequently, the PPPT is the equivalency of the price rates of two economies to the exchange rates between their respective currencies (Wee & Lee, 2022).

Uncovered Interest Rate Parity Theory of Exchange Rate (UIRT-ER)

Based on the UIRT-ER, the relative change in foreign exchange rates over a given time is equal to the difference in interest rates (Jie & Liu, 2023). The UIRT-ER is based on the hypothesis that there is no foreign EXR or excess returns on foreign bonds that are equal to zero (Engel *et al*., 2019).

Abstinence or Waiting Theory of Interest Rate (A/WTINTR)

The A/WTINTR upholds that the reward of abstinence from immediate consummation of wealth is interest. The consequence also embraced the concept that asserts engaged in lending are those that are not utilized for consumption (Adenuga, 2020).

Mark-up Theory of Inflation Rate (MUTINFR)

The MUTINFR states that stimulated production and increased demand for factors of production can be caused by an increment in the process levels (Udo & Isaiah, 2018). The theory agrees that for inflation to occur, there must be cumulative effects of cost-push and demand-pull.

Classical School Theory of Money (CSTM)

The CSTM) is of the view that there exists a self-adjustment mechanism with the market system that operates to restore the economy to the natural level of the real GDP (Kates, 2018). According to Birol (2015), the major assumption of the CSTM is the full flexibility of prices and wages, which indicates the approach to perfect equilibrium and the automatic settlement for the economy at full employment. Consequently, this theory has been exposed to several critics.

2.3.7 Keynesian Position Theory of Money (KPTM)

The KPTM theory states that the sole aim of the central bank or other monetary regulatory authorities should be directed towards the control of the INTR and the displacement of unemployment by full employment (Dickens, 2011).

2.0 Materials and Methods

2.1 Research Design

In this study, the ex-post facto design was adopted since the study aims at establishing a relationship between cause and effect. By implication, the researcher has zero control over the intended variables because they are secondary data, which cannot be manipulated.

2.2 Population and Sampling Technique

Thirty-seven (37) quoted manufacturing firms in Nigeria, constituted the population of the study. However, fifteen (15) manufacturing

firms were employed for the analysis and consequently accounted for the sample size. The reason for adopting the sample size of fifteen (15) was that only the studied firms had available data during the period under review with CBN.

The judgmental sampling technique was adopted for the study and the sampling period was 20 years (2001-2021). The supporting evidence for the choice of the technique was based on the availability of data during the period expected for the collection of data.

2.3 Method of Data Collection

The secondary data needed to facilitate this study were extracted from the annual reports of the selected firms and the Statistical Bulletin of the Central Bank of Nigeria (2021). Other sources of secondary data were periodicals, journals, newspapers, etc.

2.4 Procedure for Data Analysis and Model Specification

Analysis of data for the descriptive statistics and the plotting of essential graphs were carried out using Origin 65 software (2022) while E-view version 7.0 (2022) was used for regression analysis. In the regression, the constant, coefficient and error terms were obtained after the calculations. The estimator also presented the t-test statistics and corresponding p-values. The p-value was centred at a 0.05% level of significance. An econometric process was employed in specifying the model required to achieve the proposed objectives. The regression model and the econometric models are shown in equations 1 and 2

$$ROE = (REER, INTR, INFR, MSP) \quad (1)$$

$$ROE = \beta_0 + \beta_1 REER + \beta_2 INTR + \beta_3 INFR + \beta_4 MSP + \mu \quad (2)$$

In the above-listed models, ROEQ is the dependent variable, i.e. return on equity. The independent variables were the interest rate (INTR), the real effective exchange rate (REER), the inflation rate (INFR) and the money supply (MSP). B_0 is the intercept of the relationship in the model, μ is the Stochastic Disturbance (Error Term), β_1 to β_4 define the coefficients of each of the independent variables and from the logarithm of the model, equation 3 was obtained,

$$\log(ROE) = \beta_0 + \beta_1 Rlog(EER) + \beta_2 \log(INTR) + \beta_3 Ilog(NFR) + \beta_4 \log(MSP) + \mu \quad (3)$$

Apriori Expectations, REER> 0

The proposed expectation is that the real effective exchange rate will have a positive effect on the ROEQ of quoted manufacturing firms in Nigeria, INTR < 0

The proposed inequality was guided by the expectation that the interest rate will exert a negative effect on the ROEQ of quoted manufacturing firms in Nigeria, INFR < 0

The results obtained were expected to align with the inflation rate showing a negative effect on the ROEQ of quoted manufacturing firms in Nigeria, MSP > 0

This model expectation of the result was based on money supply (MSP) exerting a positive effect on the ROEQ of quoted manufacturing firms in Nigeria.

2.5 Data Presentation

The study made use of secondary data obtained from the CBN statistical bulletin for the independent variables while data on the dependent variables were sourced from the annual bulletin of the various fifteen (15) firms used for the study. Foreign exchange rate variables; MSP, INFR, REER and INTR between 2001 and 2021 showed a trend demonstrated in Fig.1. The Figure shows that the percentage supply of (MSP) in 2001 was 1.55%, rose gradually to 19.88% in 2009 but showed a very sharp rise till 2018 with a maximum peak of 155.75% in that year. Since then, such value has never been observed in Nigeria's economic profile, rather a very steep

drop to 90.31% in 2019, followed by a slow rise to 95.8% in 2022 and a dip to 93.39% in 2021. The pattern observed for the MSP for the review period shows some irregularity but the effect on the ROEQ; exchange rate displayed no fluctuation over the period rather, the REER kept rising steadily between 2001 and 2021 with a corresponding value of 14.43% and 109.8% respectively. Numerically, there are many quoted manufacturing firms in Nigeria, but the researcher limited the study to only fifteen (15). Although there are several sectors in the manufacturing industries, the researcher concentrated on firms that manufacture consumer goods.

2.0 Results and Discussion

Figs. 2 to 5 illustrate the return on equity (ROEQ) trends for fifteen quoted manufacturing companies in Nigeria, as extracted from their annual financial bulletins. These trends provide insights into the financial performance of these firms over time and their susceptibility to fluctuations in foreign exchange rates. Given that manufacturing firms rely heavily on imported raw materials and machinery, variations in currency valuation can significantly impact their profitability.

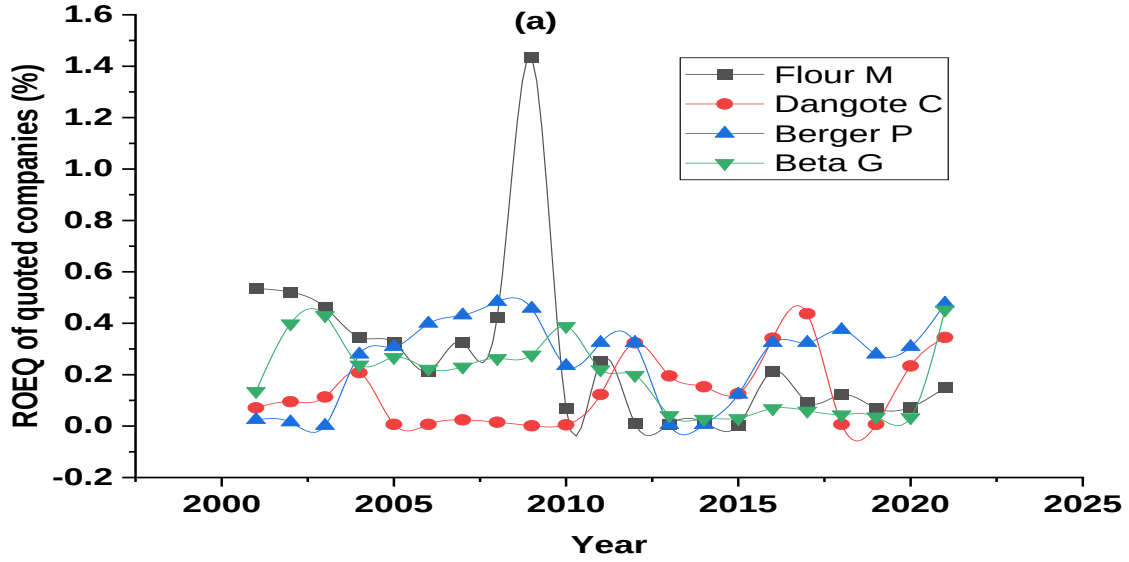

Fig. 2: ROEQ for Flour Mills (Flour M), Dangote Cement (Dangote C), Berger Paint (Berger P) and Beta Glass (Beta G) between 2001 and 2021

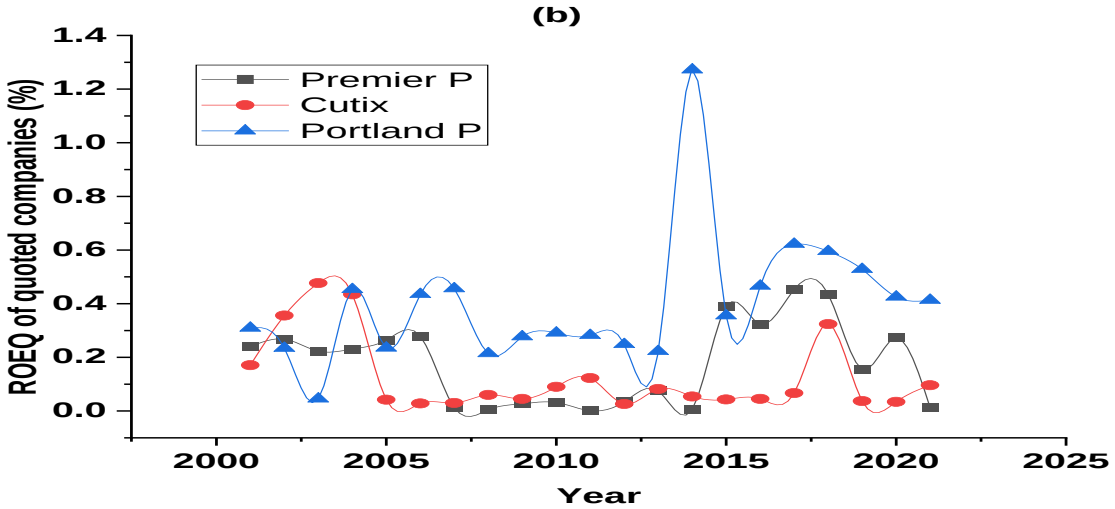

Fig. 3: ROEQ for Premier Paint (Premier P); Cutix and Portland Paint (Portland P) between 2001 and 2021

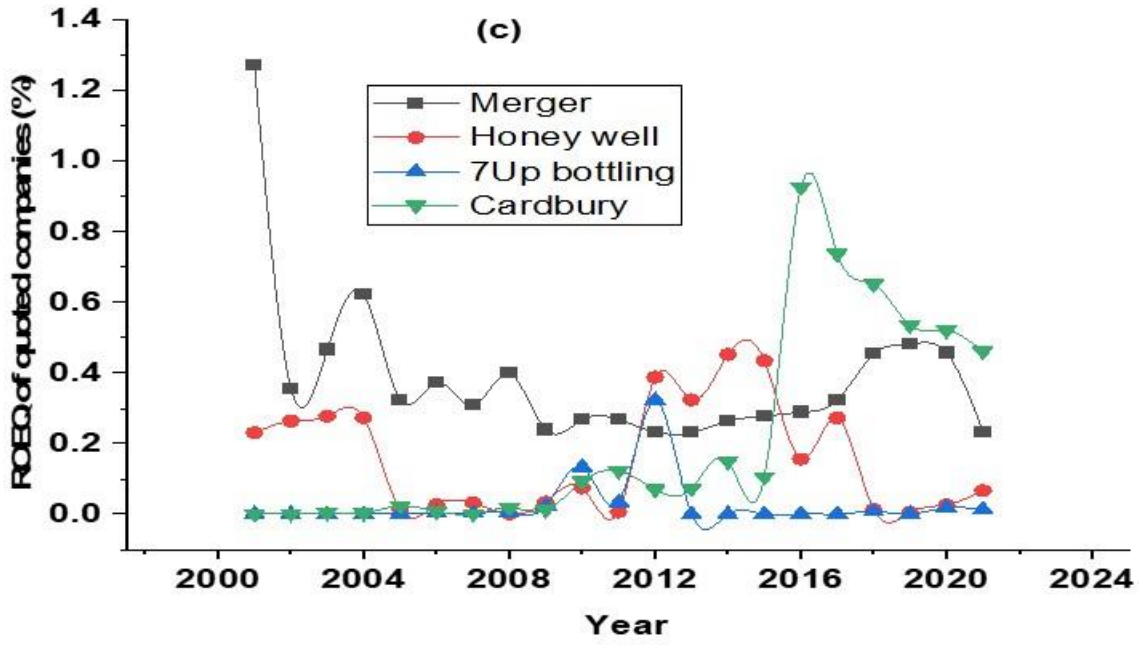

Fig. 4: ROEQ for Merger Paint, Honey Well, 7up bottling and Cadbury between 2001 and 2021

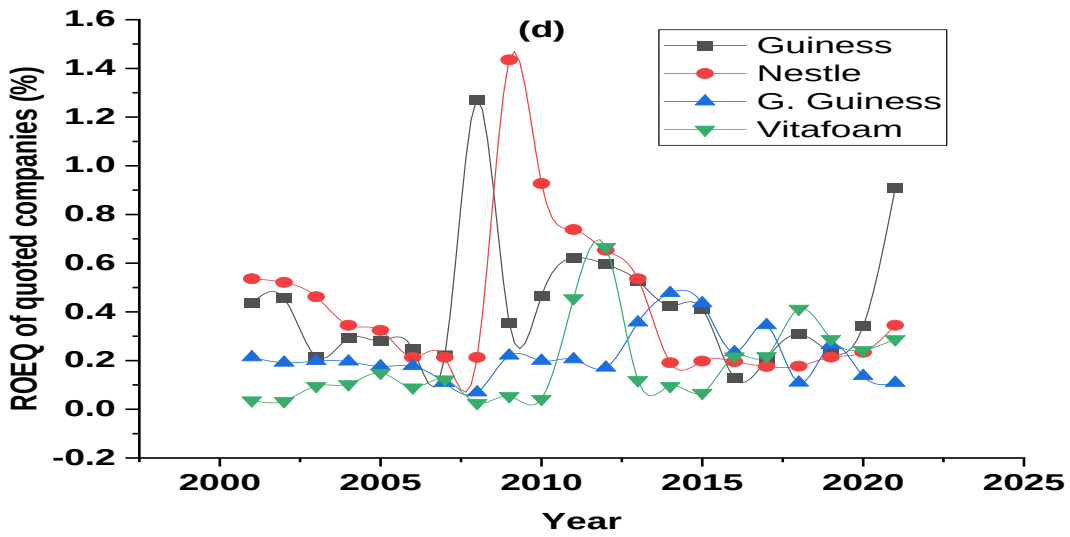

Fig. 5: ROEQ for Guinness, Nestle Plc, Golden Guinness (G. Guinness) and Vita foam between 2001 and 2021

The figures presented in this study illustrate the return on equity (ROEQ) trends of various manufacturing companies in Nigeria over the period from 2001 to 2021. These trends provide valuable insights into the financial performance of these firms and how fluctuations in foreign exchange rates may have influenced their equity returns. Given the reliance of manufacturing firms on imported raw materials, machinery, and other inputs, volatility in foreign exchange rates is expected to play a significant role in determining profitability and overall financial health.

Fig. 2 depicts the ROEQ trends for Flour Mills (Flour M), Dangote Cement (Dangote C), Berger Paint (Berger P), and Beta Glass (Beta G). The observed fluctuations in ROEQ suggest that these firms experienced varying degrees of profitability over the years, which could be attributed to economic conditions, market demand, and changes in production costs influenced by exchange rate movements. Flour Mills, for instance, exhibits a significant spike in ROEQ at certain points, indicating a period of high profitability. This may be linked to favourable currency valuation, government policies supporting local production, or a surge in demand for its products. Dangote Cement maintains a relatively stable yet low ROEQ, which suggests a more controlled financial performance, possibly due to its dominance in the cement industry and ability to hedge against exchange rate risks. Berger Paint and Beta Glass, on the other hand, display more pronounced fluctuations, likely reflecting the direct impact of foreign exchange volatility on their imported raw materials and operational costs.

Fig. 3 highlights the ROEQ patterns for Premier Paint (Premier P), Cutix, and Portland Paint (Portland P). The trends in this figure show that these firms experienced varying financial performances, with some displaying more stable growth while others witnessed sharp fluctuations. Given that the paint and electrical cable industries rely heavily on imported chemicals and raw materials, changes in the exchange rate could significantly affect their production costs and, in turn, their profit

margins. The observed volatility in ROEQ among these firms further underscores the broader economic challenge posed by fluctuating foreign exchange rates on manufacturing firms. Firms with higher adaptability in sourcing local alternatives or hedging against currency risks may have better sustained their profitability over time.

Fig. 4 presents the ROEQ dynamics of Merger Paint, Honey Well, 7Up Bottling, and Cadbury over the same period. The data reveal significant variations, with Merger Paint experiencing an initial peak followed by a sharp decline, indicating that the company may have faced operational challenges or foreign exchange pressures that affected its returns on equity. Honey Well, a major player in the food processing industry, shows relatively stable performance with some fluctuations, possibly due to variations in the cost of imported food ingredients and packaging materials. 7Up Bottling, being part of the beverage sector, maintains a relatively low but stable ROEQ, which may reflect competitive market dynamics and cost pressures from currency fluctuations. Cadbury experienced a substantial rise in ROEQ around 2016, potentially due to increased market demand or strategic financial decisions, followed by a gradual decline, which could be linked to foreign exchange losses or changing consumer preferences.

Fig. 5 illustrates the ROEQ trends for Guinness, Nestle Plc, Golden Guinness (G. Guinness), and Vitafoam from 2001 to 2021. The observed trends indicate that these firms faced considerable financial volatility, likely influenced by fluctuating exchange rates and macroeconomic conditions. Nestle Plc and Guinness exhibited significant spikes at different periods, possibly due to increased revenue from market expansion or currency advantages that temporarily boosted their profitability. However, periods of decline could suggest challenges such as rising import costs, currency depreciation, or shifts in consumer spending power. Golden Guinness demonstrates relatively lower but stable ROEQ values, which may indicate a more conservative financial approach or less exposure to foreign exchange risks. Vitafoam, a company involved in foam manufacturing, experiences periodic fluctuations, likely reflecting changes in the cost of raw materials, many of which are imported.

The ROEQ analysis reveals that certain firms demonstrated superior financial performance, with an ROEQ index greater than unity. Specifically, Flour Mills, Portland Paint, Merger Paint, Golden Guinness, and Nestle Plc recorded the highest ROEQ values at different periods. Flour Mills achieved the highest ROEQ in 2009 (1.435), Portland Paint in 2014 (1.272), Merger Paint in 2001 (1.272), Golden Guinness in 2008 (1.272), and Nestle Plc in 2009 (1.435). Except for Merger Paint, all instances of ROEQ greater than 1.0 occurred between 2008 and 2009, a period that may have been characterized by favourable economic conditions, increased consumer demand, or beneficial exchange rate movements.

A second category of firms exhibited moderate ROEQ values, with indices ranging from 0.5 to less than 1.0. Only Vitafoam fell into this category, recording an ROEQ of 0.667 in 2012. The remaining firms had ROEQ values below 0.5, indicating relatively lower financial returns on equity investments.

The descriptive statistics for key foreign exchange rate variables between 2001 and 2021 are presented in Table 1. These variables include the Market Selling Price (MSP), Inflation Rate (INFR), Real Effective Exchange Rate (REER), and Interest Rate

(INTR), all of which influence the financial stability of manufacturing firms.

Table 1: Descriptive Statistics for Foreign Exchange Rate Variables (2001–2021)

Variable	Mean ± SD	Sum	Minimum	Maximum
MSP	66.38 ± 49.85	1394.01	16.55	155.75
INFR	20.08 ± 3.83	421.66	13.54	29.80
REER	44.47 ± 29.28	933.79	14.43	109.80
INTR	27.88 ± 14.65	585.40	2.00	63.30

Among these variables, MSP exhibited the highest mean value and standard deviation, suggesting significant fluctuations in currency valuation over the period. The Pearson correlation coefficient (r) between MSP and REER was 0.7928, indicating a strong positive relationship that was statistically significant (P-value = 0.0001823). Conversely, INFR showed an insignificant negative correlation with REER (r = -0.0723) and MSP (r = -0.1785), suggesting that inflationary pressures did not have a direct linear impact on currency valuation.

4.3 Diagnostic Tests and Model Validation

The diagnostic tests conducted to validate the robustness of the model included heteroskedasticity tests, Ramsey RESET test, and stationarity tests using the Augmented Dickey-Fuller (ADF) test.

Heteroskedasticity Test: The p-values for the observed R-squared in the heteroskedasticity test ranged from 0.305 to 0.4572, exceeding the critical value at a 5% significance level. This result suggests the acceptance of the null hypothesis, indicating that the residuals are not heteroskedastic in nature, confirming the homoscedasticity assumption of the model.

Ramsey RESET Test: The F-statistic from the Ramsey RESET test yielded a p-value of 0.001, which is below the 5% critical value. This supports the acceptance of the alternative hypothesis (H1), indicating that the model is structurally unstable and does not conform to financial form.

Stationarity Tests (Augmented Dickey-Fuller Test): The stationarity of the variables was examined using the Augmented Dickey-Fuller (ADF) test at different levels of differencing:

ROEQ: At the second difference I(2), the ADF test statistic (-3.412) was greater than the threshold value (-2.991) at the 5% significance level, confirming the absence of a unit root and indicating stationarity.

REER: The ADF test at the second difference I(2) produced a value of -5.6404, which is greater than the threshold value (-3.020) at a 5% significance level, confirming stationarity.

INTR: At the first difference I(1), the computed ADF test statistic (-4.391) was below the threshold value (-2.986), indicating the presence of a unit root and confirming that the series is stationary ($p < 0.05$).

INF: The ADF test at first difference I(1) produced a computed value of -3.357, which is greater than the threshold value (-2.986) at a 5% significance level, confirming stationarity.

The results of the stationarity tests suggest that all variables are stationary at the appropriate levels of differencing, making them suitable for further econometric analysis.

Granger Causality Test: Table 1 presents the results of the Granger causality test, evaluating causal relationships between the variables. Given that all p-values are below 0.05, the results confirm significant bidirectional causality between REER and ROEQ, as well as INF and ROEQ, while INTR only Granger causes ROEQ without reverse causality.

Table 1: Granger Causality Test Results for Macroeconomic Variables and ROEQ

Diagnostic Check	F-stat	Prob.	Conclusion
REER and ROEQ	10.1294	0.0009	REER Granger causes ROEQ
ROEQ and REER	7.62524	0.0035	ROEQ Granger causes REER
INTR and ROEQ	6.63804	0.0062	INTR Granger causes ROEQ
ROEQ and INTR	2.95789	0.0749	ROEQ does not Granger cause INTR
INF and ROEQ	0.81969	0.0062	INF Granger causes ROEQ
ROEQ and INF	8.85650	0.0487	ROEQ Granger causes INF

4.4 Test of Research Hypotheses

The Ordinary Least Squares (OLS) analysis provides statistical evidence for rejecting the null hypotheses and accepting the alternative hypotheses for the examined variables:

REER and ROEQ: The p-value of the t-test (0.0361) is less than 0.05, confirming that REER has a significant impact on the ROEQ of listed manufacturing firms in Nigeria.

INTR and ROEQ: The p-value (0.0316) at a 5% significance level suggests that INTR significantly affects ROEQ.

INF and ROEQ: The evaluated p-value (0.000) at a 5% level of significance confirms that INF significantly influences ROEQ.

MSP and ROEQ: The OLS analysis indicates a zero p-value, providing strong confidence in rejecting the null hypothesis. This suggests that MSP has a significant effect on the ROEQ of the listed Nigerian manufacturing firms.

The calculated R-squared (R^2) and adjusted R-squared (adjusted R^2) values for the OLS model were 0.987 and 0.984, respectively, indicating a strong predictive ability. This suggests that the independent variables (REER, INTR, INF, and MSP) explain at least 98% of the variations in ROEQ. The remaining 1.8% can be attributed to errors or other factors outside the model.

The Durbin-Watson test statistic of 2.231 suggests the presence of some degree of serial correlation over the study period. The global F-statistic (p-value = 0.000) confirms strong statistical significance at a 5% level, validating the inclusion of all independent variables (REER, INTR, INF, and MSP) in the model.

4.5 Discussion of Findings

The study provides strong empirical evidence affirming that fluctuations in foreign exchange rate factors (FERF) exert a significant effect on ROEQ in Nigeria's manufacturing sector. The statistical significance of REER, INTR, INF, and MSP as independent variables highlights their importance in explaining variations in ROEQ. The findings align with prior studies by Miller (1983, 2011), Souisa (2018), Kisseih. (2017), and Kiyabo & Isaga (2020) but deviate from perspectives presented by Lumpkin et al. (2009), Lumpkin & Dess (1996), and Huang et al. (2022).

Hypothesis 1: REER and ROEQ The results confirm a positive and significant relationship

between REER and ROEQ, supporting the notion that foreign exchange rate fluctuations impact firm performance. This aligns with Souisa (2018) but contrasts with findings from Lumpkin et al. (2009) and Lumpkin & Pidduck (2021).

Hypothesis 2: INTR and ROEQ The significant effect of INTR on ROEQ suggests that access to credit in the manufacturing sector plays a crucial role in improving capital structure and firm performance. These findings align with Kisseih. (2017) and Huang et al. (2022).

Hypothesis 3: INF and ROEQ The results indicate that the inflation rate (INF) significantly affects ROEQ, emphasizing the economic importance of stable price levels for goods and services. This conclusion is consistent with studies by Amin (2015), Ibrahim & Abu (2020), and Kiyabo & Isaga (2020).

Hypothesis 4: MSP and ROEQ The analysis confirms that market structure and pricing (MSP) significantly affect firm performance, supporting prior research by Rezaei & Ortt (2018), Lawal et al. (2018), and Ichsan *et al*. (2022). However, Souisa (2018) reported contrasting results.

Overall, the study establishes that REER, INTR, INF, and MSP are critical determinants of firm performance in Nigeria's manufacturing sector, with significant policy implications for economic stability and firm competitiveness.

5.1 Conclusion

The findings from this work reveal that foreign exchange rate factors significantly impact the return on equity (ROEQ) of listed manufacturing firms in Nigeria. The Granger causality test confirms a bidirectional causality between real effective exchange rate (REER) and ROEQ, as well as between inflation (INF) and ROEQ, while interest rate (INTR) only Granger causes ROEQ without reverse causality. The OLS regression results establish that REER, INTR, INF, and market structure and pricing (MSP) collectively explain 98% of the variations in ROEQ, demonstrating a strong predictive capacity. The positive and significant effect of REER on ROEQ underscores the influence of exchange rate fluctuations on firm performance, consistent with prior research. The impact of INTR on ROEQ highlights the role of credit access in enhancing firm performance, aligning with existing literature. The significant relationship between INF and ROEQ emphasizes the need for price stability to support firm growth and competitiveness. The findings further indicate that MSP has a substantial effect on ROEQ, reinforcing the role of market dynamics in shaping firm profitability.

In conclusion, foreign exchange rate factors play a crucial role in determining the financial performance of manufacturing firms in Nigeria. The study confirms that variations in exchange rates, interest rates, inflation, and market structure significantly influence return on equity. The strong explanatory power of the regression model highlights the importance of these macroeconomic factors in shaping firm profitability. These findings align with previous studies but also provide new insights into the complex relationship between foreign exchange dynamics and firm performance in Nigeria's manufacturing sector.

Based on these findings, it is recommended that policymakers implement strategies to stabilize exchange rates and control inflation to enhance firm profitability. The government should adopt policies that facilitate favourable interest rates to improve access to credit for manufacturing firms. Firms should develop

robust financial strategies to hedge against exchange rate risks and inflationary pressures. Additionally, market structures should be regulated to ensure fair competition and sustainable pricing strategies. By addressing these macroeconomic challenges, policymakers and industry stakeholders can foster a more resilient and competitive manufacturing sector in Nigeria.

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